

Childhood obesity: a societal problem to solve

M. B. Schwartz and R. Puhl

Department of Psychology, Yale University, New Haven, CT, USA

Received 7 August 2002; revised 24 October 2002; accepted 6 November 2002

Address reprint requests to: MB Schwartz, Department of Psychology, Yale University, 2 Hillhouse Avenue, Box 208205, New Haven, CT 06520-8205, USA. E-mail: marlene.schwartz@yale.edu

Summary

In contrast to other threats to American children's health, the treatment and prevention of childhood obesity are considered the responsibility of individual children and their parents. This pressure exists in the context of the societal stigmatization of overweight children and the powerful environmental inducements aimed directly at children to eat nutritionally poor foods. Parents of overweight children are left in the difficult position of fearing the social and health consequences of their child's obesity, and fighting a losing battle against the omnipotent presence of the media and constant exposure to unhealthy foods. This paper brings together several literatures to provide a comprehensive examination of the major challenges facing obese children and their families. In particular, this paper documents the extent of stigmatization towards overweight children and reviews evidence of the conflicting advice given to parents about how to help children develop healthful eating in the face of biological and learned food preferences. We conclude with a call for a shift in thinking about the role of our society in the aetiology, treatment and prevention of childhood obesity.

Keywords: Child, environment, obesity, stigma.

obesity reviews (2003) **4**, 57–71

Introduction

Childhood obesity has been identified as a major threat to children's health in the USA (1). The prevalence of obesity in children between the ages of 6 and 17 years [body mass index (BMI) > 95th percentile of reference population] is currently estimated at approximately 11%, with an additional 14% overweight with a BMI between the 85th and 95th percentiles (2). These prevalence rates are a dramatic increase from 1963–70 prevalence rates, during which only 4–4.5% of 6–17-year-olds were overweight (2). Despite the alarm over these numbers, treatment and prevention are considered the primary responsibility of the individual children and their parents. Public health and economic strategies for the prevention and treatment of childhood obesity are often not taken seriously. For example, when Brownell suggested a tax on high-fat foods to subsidize healthful foods, he was given the 1998 'Nanny of the Year' award for this idea (3) and was subsequently accused of being a 'food fascist' (4).

There is a striking contrast between childhood obesity and other child safety issues. Most threats to children are considered societal problems to solve. The leading cause of death for children between 1 and 15 years of age is unintentional injury (5). In response to this, there is public education and legal measures that aim to prevent these injuries. For example, parents are warned about the risks of injury or death from toys, such as choking on small items or falling off scooters. Certainly, parents are expected to keep unsafe toys out of the hands of small children and teach older children how to use toys in a safe manner. To facilitate this, however, unsafe toys that can break into small pieces or pose choking hazards are recalled, and safety measures (e.g. bicycle helmets) are required by law. Similarly, child car seats are legally required and warnings about the danger of air bags to small children are posted inside automobiles. These legal and informational mechanisms create an environment where parents, the legal system and product manufacturers are all working towards the same goal of protecting children.

An underlying problem in developing a similar comprehensive strategy to address the rise in childhood obesity is that the attitude towards the treatment of obesity has historically focused exclusively on the behaviours of the obese individual (6). Obesity treatments for adults consist of behavioural or medical interventions designed to change one person at a time. Obese children are treated the same way, with specific psychological, behavioural and medical treatments aimed at individual children and their families (7). A recent decision of several school systems to mail home letters to parents of overweight children to alert them to their child's poor health status exemplifies the attitude that parents and children are responsible to solve the problem of childhood obesity (8).

We argue that our society needs to respond to the health crisis of childhood obesity and approach it with the attention given to other environmental risks which affect the well-being of children. The aim of this paper is to bring together several literatures to provide a comprehensive examination of the complex and multiple challenges facing obese children and their families. We live in a culture preoccupied with food and eating, and at the same time, there is a powerful societal stigma against obese individuals, including obese children (9). Put simply, our current culture consistently and powerfully sends two opposing messages: 'it's good to eat' and 'it's bad to be fat.' This paper will examine how these contradictory messages are sent by the media and popular culture, and the impact of these messages on parents and their children. We also examine the research on how children develop food preferences and the challenge of parenting in a toxic food environment. We then examine the role of parents in filtering these messages and conclude with avenues for further research. With these literatures assembled, it becomes clear that the current problems which contribute to childhood obesity call for solutions at a societal level.

Societal messages about food

We live in a society preoccupied with food. Thousands of new food products are introduced in the USA each year and our desire for new food products has become stronger over time. In 1985, 5500 new food products were introduced. Nearly 10 years later, in 1995, about 17 000 new products were introduced (10).

Messages about how to feed children

Society provides some consistent messages about how to feed children. The clearest messages involve the period before the child is born. Specifically, mothers should not eat anything that may be harmful to the growing baby and be sure to consume the required nutrients for optimal foetal health. There are popular books with extensive guidelines

about how pregnant women should eat (11). Societal messages about feeding infants and toddlers are also clear, and emphasize nutrition and health. There has been a significant move towards breastfeeding and the rate of sales of 'organic' baby foods increased by nearly 2200% from 1989 to 1995 (12). When children are very young, the societal message is to feed them carefully and only with the best ingredients.

Food advertisements aimed at children

Once the child is over 2 years old, societal messages about food change dramatically. Rather than addressing the importance of proper nutrition for health, children become targets of advertising for a multitude of unhealthful foods. Children are exposed to an estimated 10 000 advertisements for food per year, 95% of which are for fast foods, candy, sugared cereal and soft drinks (13). By pre-school, the child begins to have preferences for certain products and, according to McNeal, is a 'consumer by influence' (14). Advertisers place cereal boxes at child eye level because they know that toddlers can recognize brands of cereal and request them from their seat in the grocery cart. Society sanctions using sweets to reinforce for desired behaviour. In fact, this is explicitly recommended by psychologists for behavioural change, such as with toilet training (15).

Food is a heavily promoted commercial product, and children are the targets. In 1997, the food industry was the second largest advertiser in the USA, with television as the most popular medium (16). Gallo notes that 'much television advertising is also aimed toward people who do not read newspapers, such as children' (p. 175). Importantly, these advertisement dollars are spent disproportionately on highly processed and packaged foods. In 1997, nearly seven times as much money was spent advertising confectionery and snacks (i.e. candy, gum, mints, cookies, crackers, nuts, chips and other salty snacks) than was spent advertising fruits, vegetables, grains and beans (16). In the same year, the food industry spent \$7 billion on advertising; this is 21 times the \$333 million spent by the US Department of Agriculture on nutrition education the same year (16).

As children enter the elementary and middle school years, societal messages about the role of non-nutritive food become increasingly prevalent and confusing. Candy and sweets are strongly associated with holidays and parties. Soft drink machines and snack foods are available every day in schools. Millions of American children watch Channel One in school, a television network which broadcasts daily educational programming in classrooms. Over two-thirds of the advertisements on this programme are for food products including gum, soft drinks, fast food, candy and snack chips (13). While children are taught about nutrition in class, these few days of nutrition lessons can't possibly compete with daily exposure to advertising and vending machines outside the classroom.

Food advertisements aimed at parents

In order to address the rise in childhood obesity, we must examine messages aimed at parents and caretakers about giving children sweets. Advertisements send the message that giving a child sweets makes 'childhood that much sweeter' or shows the child 'how much you love her'. Special food treats have become daily occurrences for many children, as they are a convenient and inexpensive way for parents to please their children. This message must be challenged – parents can show children their love and attention in other ways. Advertising that promotes the use of sweets as a sign of love is contributing to the childhood obesity epidemic.

Mixed messages about obesity and eating disorders

One confusing set of messages concerns the rising prevalence of obesity and eating disorders and the role of dieting. Popular press articles in magazines such as *Newsweek* explain that there is a rise in childhood obesity and it is important to promote healthful eating and activity in children (17). A page later, parents are warned that if they are insensitive in how they talk to their child about losing weight, they risk compounding the obesity with 'depression, anxiety, or a life-threatening eating disorder' (18). Even medical journals have fallen into the trap of seeing these two issues as related. In an editorial in *The New England Journal of Medicine* entitled 'Losing weight – an ill-fated new year's resolution', the authors argue that losing weight is difficult, sustaining weight loss almost impossible and that 'the cure for obesity may be worse than the condition', where 'countless numbers of our daughters and increasingly many of our sons are suffering immeasurable torment in fruitless weight-loss schemes and scams, and some are losing their lives' (19).

