A preliminary analysis of elementary school children's responses

Developmental differences in the conceptualization of obesity

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Results from this study suggest that children are ready very early in life to begin learning how to prevent obesity.

Obesity is generally recognized as a condition with negative medical and social consequences. Even though most researchers agree that obesity is almost always the direct result of maladaptive attitudes and behaviors which lead to overconsumption and/or underactivity, little is known about how these attitudes and behaviors develop. The statistics on recidivism among obese individuals who have succeeded in losing weight suggest that, once these attitudes and behaviors have been established, they are extremely resistant to change. For example, in a recent overview of the problems associated with obesity, it was estimated that between 75 and 95 percent of persons who lose weight will eventually regain it (1). Even behavior modification programs have the same low rates of long-term maintenance as more traditional treatment programs (2,3).

Since obesity, once it is established, is such a difficult problem to eliminate, more needs to be done to ensure its prevention. Prevention is at least in part dependent upon educating individuals early in life about the causes and consequences of excess body weight. First, however, we need to know how children of different ages conceptualize various factors related to overweight. It is well established that there are developmental differences in how children view the world and conceptualize identical information. Thus, it seems likely that there may be developmental differences in how children view causes and "cures" for obesity. To be effective, nutrition education programs must reflect these differences.

This study represents the first part of a continuing investigation of developmental differences in conceptualizations of causes of overweight. Specifically, how do children of different ages conceptualize the causes of obesity, what do they see as problems associated with obesity, and what do they see as appropriate remedial steps? Because of public health campaigns stressing negative medical aspects of obesity, it was expected that some of the answers would be health related. The mention of health issues was expected to be more common among the older subjects than the younger ones.

Children's attitudes about obesity and the obese are also of interest. In our culture, there is intense social pressure against obesity. This is often so pervasive that some researchers suggest that obesity constitutes a form of social deviance, since the obese (particularly children and teenagers) are stigmatized (4,5). There is evidence that negative stereotypes about the obese develop very early in life (6-9). Questions in the present study were designed to uncover the rationale for these negative attitudes. What reasons do children give for viewing obesity as a negative attribute? Do these reasons change as a function of age?

Method

SUBJECTS. All subjects were pupils at two elementary schools serving a predominantly white working and middle-class suburban community. One of the schools served as the kindergarten for the entire community. The other was one of three elementary schools serving grades 1 through 6. In this school, there were two classes of each grade. Pupils of the appropriate age had an equal chance of being assigned to either of the classes in the grade.

At the beginning of the study, letters were sent to parents of every pupil in the kindergarten and in one of the two classes for each grade asking for permission to interview their child about eating, activity, and body weight. Approximately half of the parents sent back letters of permission. Only children whose parents gave this approval were considered as possible subjects.

The final sample consisted of 40 girls and 36 boys in grades kindergarten through 6. They ranged in age from 5 years, 2 months, to 11 years, 8 months. At least five and not more than seven subjects were in each age and sex group.

TEST STIMULI. Pictures of thin and fat children were used to illustrate the concept of obesity. This was done for several reasons. First, it gave children the same reference point on which to base their answers. Second, extensive pilot testing of the interview revealed that many children younger than age 7 found the concept of obesity or fatness difficult to discuss in the abstract, even though they could appropriately label someone as being fat. Finally, a picture provides a concrete rather than an abstract example of an obese individual. As has been pointed out in a study of children's conceptual development, children are able to discriminate, generalize, hypothesize, and infer at a much earlier age for concrete examples of concepts than for symbolically expressed examples (10).

PROCEDURE. Pupils were interviewed individually in a taped structured interview for about 15 minutes. A series of open-ended questions was asked. Although interviews

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were structured, if a child spontaneously began to talk about an issue scheduled to come at a different stage of the interview, he or she was encouraged to continue. The interview format was similar to formats used in other developmental studies, such as investigations of the development of social justice in children (11). The questions were designed to provide complete and descriptive information on how the child conceptualized particular issues rather than to elicit simple "yes" or "no" answers.

The interview began the same way for each subject. After rapport was established via introductions and assurances that this was not a test, the child was shown the pictures of the thin and fat children. The girls were shown pictures of the two girls and boys were shown pictures of the two boys. The interviewer pointed first to the picture of the thin child and said: "This is David (Jane) and this is Billy (Nancy). They are (child's age) and are in the (child's grade) like you. I want to ask you some questions about them. (1) Can you tell me, is anything different about them?" After answering question 1, the subject was asked: (2) "How did Nancy (Billy) get that way? (3) Does Nancy (Billy) want to be that way? (4) Why (not)? (5) Can Nancy (Billy) do anything about it, or does she (he) have to be that way? (6) What can Nancy (Billy) do about it?"

SCORING. The answers that these questions elicited showed a developmental progression in terms of the complexity of the responses and the awareness of factors involved in body weight regulation and obesity. Each answer was scored for both content and complexity. A category system was developed to describe the developmental differences in the type of very issue-specific answers given to each question.

As a check on the investigator's classification, a random sample of interviews was scored independently by a researcher with expertise in developmental investigations. There was an 86 percent inter-observer agreement.

Analyses and results

OVERVIEW. Answers to each question are presented separately. A description of the type of answers and the category system used to describe those answers is presented for questions pertaining to causes of obesity, ways of preventing it, and its negative consequences.

Question 1: Is anything different about them?

After being shown the pictures, 100 percent of the subjects responded correctly that the appropriate child was fatter than the other one.

Question 2: How did Nancy (Billy) get that way?

As can be seen in Table 1, most answers were food related. Even the youngest children mentioned eating as a causal factor in overweight. Four general categories were distinguished on the basis of responses to the questions. These categories describe differences in the complexity of the answers and awareness of the actual causes of obesity.

Undifferentiated. The answers revealed that the child knew food was involved. Upon further questioning, it became apparent that the level of understanding was at an extremely superficial level. The child was repeating information that he/she had heard but had not understood (e.g., Subject: "He ate too much." Interviewer: "What about eating too much makes you fat?" Subject: "I don't know; it just does. You eat too much food and you get fat.") When this issue was explored further by asking the child what foods made Billy (the fat boy in the picture) fat, all foods were equally likely to be mentioned (e.g., "he ate too much ham, lettuce, and bread").

Concrete. A specific attribute of food was mentioned as the cause of obesity. The most commonly mentioned attribute was sweets or sugar (e.g., "candy makes you fat because it is sweet"). Fat was also mentioned as a cause of overweight (e.g., "he's fat because he ate too much food like the fat on the steak").

Complex. At least two factors were mentioned. For example, food and exercise were both mentioned, but when the child was questioned further (e.g., "that's a very interesting answer, but how does eating too much and not getting enough exercise make you fat?"), the same answer was usually repeated ("well, you know, you eat too much, and you don't move enough, and you get fat.") There was no evidence of any understanding of the inter-relationships of the factors involved in energy balance.

Interactive. Answers were scored as interactive if the subject referred to abstract notions of energy balance with some understanding of the relationships between different factors (e.g., "he ate too much and didn't burn it off by jogging or something like that so he got fat.")

Table 1 shows the relationship between age and complexity of answer as well as examples of typical answers in each category. As can be seen by the percentages of children in each age group answering in a particular way, there was an overall correspondence between age and complexity of answer. A chi-square analysis revealed a dependence between age and type of response ($X^2 = 47.6$, d.f. $= 18$, p is greater than 0.001).

Fewer than 8 percent of the subjects viewed activity as playing a major role in the development of overweight. Not one of the subjects younger than the age of 10 even mentioned activity as being involved in the development of obesity. Only 27 percent of the 11-year-old subjects talked spontaneously about the relationship of both eating and activity to body weight regulation.

Question 3: Does Billy (Nancy) care about being fat?

There was almost perfect agreement in the answers to this question. All but one of the subjects said that Billy (Nancy) cared and did not want to be fat. The remaining subject, an 11-year-old boy, suggested that Billy might really want to be fat; otherwise he would lose weight. Since there was such agreement in answers to question 3, question 4 was reworded to logically follow question 3.