The numbers speak for themselves. The prevalence of childhood obesity is 11% among children between 6 and 17 years of age (2). The prevalence of bulimia nervosa among young females is 1% and anorexia nervosa is 0.28% (20). As 90% of patients with eating disorders are female, the rates among young men can be assumed to be 1/10 of these (i.e. 0.1% for bulimia nervosa and 0.028% for anorexia nervosa). Research suggests that one of the risk factors of developing an eating disorder is being overweight as a child, so it is true that some of those who are today's overweight children may be tomorrow's patients with eating disorders (21). However, this is a very small percentage of the obese child population. In comparison, 60% of overweight children have developed at least one cardiovascular risk factor (i.e. high blood pressure, lipid levels or impaired glucose tolerance) and 20% of overweight children have two or more of these (22). Fear of inadvertently inducing more eating disorders should not keep people from addressing childhood obesity.

A challenge for parents: feeding children healthful foods

While the media and popular culture clearly promote poor foods, parents are held responsible for feeding their children properly. Yet, parents are vulnerable to the same societal pressures as everyone else to eat in an unhealthful manner. Parents are encouraged to show their children how much they love them by feeding them sweets, but at the same time are warned not to let their children get fat. The following section outlines several challenges parents face in promoting good nutrition in the current environment (Table 1).

Children's initial food preferences are biologically driven

Clearly, parents want to promote healthful eating habits for their children. Part of the challenge is that children's initial food preferences are biologically driven. After the first 6 months of life, the transition from suckling to eating appropriate foods begins. This is an important time in children's development of eating patterns because food preferences strongly influence food intake and thus help form the foundation of their overall diet (23).

Table 1 Summary of childhood eating behaviour research

What do we know about how children eat?

Biological factors

- Children have a preference for sweets and salt
- Children fear new and unfamiliar foods
- Children are predisposed to learn to prefer energy-dense foods
- Children can effectively self-regulate when provided with healthful food choices

Parenting factors

- Children need approximately 10 exposures to new foods to accept them
- Children can learn to prefer new foods as they become increasingly familiar
- Children are more likely to eat foods that teachers, parents and peers are eating
- Children will overeat when they are rewarded for eating
- Children desire palatable foods that they can see but are forbidden to have

What do we need to learn?

- Are some children biologically vulnerable to difficulty self-regulating food intake?
- Which comes first – parental restriction or childhood disinhibition?
- Can children self-regulate intake when surrounded by palatable high-calorie foods?
- How does advertising affect children's food preferences and intake?
- How can parents encourage healthful eating without being perceived as withholding?

Children are born preferring sweets and salt

There is a major collision between biology and the environment in the consumption of sweets and salt among children. It is known that high levels of sugar and sodium intake are linked to the development of hypertension and diabetes (24). Consequently, most dietary guidelines recommend limiting salt and sugar intake (25,26). Despite this, research indicates that children consume significantly more added sugar than recommended (27).

Why is this? Children are born with a genetic predisposition to prefer sweet tastes and quickly develop a preference for salty tastes as well as an innate dislike for bitter and sour tastes (28,29). These preferences are thought to have served an evolutionary purpose, as sweetness positively predicts the energy value of foods, and bitter tastes are linked to toxic substances (30). Today, the prevalence of foods high in sugar and sodium makes this innate preference not only unnecessary but dangerous. Parents face the difficult task of asking their children to fight their biological preferences and limit sweets and salty foods. They can help with this by providing exposure to foods prepared without excess salt and sugar. However, when these foods are readily available and heavily promoted outside of the home, parents face an uphill battle.

Encouragingly, there is evidence that if children are continually exposed to healthful foods, they will learn to prefer these foods. Sullivan & Birch examined children's acquisition of food preferences and demonstrated that repeated exposure to a novel food led to increased acceptance; in addition, that increased preference occurred regardless of whether the new food was sweetened, salty or plain (31). Interestingly, repeated exposures to either the plain or flavoured food decreased preferences for the other food. Thus, children who repeatedly taste the plain food develop a decreased preference for the salty/sweet foods and vice versa. This has important implications for those who make children's meals. Parents, restaurants and schools may feel that it makes sense to add salt or sweeten foods to increase children's initial acceptance, but this strategy may actually result in decreased long-term acceptance of the food prepared plain without added flavours (31).

Children are reluctant to try new foods

People are encouraged to eat a variety of foods in order to achieve a balanced diet. Yet, children do not immediately or willingly accept new foods, with the exception of sweets (32). This developmental fear of new and unfamiliar foods, called neophobia, is thought to have evolutionary roots to protect the child from eating potentially toxic or inappropriate substances (33). Initially, all foods to the growing infant are unfamiliar, and neophobic reactions can substantially shape subsequent food preferences (33). This poses a challenge for parents who may label their child finicky and give up promoting a variety of non-sweet foods.

Research suggests that children's food preferences are also influenced by associative learning where children learn to accept or reject new foods on the basis of taste and anticipated consequences of eating the food (34). There is evidence that repeated exposure and tasting of new foods can reduce neophobia and increase acceptance of unfamiliar food items. Work by Birch and colleagues have demonstrated that approximately 10 exposures of tasting food are adequate to establish and increase acceptance in infants (31,35,36). Recent work has demonstrated that much of the increased acceptance to new foods may occur early in the sequence of exposures and that infants' consumption of a novel food also generalizes to increased acceptance of similar foods within the same general food category (33).

How parents respond to their child's neophobic behaviours and subsequently present new foods is consequential to early food acceptance. Few parents recognize that rejection of new foods is a normal and adaptive process for developing children and that successful food acceptance may take time (32). One self-report study indicates that parents feel they have little control over whether their children will eat and enjoy certain foods. They also report focusing more on providing food that is enjoyable to their families rather than making food choices based primarily on health and nutrition (37). Parents may assume that their child dislikes particular foods after a couple of attempts at feeding; as a result they stop presenting those foods and instead offer only preferred items (32). Given innate preferences, it is likely that preferred foods are those higher in sugar and salt. On the other hand, if healthful foods are repeatedly fed to children, they can also learn to prefer those foods.

The role of modelling

Several studies have tested various teacher behaviours to increase pre-school children's acceptance of novel foods. In one study, the effectiveness of five different teacher actions were compared (i) rewarding children with a dessert for trying new foods; (ii) modelling; (iii) insisting that children at least taste the food once; (iv) offering the child the choice to try new foods; and (v) exposing children to the novel foods as a control condition (38). Overall, offering dessert as a reward and offering children the choice to taste the novel foods were most and equally effective in encouraging children to sample the novel foods and in eating more bites of the novel foods. Simply exposing the children to novel foods was less effective than the other strategies and teacher modelling was the least effective. Offering children choices in trying new foods may be the most adaptive strategy as it may encourage self-regulation and help children eat certain foods because they choose to (38). Although additional work has demonstrated that children's preferences for foods increase when those foods are used as rewards (39), the outcome of increasing food acceptance

may not outweigh long-term preferences for unhealthy food rewards which can become established using this approach. Other researchers have cautioned practices that promote the use of food in contexts of punishment and reward as children may ultimately come to dislike foods used in these ways (34).

In several related quasi-experimental studies, silent teacher modelling was found to be ineffective in encouraging food acceptance among pre-schoolers, but 'enthusiastic' verbal teacher modelling was found to increase food acceptance (40). However, when a competing peer model was introduced into the eating environment, the effectiveness of teacher modelling disappeared, suggesting children are more influenced by peers. The authors suggest that enthusiastic teacher modelling can effectively increase children's food acceptance but that competing peer models may hinder this process, particularly among girls.

Parental behaviours may also foster increased acceptance of nutritious foods and appropriate self-regulation in children. One study demonstrates that young children are more willing to taste novel foods if their mother models tasting the food first compared to a condition in which children are offered food with no adult model (41). Some work has demonstrated that parental modelling of fruit, juice and vegetable consumption was positively related to consumption of these foods among elementary school children (42). One study of self-reports of elementary school students indicates that lack of parental modelling of eating fruits and vegetables is a primary reason children cited for not eating those same foods (43).