Question 4: Why does someone not want to be fat?

Table 1. How did he/she get fat? Percentage of children at each age answering with a given degree of complexity

age	*undifferentiated*	*concrete*	*complex*	*interactive*
5	67% Eating a lot.	33% Ate a lot of candy with sugar. Ate a lot of junk food like candy and cake.		
6	50% Ate too much.	50% Ate a lot of food like lollipops. Ate too much candy.		
7	45% Ate too much food—ham, salad, cake.	55% Ate too much fat or sweets. Ate foods with sugar.		
8	33% Ate too much.	50% Ate a lot of junk food like candy. Ate a lot of sweets—they make the cells in the stomach get bigger and bigger.	17% Ate too much and didn't move.	
9		60% Ate too many sweets. Ate fat foods with no nutrition like Pop-tarts.	40% Eats too much, doesn't move.	
10		45% Ate a lot of candy. Ate too much food with cholesterol.	45% His parents could have been fat and he inherited it, or he eats too much junk. Overeats, doesn't exercise.	10% Ate food with too many calories, fats, and doesn't move around so he doesn't burn off any calories.
11		27% Eating too many snacks—junk food. Ate too much candy.	45% Ate too much junk food or his parents were fat. Overeats and doesn't move.	27% Didn't eat the right food, didn't exercise—no expended energy, didn't burn it off.

Four general categories emerged from the answers to this question. The prediction that many of the answers, particularly those of older children, would involve the negative health consequences of obesity was not supported. None of the subjects mentioned possible health risks. Most of the answers mentioned the negative social consequences of obesity. There were developmental differences in the content and complexity of the type of answers that were given. The category system was based on the degree of awareness of the negative social consequences of obesity.

Undifferentiated. No reason was attributed (e.g., Subject: "He just doesn't." Interviewer: "Can you tell me why he doesn't want to be fat?" Subject: "He just doesn't because it's not good to be fat").

Concrete. Answer was related to the physical property of being obese (e.g., "you bump into things when you're fat").

Social stigma. Response was related to the role of the obese child as a social deviant (e.g., "people make fun of you when you are fat").

Empathic. Subject referred to the feelings of the overweight person in addition to the negative social consequences of being obese (e.g., "she feels bad because people make fun of fat kids").

Table 2 shows the relationship between age and awareness of negative social consequences as well as examples of typical answers in each category. There was an overall correspondence between age and increasing awareness. A chi-square analysis revealed a dependence between age and type of response ($X^2 = 45.25$, d.f. $= 18$, p is greater than 0.001). The most common response involved an awareness of the social stigma associated with obesity, which appeared at a young age. For example, by age 7, 28 percent of children responding to this question showed an awareness of the negative social consequences of obesity. By the age of 8 years, 50 percent of children responded this way. Older children were often more articulate but expressed the same general theme.

Less than 10 percent of subjects gave answers which could be categorized as empathic. Age and sex differences were apparent with respect to empathic answers. None of the boys or any of the girls younger than age 10 gave answers which could be categorized as empathic. Forty-six percent of the girls aged 10 and 11 years gave answers of this type (e.g., "no one wants to be friends with fat children so she feels bad").

Question 5: Could Nancy (Billy) lose weight?

One hundred percent of the subjects answered yes to this question. The responses of a few 10- and 11-year-old girls showed an awareness of the difficulty obese people often experience in trying to lose weight, but even these children maintained that people can lose weight if they really want to.

Question 6: How could Billy (Nancy) lose weight?

Again, four general categories emerged from answers to this question.

Undifferentiated. No reason was attributed, or some instant magical process could occur (e.g., "stop eating and you just lose weight").

Concrete. One aspect of weight loss was mentioned (e.g., "stop eating junk food").

Table 2. Why doesn't he/she want to be fat? Percentage of children at each age answering with a given degree of complexity

age	*undifferentiated*	*concrete*	*social stigma*	*empathic*
5	67% It's not good to be fat. She just doesn't want to be.	22% People bump into her.	11% Everyone laughs at her.	
6	40% She should be skinny. I don't know; he just doesn't.	30% He can't run fast. It would cost a lot of money, because he would wear out his clothes.	30% Fat people are left out. People call him names.	
7	8% It hurts to be fat.	67% He can't run as fast. He looks funny. She falls when she ice skates.	25% People call him names. They call her fatso.	
8	17% It gives you a stomachache to be fat.	33% When he runs, his fat goes up and down and he falls. He looks different.	50% People make fun of you.	
9		22% You're not as pretty.	67% People make fun of her.	11% People make fun of her and she feels bad. If they were fat, they wouldn't like it.
10		22% He can't run as fast.	45% People make fun of you.	27% She feels bad because people pick on her. No one wants to know fat kids.
11		9% It's hard to get clothes to fit.	64% People call her names. Boys don't like fat girls.	27% She feels bad cause kids make fun of her and so she eats more.

Complex. Several possible methods of losing weight were mentioned independently, but, as with question 2, further questioning revealed that the subject was not conceptualizing energy balance abstractly. Attempts to get the subject to elaborate on his/her original response produced restatements with no evidence of either further knowledge or deeper understanding.

Interactive. Answers approached scientific explanations of input/output relationship, particularly in references to abstract processes (e.g., "he needs to burn off calories by eating less and running around more"). These categories were based on the complexity of the answer and how closely the answer resembled the scientific explanation.

Table 3 shows the relationship between age and complexity of answer as well as typical answers in each category. There was an overall correspondence between age and type of response as measured by content and complexity. A chi-square analysis revealed a dependence between age and type of response ($X^2 = 60.34$, d.f. $= 18$, p is greater than 0.001).

Responses to this question suggest that children

Table 3. How could he/she lose weight? Percentage of children at each age answering with a given degree of complexity

age	*undifferentiated*	*concrete*	*complex*	*interactive*
5	55% Stop eating and fat will go away. Stop eating and fat will melt.	45% Stop eating junk food, like candy. Eat stuff like salad, not candy or cake.		
6	60% By exercise he'll get skinny; it just happens. Don't eat any more lollipops or ham.	40% Do exercises every day—shake the fat out of your body. Eat less fat stuff like fat on steak.		
7	27% Stop eating so much salt.	73% Don't eat so much—eat only one snack a day. Go on a diet and take steambaths; fat will come out of you.		
8	18% Eat the right foods; you breathe the air out and get skinny.	82% Go on a diet; eat less. Stop eating candy. Exercise; run a lot.		
9		100% Go on a diet; don't eat so much. Jog; fat goes up and down. Stop eating candy.		
10		40% Stop eating so much fattening stuff; go on a diet. Stop eating so much—it takes a long time though.	40% Jog and eat the right foods; should do both.	20% Burn calories off by exercise and diet—jog and don't eat so much.
11		28% Don't eat as much. Eat good stuff; you go to the bathroom more. Bad stuff like candy builds up inside you; hard to get rid of.	36% Eat vegetables and fruit, less calories, also exercise. As you exercise you sweat, calories in the sweat come out.	36% Eat less, go out and run around; muscles get stronger; fat is burned off.

conceptualize the processes of getting fat and losing weight somewhat differently. When asked how someone got fat, only a few subjects saw not getting enough exercise as a factor. The vast majority of answers were food related. When asked how someone could lose weight, many subjects (particularly boys) mentioned increased activity. Forty-two percent of boys compared to 11 percent of girls mentioned activity as a factor in weight loss. Girls stressed diet; even when they mentioned activity, they gave it far less emphasis.