Children are predisposed to prefer energy-dense foods

In addition to resistance to new foods and innate preferences for sweet and salty tastes, children are predisposed to learn to prefer energy-dense foods, which tend to be high in fat (23). Several reasons for this preference are possible. There are pleasant physiological and satiety effects from these foods – they often have rich flavours – and children may learn to associate these foods with special occasions (32,44). Several studies have reported learned preferences for energy-dense foods, as certain flavours are conditionally associated with satiation signals (45,46). Although children are innately predisposed to learn to prefer these foods, this preference may be compounded by repeated exposures and association of these foods with positive social situations.

One social situation that may reinforce calorie-dense foods is eating out at restaurants. A recent study of the food items on children's menus at the top 10 most profitable American restaurants found that nearly every restaurant offers high-fat items such as fried chicken nuggets, hamburgers and french fries (MB Schwartz, J Hrabosky & KD Brownell, unpublished data). Interestingly, most of the restaurants offered healthful alternatives on the regular

menu, but these items were considered only for adults. It is striking that the least nutritious items on the menu are suggested as the most appropriate for children.

Can children self-regulate their food intake?

Given the powerful biological and environmental influences to eat high-fat and sweet foods, many parents who want their children to eat a healthful diet feel pressured to restrict their child's intake of these foods. Unfortunately, parents are often alone as the voice of moderation against the backdrop of advertisements and daily exposure to unhealthy foods in our environment. Can children be trusted to self-regulate their intake, or should parents intervene and try to influence their child's eating?

There are several studies suggesting that children can self-regulate their food intake under some circumstances. Studies conducted in the 1930s are the first to demonstrate that infants can regulate food intake when nutritious foods are offered in the absence of parental control (47,48). These studies included infants from 4 months old to 4-year-old toddlers, where a variety of fresh, unsweetened, unprocessed foods (such as oatmeal, chicken, ocean fish, cereals, eggs, fruits and vegetables) and milk were offered to children to select on their own at each meal. Since then, additional work has indicated that infants as young as 6 weeks old can adjust their intake of formula in the absence of maternal control when the energy density of the formula is varied (49). The finding that breast-fed infants have better self-regulation abilities than formula-fed infants supports the idea that children do better when they control their own intake. In theory, those who are breast-fed have more control over energy intake and gain more experience with self-regulation than formula-fed infants whose intake is controlled by whoever is holding the bottle (32,50).

Research by Birch and colleagues measured food intake of pre-school children over 24-h periods on six different days and found that children's food intake fluctuated considerably from meal to meal but that total daily calorie intake was consistent because of appropriate caloric compensation throughout the day (51). The menus available included a variety of nutritious foods, with a limited amount of high-calorie foods (i.e. a cookie or serving of chips at snack, one brownie or pudding for dessert). The authors conclude that children are able to effectively self-regulate intake over time.

On the other hand, several of Birch's studies use a free-access procedure where children are given the opportunity to eat additional food following a meal where they have reported they are full. They are left alone in a room for 10 min with toys, books and large quantities of palatable snacks (i.e. fig bars, popcorn, pretzels, candy chews, potato chips, chocolate bars and ice cream). Across studies, the average intake of calories during the free-access time is 6–

12% of the recommended dietary allowance for the age group (52–54). In other words, children will eat even when they are not hungry if they are given free access to palatable foods.

The evidence from these studies suggests that children can effectively self-regulate when surrounded by a variety of ‘nutritious’ foods. However, it is not known how effectively children can self-regulate intake over time when surrounded by fast-food and snacks high in fat and sugar. This question is important to parents who need to know whether they are making things better or worse by keeping ‘junk’ food out of the house. It is also important to decision-makers of school systems whether or not to allow soft drink and snack vending machines in schools.

What happens when parents reward eating?

Children’s ability to self-regulate can be influenced by certain parental factors. One of these is rewarding children for eating, even when they are not hungry. In a study where parents either fed children in response to hunger and satiety cues or rewarded children for eating all food on their plates, children’s ability to regulate energy intake disappeared and food intake increased in the context where they were rewarded for eating (35). Along the same lines, sometimes parents use food as a reward, such as dessert after eating vegetables at dinner or ice cream for an accomplishment. A recent retrospective study of adults has found that individuals who recall their parents using food as a reward were more likely to struggle with dieting and binge eating in adulthood than people who do not remember food being used in this way (55).

What happens when parents restrict access to unhealthful foods?

There have been a number of studies that address the relationship between reported parental attempts to control children’s food intake and the amount of food children actually eat. Fisher & Birch found that maternal attempts to control their daughters’ food intake correspond with increased intake when these girls were given free access to restricted foods (52,53). The findings are compelling; in each study, there are strong correlations between mother’s and daughter’s weights, between the mothers’ own dietary restraint and attempts to restrict their daughters’ access to high-fat, high-sugar foods, and between maternal restriction and daughters’ increased intake of restricted foods when given free access. The authors interpret these findings as evidence for the following sequence: some mothers struggle with their own weight, attempt to restrict their own intake and experience dietary restraint. These women worry their daughters will also have these problems and therefore try to restrict their daughters’ intake. This leads the daughters to desire these foods even more, and when given a chance, to eat these foods in excess of other girls

whose mothers do not behave in this manner. Fisher & Birch acknowledge that their data are cross-sectional and cannot address causality between child and parental behaviour (52,53). The question of causality is critical, however, as it has important implications for recommended parental behaviour.

The role of seeing what you cannot have

In an experimental setting, Fisher & Birch demonstrated that restricting access to visible palatable foods increased children’s desire and intake of those foods (56). In this study, pre-school children participated in two types of snack sessions: unrestricted sessions when they were offered both control and target snacks, and restricted sessions when they were offered only the control snack and the target snack was instead placed in a closed glass jar in the middle of the table. During the experiment, children reported increased desire and intake of the restricted food item, and children with restrictive mothers showed the strongest response. After 3 weeks, however, children showed no change from before the experiment on their intake or selection of the restricted food.

Another experiment examined the impact of parental monitoring by offering children a variety of palatable foods under three conditions, they were: monitored by their parents, told that they were alone or told that their parents were watching. The children who thought they were alone chose more unhealthful foods and had a higher total calorie intake compared to those who knew they were being monitored (57). The authors conclude that because parents tend to restrict foods high in sugar and fat, they may paradoxically promote children’s selection of these higher-calorie foods when they are available (56,57).

Another view of this finding is that children are essentially participating in a version of the former experiment every time they go to the store with a parent. There are candy counters at all types of stores (even stores that do not primarily sell food). Children stand in line with their parent, staring at dozens of types of candy that are unavailable to them. When they ask for some candy, the parent must then decide whether or not to buy it. The consequence of saying yes will lead to additional empty calories, but saying no may create a stronger desire and later dietary disinhibition. The current environment forces many parents into a no-win situation.

Other research has assessed eating behaviours of 5-year-old girls and their parents and essentially found that children do the opposite of what they think their parents want (58). In one study, daughters’ dietary restraint was related to perceptions of parental pressure to eat more, and daughters’ disinhibited eating was related to perceptions of parental restriction of access to those foods. In addition, one-third of girls reported restrained eating at age five, and three-quarters reported disinhibited eating when presented

with desired foods. Again, these findings raise the question of causality between parental efforts and child dietary behaviours.

Which came first – parental restriction or child disinhibition?

Currently, there are no studies that fully answer this question of causality, but it is an important question to address because it has implications for recommendations to parents. There may be a genetic component to disinhibited eating and mothers who struggle with dietary disinhibition may have genetically passed on this vulnerability to their children (59). Still another hypothesis is that parental restriction and child over-eating get caught in a diet-binge cycle (i.e. as parents try to restrict their child's access to food, the child becomes more preoccupied with eating, which leads to the child over-eating and the parents more determined to do a better job restricting their child's intake).

Johnson & Birch conducted a study where pre-schoolers were given either high- or low-calorie drinks followed by healthful lunch meals and children were assessed to determine whether they adjusted their intake in response to the pre-load (60). Children who were poorer at self-regulating calorie intake and who ate more food despite having high calorie pre-loads were more likely to have mothers who reported high control in child-feeding practices as well as disinhibited eating styles. Children who were heavier showed less ability to self-regulate. Gender differences emerged where boys demonstrated more appropriate compensation of intake than girls and the mothers' own dietary restraint was associated with increased eating for boys but decreased eating with girls. This suggests that restrained mothers may be attempting to restrict their daughters' intake but not their sons' (60). An alternative interpretation is that daughters are more sensitive to their mothers' messages about food intake than are sons.

The relationship between maternal control of food and child eating and weight appears complex. Robinson *et al.* used self-report measures (developed by Birch and colleagues) to assess over 700 third-grade children and their parents and found that parental control of children's food intake was inversely related to overweight status in girls (61). However, consistent with past research, no relationship was found between parental control of children's food intake and overweight status in boys. This sample of 8- and 9-year olds was older than the studies of pre-school children conducted by Birch and colleagues, perhaps suggesting that the impact of maternal feeding practices on girls may change over time. As the authors suggest, the influence of parental control over food may be lessened or replaced by peer and media influences as girls mature.

A second study of elementary school age children (7–12 years) and their parents found that mothers who had

one overweight and one lean child did not differ in their feeding practices for each child, as assessed using the same self-report measures as the above study (62). These mothers did perceive, however, that their obese child had greater intake and more difficulty self-regulating than their slimmer child (62). The small sample of this study necessitates further research to replicate these findings. To help clarify the contradiction between these findings and those of Birch and colleagues, longitudinal data are needed to measure the influence of parental control and additional familial variables on children's weight over time.

With respect to children's self-regulation abilities, research suggests that parents need to offer nutritious foods from which children can serve themselves without parental coercion or interference (47,51). Interestingly, one study about children's eating habits found that parents are actually doing a good job – meals that children eat at home are more nutritious than those they eat at school, other people's houses or restaurants (54). This suggests that not only parents but also restaurants, school cafeterias and others who feed children need to provide an array of predominantly nutritious foods from which children can choose.

Do parents and children need more nutrition education?

There is some evidence that parents believe they feed their children healthful foods but, in practice, provide foods that they think their child will like. In one study, mothers thought they fed their children according to nutritional guidelines but actually fed them more sweets and less nutritious bread and dairy products than they fed themselves (63). A study of kindergarteners found that children know that excess salt, sugar and fat are unhealthful, yet they still prefer to eat these foods (64). This raises the point that simply educating parents and children about the importance of good nutrition is not likely to lead to improved eating behaviour. Knowledge about nutrition may be less important than what foods are readily available in the environment.

It may be more useful to teach parents how to implement the nutritional knowledge that they already have. Parents need assistance in creating an environment where primarily healthful foods are available. If the environment naturally provided exposure to foods that are consistent with the food guide pyramid, children would adhere to its principles more easily. Until then, parents need ideas on how to protect their children from the current food environment. Modelling healthful eating for the whole family is an important start. It is also important not to single out the overweight child when making dietary suggestions. Parents may decide to keep unhealthful foods out of the house, just as many parents today decide that smoking is not permitted at home. It seems impossible to suggest that parents of an obese child should not try to help their child restrict his or

her food intake. As the research suggests, however, there may be risks in doing this. Another issue is that the implicit message in encouraging restriction may be internalized by the child as saying that there is something wrong with his or her body. In a society that stigmatizes obesity, how can parents encourage healthful eating without generating feelings of shame in the child and self-blame for the obesity? This is an important question worthy of further research.

Societal messages about fat

The societal message about being fat in the 21st Century is clear: it is bad to be fat. But why is it bad? Clearly, there are serious medical consequences of obesity. The medical issues, however, are sometimes used to cloud the clear bias and discrimination against obese people. Obese people are not discriminated against because they are medically compromised. They are stigmatized because their obesity is viewed as a reflection of poor character. Common stereotypes associated with obese people include attitudes that they are lazy, incompetent, lacking in self-discipline, self-indulgent and emotionally unhealthful (9,65). Both laboratory and field studies have documented discrimination against obese persons in the domains of employment, health care, education and public accommodations (9). Negative attitudes towards obese persons have become an acceptable form of prejudice in Western society (66,67).

Societal stigmatization of obese children

There is a growing literature documenting the extent to which obese children are targets of societal stigmatization. Prejudiced attitudes from other children and resulting peer rejection is one of the most common sources of stigmatization of obese children. Suicides of obese children have been reported resulting from severe stigmatization from peers (68).

Peer rejection of obese children

A classic study conducted in the early 1960s instructed school children to rank six pictures of children varying in physical characteristics and disabilities in order of who they would like most for a friend (69). The picture of the obese child was ranked last among pictures of children with crutches, in a wheelchair, with an amputated hand and with a facial disfigurement. A recent replication of this study among fifth- and sixth-grade students reported that there has been an increase in prejudice against the obese child compared to the findings from 40 years ago (70).

Negative attitudes towards obese children develop early. In one study, pre-school children aged 3–5 years judged an overweight target to be a mean and less desirable playmate compared to an average-weight target (71). Similar studies

found that 3-year-olds associate overweight children with the characteristics of being mean, stupid, ugly, unhappy, lazy and having few friends (72). Children aged 4–11 years described obese targets as ugly, selfish, lazy, stupid, dishonest, socially isolated and subject to teasing, while average-weight targets were considered clever, healthy, attractive, kind, happy, socially popular and a desirable playmate (73). Other research has documented that third- and fifth-grade children negatively evaluate obese targets and positively evaluate average-weight targets (74). Another study found similar beliefs among 9-year-olds who associate overweight body shapes with poor social functioning, poor health and poor academic success (75).

Research has examined the role of demographic characteristics and knowledge about the aetiology of obesity on children's attitudes. One study measured negative stereotyping about weight among fourth- and sixth-grade students and found that children endorsed negative stereotypes to both child and adult obese targets, regardless of the child's own weight, age and gender (76). The authors also assessed children's beliefs about the controllability of obesity and found that most children believed that obesity was under personal control and that this belief was positively associated with negative stereotyping. In a similar study, researchers directly examined the influence of knowledge about obesity in a study of third and sixth graders who were randomly assigned to view a video of a peer who was average weight, obese or obese with a medical explanation for the obesity (77). Overall, child targets in the obese condition received more negative attributions than the average-weight target. The children attributed less blame to the obese child with the medical explanation, but this had little positive effect on attitudes. This suggests that providing information to explain the complex aetiology of obesity is not likely to change attitudes among children towards obese peers.

Cultural and developmental differences in children's biased attitudes have recently been examined by Crystal *et al.*, who assessed attitudes of fifth- and 11th-grade students in the USA and Japan (78). Children were asked to describe their reactions to hypothetical group interactions with an obese peer. The American and Japanese fifth graders were much more willing to interact with the obese peer than were the eleventh graders in either group. The fifth-grade Japanese students were more eager to include the obese peer in a group activity than their American counterparts, but among the eleventh graders, the Japanese students were similar to the American teenagers in their reported refusal to interact with the obese peer.

One reason why the bias appears to worsen as children get older may be that it is linked to children's own body dissatisfaction. There is evidence that many elementary school age children are dissatisfied with their bodies and the level of dissatisfaction increases with age. In a study of

fourth-grade children, 49% of girls and 30% of boys chose ideal body sizes thinner than their own and only 10% of boys and 11% of girls selected a body size larger than their own (79). Similar research with children aged 6–12 years found that children's reported ideal body type becomes thinner as children get older (80). If there is a causal link between negative attitudes about obese peers and one's own body dissatisfaction, the direction of this relationship is not known.

Surprisingly, little research has assessed the subjective teasing experiences of obese children. One exception is a study of perceived stigmatization among overweight adolescent females (81). In this sample of 50 girls, 96% reported stigmatizing experiences because of their weight, the most frequent being weight-related teasing, jokes and derogatory names. Peers were the most common perpetrators of harmful comments and the school was the most common environment. The girls reported being stigmatized throughout elementary and high school but reported they had not yet learned how to effectively cope with these experiences.