Discussion

The preliminary results suggest that there are important developmental differences in the way children conceptualize the causes and effects of overweight. There appears to be developmental progression toward a more complex understanding of the causes and effects of obesity. However, while responses increase in complexity as a function of age, certain fundamental concepts about overweight are present at a very young age and remain constant throughout childhood. For example, almost all of the answers to the question of how Billy (Nancy) got fat were food related. Even the youngest children consistently mentioned eating as a causal factor in overweight. Studies of developmental differences in the conceptions of other bodily states, such as illness, suggest that very young children often use phenomenal or magical reasoning to explain events. Bibace and Walsh (12) found that, when young children were asked how someone got sick, their reasoning could only be explained in terms of the co-occurrence of two events or magic (e.g., "the wind makes you sick," or "falling down makes you sick"). Magical thinking was not found in any of the children in this study, although it might be found in children younger than age 5. It seems more likely, however, that an awareness of the relationship between eating and body weight is so pervasive in our culture that even very young children cannot help but make the association. Thus, even when children do not understand how food relates to obesity, they are aware that it is somehow involved. Future studies involving samples of prekindergarden age children as well as children from different socioeconomic and cultural backgrounds should provide more information about the origin of the connection.

At all ages, but particularly between the ages of 6 to 10 years, foods that are sweet tasting or contain sugar were frequently mentioned as causes of obesity. This answer probably stemmed more from what the child had been told about sweets than from any meaningful understanding of caloric density. For example, when asked in a follow-up question: "Since chewing gum (which is relatively low in kilocalories) is sweet, could it make you fat?" Subjects typically replied that regular gum makes you fat but sugarless gum does not. These children frequently asserted that, in addition to making you fat, sugar was "bad" for you. When asked how they knew that, more than half replied that the dentist had told them. There was no difference in this response as a function of age. This suggests that the dentist is an important source of health-related information and could play an important role in programs for nutrition education of children.

Differences between boys' and girls' perception of the role of activity in weight loss are noteworthy. Even though subnormal activity levels have been implicated in the etiology of obesity in children and teenagers, results have been more clear cut in studies comparing overweight and normal weight girls than in studies comparing overweight and normal weight boys (13). Overweight girls are less active than those of normal weight (14,15). Perhaps subnormal activity levels are more important in the etiology of obesity among girls than among boys. The relationships among attitudes about activity, actual activity levels, and body weight regulation in boys and girls need to be investigated further.

Results from the present study also support findings on children's negative stereotypes of the obese. Evidently, these negative attitudes develop very early, as they are found in children as young as 5 years old.

The existence of negative attitudes about obesity in very young children supports findings from earlier studies. For example, when young children were asked to rank order pictures of children with obvious physical differences, pictures of obese children were consistently ranked as less preferred than pictures of a child on crutches or a child with one hand (7). One reason for this may be that, in contrast to other problems, obesity is seen as self-determined and the "fault" of the obese person. This hypothesis received some support from the present study. Answers to the question of whether the obese child could lose weight suggest that even the youngest children saw the obese state as being under the individual's control. The most common response was that Billy (Nancy) is fat because of overeating and could lose weight if he/she wanted to.

One last comment concerns the answers about consequences of obesity. Somewhat surprisingly, none of the explanations of why it was bad to be overweight had to do with the possible health risks of obesity. Because of public health campaigns, it had been expected that some of the responses to this question would at least mention potential health risks. On the basis of this study, it appears that health is a rather remote concern of elementary school children. However, the lack of this type of answer may have been related to being shown a picture of an overweight child. A picture of an overweight adult might have elicited different responses.

Conclusion

Results from this study indicate that there are both age and sex differences in the way children conceptualize factors related to obesity. In general, older children exhibit a more complete understanding of issues related to being overweight and are more likely to conceptualize obesity as a multi-causal factor in weight gain or weight loss. Girls were more likely than boys to empathize with the plight of the overweight child.

In spite of these differences, certain similarities emerged. Being overweight is seen as something negative, a state to be avoided. This is characteristic of even the youngest children. The rationale behind this attitude

changes as a function of age, but the apparent motivation to avoid obesity is there in children as young as 5 years old. Some basic knowledge about the causes of obesity develops very early. By the age of 6, half of the children refer to a particular class of food as more likely than other foods to cause weight gain.

Results from the present study suggest that children are ready very early in life to begin learning how to prevent obesity. They recognize obesity and uniformly feel it is something to be avoided. By the first or second grade, a majority of children appear able to distinguish certain food classes and to learn some basic facts about food. At the same time, the role of activity and its importance in body weight regulation need to be stressed.

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