Adult rejection of obese children

Peers are not the only sources of weight stigmatization in the school setting. One study examined attitudes towards obesity among junior and senior high school teachers and found biases including beliefs that obese persons are untidy, more emotional, less likely to succeed and have more family problems (82). In addition, 43% of teachers strongly agreed that 'most people feel uncomfortable when they associate with obese people', 55% agreed that obesity often stems as a form of compensation for lack of love or attention and 28% agreed that 'one of the worst things that can happen to a person would be for him/her to become obese.' A similar study assessed elementary school principals' beliefs about major contributors of childhood obesity and found that 59% cited lack of self-control and 57% blamed psychological problems (83). While principals agreed that childhood obesity is a major cause of peer rejection and that schools are not doing enough to alleviate childhood obesity, a quarter of them also believed that teachers would not be supportive of implementing school-based treatment programmes to help obese students.

Obese children face stigmatization from educators beyond grade school. Obese students have been found to have lower college acceptance rates despite equivalent academic records to their non-obese peers (84). There have also been legal cases where overweight students have filed suits against teachers and educational institutions for stigmatization (85). The long-term impact of stigmatization at school is not fully understood. One prospective study found that overweight adolescents complete less education, are less likely to be married and have higher rates of poverty by adulthood when compared to their normal weight

peers (86). The hostile school environment for obese adolescents may play a causal role in these outcomes.

The damage due to stigmatization

Impact on self-esteem

It is intuitive that obese children are likely to suffer psychologically; however, the research evidence is mixed. French *et al.* reviewed 35 studies examining self-esteem and obesity in children and found that 13 of 25 cross-sectional studies indicated lower self-esteem in obese youth, and two prospective studies assessing the relationship between self-esteem and obesity had opposing findings (87). They also report that six of eight treatment studies showed improved levels of self-esteem among overweight children who participated in weight loss treatments. The authors note that inappropriate control groups and small sample sizes make it difficult to establish a clear relationship but, at least among the cross-sectional studies, obesity in children is often inversely related to self-esteem and body esteem. A more recent study reported lower body esteem among overweight 10–16-year-old girls (88). Similarly, research outside North America studying 9–12-year-old children found that obese children had lower self-perceptions and more negative feelings of self-worth than non-obese children (89). Very young children may not experience distress about their weight. One study found that levels of self-esteem do not differ between non-obese and obese pre-schoolers (90). Upon entering school, this changes substantially. In a study of 9–11-year-old children and their parents, self-esteem was lower among girls (but not boys) who were overweight (91). Low self-esteem was further linked to both the children's belief that their parents view their overweight status negatively and the parental reports of dissatisfaction with their child's weight (91).

Increased risk of depression

Increased levels of depressive symptoms among overweight children have been reported. Several studies have found an increased risk of depression among obese children presenting for treatment and significant depression and lowered self-esteem among obese paediatric patients (92,93). A recent study of third-grade students also reported higher depressive symptoms among overweight girls, where concerns about being overweight largely explained the positive relationship between BMI and depression (94). This suggests that obesity leads to concerns about weight, which then leads to depression.

Obese children blame themselves

Not only do overweight children feel badly about themselves, but the more they feel they are to blame for their obesity, the worse they feel overall. A study of children aged 9–11 years found significantly lower levels of self-esteem

among clinically overweight children when compared to normal weight peers and also found that those children with the lowest esteem believed that they had personally caused their obesity (95). These children also felt extremely ashamed of their weight and attributed their weight to the reason for having few friends and being excluded from social activities. Furthermore, 90% of the overweight children believed that teasing and harassment from peers would cease if they could lose weight and 69% thought that they would have more friends if they were thinner. This study suggests that overweight children internalize societal messages that weight is within personal control and subsequently blame themselves for the negative social experiences that they confront.

Being teased and socially rejected because of overweight is quite different from stigmatization because of religion or ethnicity. The societal message is not only that it is bad to be fat but also that this is a controllable condition and the body is infinitely malleable if only you try hard enough (96). Most children with special medical or physical conditions know that the adults at school are there to help them cope with discrimination and stigma. When it comes to obesity, however, the very people who should be protecting children also hold the beliefs that obesity is due to a lack of self-control and psychological problems. It is not surprising that children believe these attributions about themselves as well.

It is important to find ways to address childhood obesity without further stigmatizing these children (Table 2).

Table 2 Summary of childhood obesity stigma research

What do we know about the stigma of childhood obesity?

- No one is immune from negative attitudes towards obese children
 - Children as young as 3 years old hold negative attitudes about obese peers
 - Children's negative attitudes become stronger with age
 - Teachers and college admission officers exhibit negative attitudes towards obese students
 - Parents exhibit negative views of obese children in both subtle and behavioural ways
- The impact of stigmatization is profound
 - Childhood obesity is often linked to lower self-esteem and body esteem
 - Childhood obesity is linked to higher rates of depression
 - Obese children blame themselves for their weight and other's negative reactions to them
 - Parents also experience stigma regarding their inability to address their child's weight

What do we need to learn?

- How can children learn to accept peers of all sizes and shapes?
- How can we disentangle concern over medical issues from character stereotypes?
- How can parents accept their obese children, including their bodies?
- How can parents support their obese children in coping with social stigma?

Research has found connections between parental 'concern' about their child's weight and decreased self-esteem, body esteem and even perceived lower cognitive ability in children as young as 5 years old (97). Thus, helping parents and teachers of obese children to challenge their own bias against obese individuals may be the first step necessary in reducing negative stereotypes of obesity (i.e. characteristics such as ugly, selfish, lazy, stupid) and focusing instead on how to help children maintain a healthful lifestyle. Parents and educators must work together to help overweight children cope with discrimination and teasing.

The role of parents: protecting obese children from stigma

Parents are held responsible for feeding their children and for their children's mental health and coping skills. However, just as parents live in the same society that promotes unhealthy eating, they also live in the society outlined above that stigmatizes and discriminates against obese individuals. The research on stigma suggests that parents may be stigmatizing their own overweight children in subtle ways which may be as harmful as other types of more overt stigmatization.

An example of such subtle parental attitudes is a study that examined 9–11-year-old children and their parents (91). Parents were more likely to describe girls as too heavy and boys as thin even though both groups were average weight. Parental perceptions of overweight were related to low self-esteem among daughters. Children were keenly aware of their parents' judgements of their bodies. They were able to predict parental responses about their body sizes with 82% accuracy. Another study found that children whose parents had greater concern about their body size were more likely to distort their bodies as too heavy (80). The authors concluded that parents play a critical role in affecting how their children feel they should look and that overweight children possibly experience more parental concerns than average-weight children.

Other studies have more directly assessed parental stigma towards obese children. One study found that parents communicated with their children in ways that endorsed stereotypes about obese children (98). Parents were given three pictures of children (an average-weight child, an obese child and a handicapped child) and asked to tell a story about each picture to their own child. Parents portrayed the obese child as having the most negative self-esteem and self-concept of all three children. There were also striking differences among the three types of stories on the rate of successful outcomes at the end of the story: for the handicapped, the average and the obese child it was 80%, 45% and 0%, respectively. This study provides a glimpse into the way parents may subtly convey their stereotypic expectations about obese children at home.

Negative parental attitudes towards obesity may have far-reaching consequences. One study found that it can even affect their children's financial status by the time they reach college. Crandall assessed financial aid among college students as well as attitudes among parents and found that overweight daughters received less financial support from parents for college than did average-weight daughters, regardless of parental income, family size, ethnicity and education (99). Crandall theorizes that anti-fat attitudes are related to ideological attitudes among parents, which are characterized by valuing self-discipline and believing that people are responsible for their own fate. He posits that individuals with such ideological beliefs may be more likely to blame their obese children for their weight (100).

Another view is that parents of overweight children also experience stigmatization. In one study, parents of overweight children reported being criticized and blamed for their child's obesity (95). These parents also reported feeling guilty, angry that their expectations of their children's weight were not met and frustrated that they did not know how to help their children.

Parents of obese children face a complex challenge. First, they must stand by their children and help protect their self-esteem in the face of widespread social stigmatization. Second, they need to help their children make healthful food choices in a manner that will not be experienced by their children as punitive. In other words, parents need to send the message that they not only love and accept their children – and their children's bodies – as they are, but also want to support them in being healthy through making healthful food choices and being physically active. This is a delicate balance to achieve.

Avenues for future research

Clearly, obesity is a difficult condition to treat. The fact that the USA is more obese than at any time in history, with competent adults struggling with weight management, suggests that this problem is not just about lack of nutrition education or inadequate will power. Parents are understandably frustrated with the situation of having an overweight child, and the logical target of this frustration is the child. As a society, we need to address this dangerous cycle of helplessness and blame. We cannot simultaneously endorse relentless marketing of unhealthful foods aimed directly at children and their parents and then turn around and blame overweight children and their parents for having eaten those foods.

There are two primary avenues for future research that are needed to address the problem of childhood obesity. The first is research on how to reduce the stigma of obesity and the second is how to create a safe and healthful environment that provides easy access to nutritious foods and rare access to non-nutritive foods. Table 3 summarizes

Table 3 Summary of proposed societal level interventions

Change the food environment
Remove non-nutritive snack foods and sugared drinks from schools
Discourage adults from feeding poor foods to children
Pressure restaurants to provide 'kids meals' that are economical and nutritious
Change the role of the food industry
Pressure the food industry to stop developing and advertising nutritionally poor 'children's foods'
Encourage the food industry to create healthful and affordable food products for children
Change the view of obesity
Add weight to the list of personal characteristics that are unacceptable reasons for discrimination
Include weight tolerance when we teach tolerance of other individual differences
Educate the public on how to accept obese people while fighting the diseases linked to obesity

societal-level interventions that are necessary to help achieve these goals.

Stigma reduction

To date, few studies have attempted to reduce negative attitudes about obese children. An important place to start is with adults who spend time with children; namely parents and educators. Only one study has successfully reduced stigma towards obese persons by educating participants about the biological, genetic and non-controllable reasons for obesity (100). However, other work has found that providing explanations for obesity that are outside of one's personal control has little effect on changing children's attitudes or behaviours. Interventions may thus require other strategies in addition to education about the complex aetiology about obesity (77). Attitude change may require direct challenging of general knowledge structures about the stigmatized group and replacing current attitudes with more appropriate and accurate attributions (101). This type of intervention has yet to be tested with obesity stigma.

A more appropriate avenue for changing children's attitudes may be through prevention and positive body image promotion curriculum in the school setting. One study was able to improve weight acceptance attitudes and reduce weight-related teasing among elementary school children through a school intervention curriculum designed to promote body size acceptance and diversity (102). Although this is promising, further studies testing this type of program are needed with larger and more diverse samples of children.

In the meantime, obese children require support and skills to cope with stigma experiences. Identification of the

ways that obese children cope with stigma is a priority, as is determining which methods of coping are most helpful and effective in reducing stigma and maintaining self-esteem. Parents, educators and other adults who work with children also need to learn about the stigma that overweight children face. These adults need to learn strategies to help children deal with stigmatization adaptively. Given that adults may also be perpetrators of this bias, teaching them to recognize and challenge their own biases may be the first step in this process.

It is also critical that we, as obesity researchers, examine our own biases. Research on the implicit anti-fat attitudes of health professionals indicates that no one is immune to weight bias (103). This has important implications for the lives of obese children. A common response that we have heard in reaction to our work on weight stigma is that stigmatization may actually have the positive effect of motivating obese people to lose weight. No research to our knowledge has demonstrated that experiencing stigma and discrimination leads obese individuals to achieve greater success at weight loss and improved health. Because obesity rates continue to rise despite widespread societal denigration of fatness, it seems unlikely that additional stigma would reduce these rising obesity trends. In contrast, stigma has been correlated to negative psychological outcomes among obese persons (104), and research with other stigmatized groups has documented negative effects of stigma on health indices such as blood pressure (105). If we are to advance research in the field of stigma reduction and develop methods for effectively eliminating bias against obese children, it is critical that as obesity researchers we examine our own attitudes and prevent negative assumptions from blocking important avenues of research.

Change the food environment

There are multiple determinants of what children eat. Among them are biological influences, parental influences and societal influences. In order to address childhood obesity, all of these factors must be considered. The research to date has focused almost exclusively on understanding biological drives to eat certain foods and the link between parenting behaviours and food intake. It is important to note that research supporting the idea that children will appropriately self-regulate their intake has studied either infants who are regulating formula consumption or children who are choosing among primarily healthful options. This research has not been carried out in a naturalistic setting, where children were taken to fast-food restaurants or given unrestricted access to candy and soda. We do not know how living in our current environment influences food intake; our hypothesis is that it leads to overconsumption. Unlimited access to high-fat junk foods has been studied in the laboratory with rats. Normal weight

rats who were given access to 'supermarket' foods like chocolates, cookies, cheese and peanut butter gained 269% more weight than control rats who were given specified portions (106). A hypothesis that needs to be tested in a laboratory setting is whether most children demonstrate poor self-regulation in the presence of a variety of unhealthy foods, regardless of weight status or degree of parental control over feeding. Field experiments are needed to measure the impact of snack and soda vending machines in schools on the intake of these foods, and subsequent health status of the children in those schools.

It is likely that some children are at higher risk of difficulty self-regulating and therefore at higher risk of obesity than other children. It may be possible to determine in early childhood whether a particular child appears to have difficulty self-regulating his or her intake and, if so, provide guidance to the parents on how to help their child manage the current environment. New cognitive-behavioural treatment models for obese children that emphasize goals of adopting healthful eating habits instead of prescribing strict diets may be helpful for this purpose (107,108). Eventually, perhaps the environment will promote healthful eating among all members of society. Just as there are wheelchair ramps so that everyone can access restaurants, the menus should include options enabling everyone to order an appropriate meal.

The current thinking about how to address childhood obesity is evident in a US Department of Agriculture publication entitled 'Examining the well-being of children' (54). One article presents data that children are increasingly eating out of the home more frequently and the foods that are eaten outside of the home (at school, fast-food restaurants, other people's homes) are of poorer nutritional value than foods eaten at home. Another article reports that parents who lack nutrition knowledge are more likely to have overweight children. Specifically, this article suggests that 'obesity prevention and/or treatment should focus on early attention and involvement of parents...' (p. 20). Given that the first study found that the healthiest meals kids eat are those at home, one could conclude that the real issue is that parents who know less about nutrition make the mistake of trusting others – schools and restaurants – to responsibly feed their children.

Shift the locus of responsibility

The locus of responsibility for childhood obesity needs to shift away from individuals and towards the environment. Society can address this health problem in a number of ways that are consistent with strategies used to combat other childhood diseases. Many of these are outlined in a recent article on the obesity epidemic (109). Places that are intended to protect children, such as schools, need to become involved in proactive ways (110). Unhealthful

foods should be removed from public schools. Physical education should return as a required part of each child's school day. Advertising unhealthful foods to children should be limited and advertising healthful foods should be subsidized. In addition, parents, teachers and others who work with children need to take on the challenges of educating children not only about nutrition but also about the importance of treating each other with respect and tolerance despite physical differences in size and shape. On the federal level, legal steps to prohibit size discrimination and limit advertising of unhealthful products to children are necessary.

When a child dies because of choking on a toy in a kid's meal, we do not hold the child or the parent responsible by saying that the child should not have had that toy in his or her mouth. We respond by saying that the toy should not have been in the kid's meal and we hold the fast-food restaurant responsible. When a child becomes obese because of eating the same fast-food meals, we say that the child should not have eaten that food and that the parent should not have taken the child to the fast-food restaurant. We demand that toys that are choking hazards in fast-food kid's meals be recalled by the restaurant. Perhaps the entire meal should also be recalled.

Acknowledgement

The authors would like to acknowledge the Rudd Institute for supporting this work.

References

- Micic D. Obesity in children and adolescents – a new epidemic? Consequences in adult life. *J Pediatr Endocrinol* 2001; **14**: 1345–1352.
- Troiano RP, Flegal KM. Overweight children and adolescents: Description, epidemiology, and demographics. *Pediatrics* 1998; **497**–504.
- Guest Choice Network. (1999). *The 1998 'Nanny of the Year' Awards*. [WWW document.] URL <http://www.junkscience.com/dec98/nanny.htm>
- McElroy W. (2000). *The Food Fascists*. [WWW document.] URL <http://www.lewrockwell.com/mcelroy/mcelroy16.html>
- United States Consumer Product Safety Commission (2001). *Toy-Related Deaths and Injuries, Calendar Year 2000*. [WWW document.] URL <http://www.cpsc.gov/library/toydt00.pdf>
- Wilson TG. Behavioral treatment of obesity: Thirty years and counting. *Adv Behav Res Ther* 1994; **16**: 31–75.
- Epstein LH, Roemmich JN, Raynor HA. Behavioral therapy in the treatment of pediatric obesity. *Pediatr Clinics of North America* 2001; **48**: 981–993.
- Morris BR. Letters on students' weight ruffle. *The New York Times*, Section F, 2002; p 7.
- Puhl R, Brownell KD. Bias, discrimination, and obesity. *Obesity Res* 2001; **9**: 788–805.
- Gallo AE. (1996). *The Food Marketing System in 1995*. US Department of Agriculture, Economic Research Service, Food and Consumer Economics Division. Agriculture Information Bulletin no. 731. [WWW document.] URL <http://www.ers.usda.gov/publications/AIB731/AIB731.pdf>
- Eisenberg A, Murkoff HE, Hathaway SE. *What to expect the first year*. Workman Publishing: New York, 1989.
- Harris JM. (1997). Consumers pay a premium for organic baby foods. *Food Review: Understanding Food Prices*. Economic Research Service, US Department of Agriculture. [WWW document.] URL <http://www.ers.usda.gov/publications/foodreview/aug1997>.
- Horgen KB, Choate M, Brownell KD. Television food advertising: Targeting children in a toxic environment. In: Singer DG, Singer JL (eds). *Handbook of Children and the Media*. Sage: Thousand Oaks, CA, 2001, pp 447–461.
- McNeal J. *Kids as customers: a handbook of marketing to children*. Lexington Books: Lexington, MA, 1992.
- Schaefer CE, DiGeronimo TF. *Toilet training without tears*. Revised edition. Signet: New York, 1997.
- Gallo AE. (1998). Food advertising in the United States. *America's Eating Habits: Changes and Consequences*. Food and Rural Economics Division, Economic Research Service, US Department of Agriculture. [WWW document.] URL <http://www.ers.usda.gov/publications/AIB750/AIB750.pdf>
- Cowley G. Generation XXL. *Newsweek* 2000 (July 3); **136**: 44.
- Begely S. What families should do. *Newsweek* 2000 (July 3); **136**: 44–47.
- Kassirer JP, Angell M. Losing weight – an ill-fated new year's resolution. *New Eng J Med* 1998; **338**: 52–54.
- Hoek HW. Distribution of eating disorders. In: Fairburn CG, Brownell KD (eds). *Eating Disorders and Obesity: A Comprehensive Handbook*. Guilford Press: New York, 2002, pp 233–237.
- Fairburn CG, Doll HA, Welch SL, Hay PJ, Davies BA, O'Connor ME. Risk factors for binge eating disorder: A community-based, case-controlled study. *Arch General Psych* 1998; **55**: 425–432.
- Dietz WH. Medical consequences of obesity in children and adolescents. In: Fairburn CG, Brownell KD (eds). *Eating Disorders and Obesity: A Comprehensive Handbook*. Guilford Press: New York, 2002, pp 473–476.
- Birch LL, Fisher JO. Development of eating behaviors among children and adolescents. *Pediatrics* 1998; **101**: 539–549.
- Manson JE, Skerrett PJ, Willet WC. Epidemiology of health risks associated with obesity. In: Fairburn CG, Brownell KD (eds). *Eating Disorders and Obesity: A Comprehensive Handbook*. 2nd edn. Guilford Press: New York, 2001, pp 422–428.
- Dixon LB, Cronin FJ, Krebs-Smith SM. Let the pyramid guide your food choices: Capturing the total diet concept. *J Nutr* 2001; **131**: 461S–472S.
- Johnson RK, Frary C. Choose beverages and foods to moderate your intake of sugars: The Dietary Guidelines for Americans – What's All the Fuss About? *J Nutr* 2001; **131**: 2766S–2771S.
- Munoz KA, Krebs-Smith SM, Ballard-Barbash R, Cleveland LE. Food intakes of US children and adolescents compared with recommendations. *Pediatrics* 1997; **100**: 323–329.
- Cowart B. Development of taste perception in humans: Sensitivity and preference throughout the life span. *Psych Bull.* 1981; **90**: 43–73.
- Cowart B, Beauchamp GK. Factors affecting acceptance of salt by human infants and children. In: Kare MR, Brand JG (eds). *Interaction of the chemical senses with nutrition*. Academic Press: San Diego, 1986, pp 25–44.
- Rozin P. The importance of social factors in understanding the acquisition of food habits. In: Capaldi ED, Powley TL (eds).

- Taste, experience, and feeding.* American Psychological Association: Washington, DC, 1990, pp 225–269.
31. Sullivan SA, Birch LL. Infant dietary experience and acceptance of solid foods. *Pediatrics* 1994; **93**: 271–277.
 32. Birch LL, Fisher JO. The role of experience in the development of children's eating behavior. In: Capaldi ED (ed.). *Why we eat what we eat: The psychology of eating.* American Psychological Association: Washington, DC, 1996; pp 113–141.
 33. Birch LL, Gunder L, Grimm-Thomas K. Infants' consumption of a new food enhances acceptance of similar foods. *Appetite* 1998; **30**: 283–295.
 34. Birch LL. Development of food acceptance patterns. *Develop Psych* 1990; **26**: 515–519.
 35. Birch LL, McPhee L, Shoba BC, Pirok E, Steinberg L. What kind of exposure reduces children's food neophobia? *Appetite* 1987; **9**: 171–178.
 36. Sullivan SA, Birch LL. Pass the sugar; pass the salt: Experience dictates preference. *Dev Psychobiol* 1990; **26**: 546–551.
 37. Stratton P, Bromley K. Families' accounts of the causal processes in food choice. *Appetite* 1999; **33**: 89–108.
 38. Hendy HM. Comparison of five teacher actions to encourage children's new food acceptance. *Annals Behav Medical* 1999; **21**: 20–26.
 39. Newman J, Taylor A. Effect of a means: end contingency on young children's food preferences. *J Exp Child Psych* 1992; **64**: 200–216.
 40. Hendy HM, Raudenbush B. Effectiveness of teacher modeling to encourage food acceptance in preschool children. *Appetite* 2000; **34**: 61–76.
 41. Harper KU, Sanders KM. The effect of adult's eating on young children's acceptance of unfamiliar foods. *J Exper Child Psych* 1975; **20**: 206–214.
 42. Cullen KW, Baranowski T, Rittenberry L, Cosart C, Hebert D, de Moor C. Child-reported family and peer influences on fruit, juice and vegetable consumption: Reliability and validity of measures. *Health Educ Res* 2001; **16**: 187–200.
 43. Cullen KW, Rittenberry L, Olvera N, Baranowski T. Environmental influences on children's diets: Results from focus groups with African-, Euro- and Mexican-American children and their parents. *Health Educ Res* 2000; **15**: 581–590.
 44. Smith GP, Greenberg D. The investigation of orosensory stimuli in the intake and preferences of oils in the rat. In: Mela D (ed.). *Dietary Fats.* Elsevier Service: Essex, England, 1992, pp 167–178.
 45. Johnson SL, McPhee L, Birch LL. Conditioned preferences: Young children prefer flavors associated with high dietary fat. *Physiol Behav* 1991; **50**: 1245–1251.
 46. Kern DL, McPhee L, Fisher JO, Johnson SL, Birch LL. The postingestive consequences of fat condition preferences for flavors associated with high dietary fat. *Physiol Behav* 1993; **54**: 71–76.
 47. Davis CM. Self-selection of diet by newly weaned infants. *Am J Dis Child* 1928; **36**: 651–679.
 48. Story M, Brown JE. Do young children instinctively know what to eat? The studies of Clara Davis revisited. *New Eng J Medical* 1987; **316**: 103–105.
 49. Fomon SJ. *Nutrition of Normal Infants.* Mosby Year Book. Mosby: St. Louis, 1993.
 50. Wright P, Fawcett J, Crow R. The development of differences in the feeding behavior of bottle and breast fed human infants from birth to two months. *Behav Process* 1980; **5**: 1–20.
 51. Birch LL, Johnson SL, Andersen G, Peters JC, Schulte MC. The variability of young children's energy intake. *New Eng J Med* 1991; **324**: 232–235.
 52. Birch LL, Fisher JO. Mothers' child-feeding practices influence daughters' eating and weight. *Am J Clin Nut* 2000; **71**: 1054–1061.
 53. Fisher JO, Birch LL. Restricting access to foods and children's eating. *Appetite.*, 1999; **32**: 405–419.
 54. Biing-Hwan L, Guthrie J, Frazao E. American children's diets not making the grade. *Food Review* 2001; **24**: 8–17. [WWW document.] URL <http://www.ers.usda.gov/publications/FoodReview/May2001/FRV24I2b.pdf>
 55. Puhl R, Schwartz MB. If you are good you can have a cookie: How memories of childhood food rules link to adult eating behaviors. *Eating Behaviours* 2003, in press.
 56. Fisher JO, Birch LL. Restricting access to palatable foods affects children's behavioral response, food selection, and intake. *Am J Clin Nut* 1999; **69**: 1264–1272.
 57. Klesges RC, Stein RJ, Eck LH, Isbell TR, Klesges LM. Parental influence on food selection in young children and its relationships to childhood obesity. *Am J Clin Nut* 1991; **53**: 859–864.
 58. Carper JL, Fisher JO, Birch LL. Young girls' emerging dietary restraint and disinhibition are related to parental control in child feeding. *Appetite* 2000; **35**: 121–129.
 59. Cutting TM, Fisher JO, Grimm-Thomas K, Birch LL. Like mother, like daughter: familial patterns of overweight are mediated by mothers' dietary disinhibition. *Am J of Clin Nutr* 1999; **69**: 608–613.
 60. Johnson SL, Birch LL. Parents' and children's adiposity and eating style. *Pediatrics* 1994; **94**: 653–661.
 61. Robinson TN, Kiernan M, Matheson DM, Haydel KF. Is parental control over children's eating associated with childhood obesity? Results from a population-based sample of third graders. *Obes Res* 2001; **9**: 306–312.
 62. Saelens BE, Ernst MM, Epstein LH. Maternal child feeding practices and obesity: a discordant sibling analysis. *Int J Eat Disord* 2000; **27**: 459–463.
 63. Alderson TS, Ogden J. What do mothers feed their children and why? *Health Educ Res* 1999; **14**: 717–727.
 64. Murphy AS, Youatt JP, Hoerr SL, Sawyer CA, Andrews SL. Kindergarten students' food preferences are not consistent with their knowledge of the Dietary Guidelines. *J Am Dietetic Assoc* 1995; **95**: 219–223.
 65. Paul RJ, Townsend JB. Shape up or ship out? Employment discrimination against the overweight. *Employees Responsibilities and Rights Journal* 1995; **8**: 133–145.
 66. Falkner NH, French SA, Jeffery RW, Neumark-Sztainer D, Sherwood NE, Morton N. Mistreatment due to weight. Prevalence and sources of perceived mistreatment in women and men. *Obesity Res* 1999; **7**: 572–576.
 67. Kilbourne J. Still killing us softly: Advertising and the obsession with thinness. In: Fallon P, Katzman M, Wooley SC (eds). *Feminist Perspectives on Eating Disorders.* Guilford Press: New York, 1994, pp 395–418.
 68. Lederer EM. Teen-ager takes overdose after years of 'fatty' taunts. *The Associated Press*, October 1, 1997.
 69. Richardson SA, Goodman N, Hastorf AH, Dornbusch SM. Cultural uniformity in reaction to physical disabilities. *Am Sociol Rev* 1961; **26**: 241–247.
 70. Latner JD, Stunkard AJ. Getting worse: The stigmatization of obese children. *Obesity Research* 2003, in press.
 71. Cramer P, Steinwert T. Thin is good, fat is bad: How early does it begin? *J Appl Dev Psych* 1998; **19**: 429–451.
 72. Brylinsky JA, Moore JC. The identification of body build stereotypes in young children. *J Res Pers* 1994; **28**: 170–181.

73. Wardle J, Volz C, Golding C. Social variation in attitudes to obesity in children. *Int J Obesity* 1995; **19**: 562–569.
74. Counts CR, Jones C, Frame CL, Jarvie GJ, Strauss CC. The perception of obesity by normal-weight versus obese school-age children. *Child Psychiatry Hum Dev* 1986; **17**: 113–120.
75. Hill AJ, Silver EK. Fat, friendless and unhealthy: 9-year old children's perception of body shape stereotypes. *Int J Obesity* 1995; **19**: 423–430.
76. Tiggermann M, Anesbury T. Negative stereotyping of obesity in children: The role of controllability beliefs. *J Appl Soc Psych* 2000; **30**: 1977–1993.
77. Bell SK, Morgan SB. Children's attitudes and behavioral intentions toward a peer presented as obese. Does a medical explanation for the obesity make a difference? *J Ped Psych* 2000; **25**: 137–145.
78. Crystal DS, Watanabe H, Chen RS. Reactions to morphological deviance. A comparison of Japanese and American children and adolescents. *Soc Dev* 2000; **9**: 40–61.
79. Thompson SH, Corwin SJ, Sargent RG. Ideal body size beliefs and weight concerns of fourth-grade children. *Int J Eat Disord* 1997; **21**: 279–284.
80. Gardner RM, Sorter RG, Friedman BN. Developmental changes in children's body images. *J Soc Behav Pers* 1997; **12**: 1019–1036.
81. Neumark-Sztainer D, Story M, Faibisch L. Perceived stigmatization among overweight African-American and Caucasian adolescent girls. *J Adoles Health* 1998; **23**: 264–270.
82. Neumark-Sztainer D, Story M, Harris T. Beliefs and attitudes about obesity among teachers and school health care providers working with adolescents. *J Nutr Educ* 1999; **31**: 3–9.
83. Price JH, Desmond SM, Stelzer CM. Elementary school principals' perceptions of childhood obesity. *J Sch Health* 1987; **57**: 367–370.
84. Canning H, Mayer J. Obesity – its possible effect on college acceptance. *N Engl J Med* 1966; **275**: 1172–1174.
85. Weiler K, Helms LB. Responsibilities of nursing education. The lessons of Russell v Salve Regina. *J Prof Nurs* 1993; **9**: 131–138.
86. Gortmaker SL, Must A, Perrin JM, Sobol AM, Dietz WH. Social and economic consequences of overweight in adolescence and young adulthood. *N Engl J Med* 1993; **329**: 1008–1012.
87. French SA, Story M, Perry CL. Self-esteem and obesity in children and adolescents: A literature review. *Obes Res* 1995; **3**: 479–490.
88. Stradmeijer M, Bosch J, Koops W, Seidell J. Family functioning and psychosocial adjustment in overweight youngsters. *Int J Eat Disord* 2000; **27**: 110–114.
89. Braet C, Mervielde I, Vanderycken W. Psychological aspects of childhood obesity: A controlled study in a clinical and non-clinical sample. *J Pediatr Psychol* 1997; **22**: 59–71.
90. Klesges RC, Haddock CK, Stein RJ, Klesges LM, Eck LH, Hanson CL. Relationship between psychosocial functioning and body fat in preschool children: A longitudinal investigation. *J Consult Clin Psychol* 1991; **60**: 793–796.
91. Pierce JW, Wardle J. Self-esteem, parental appraisal and body size in children. *J Child Psychol Psychiatry* 1993; **34**: 1125–1136.
92. Sheslow D, Hassink W, Wallace W, DeLancey E. The relationship between self-esteem and depression in obese children. *Ann N Y Acad Sci* 1993; **699**: 289–291.
93. Wallace W, Sheslow D, Hassink W. Obesity in children: a risk for depression. *Ann N Y Acad Sci* 1993; **699**: 301–303.
94. Erickson SJ, Robinson TN, Haydel KF, Killen JD. Are overweight children unhappy? Body mass index, depressive symptoms, and overweight concerns in elementary school children. *Arch Pediatr Adolesc Med* 2000; **154**: 931–935.
95. Pierce JW, Wardle J. Cause and effect beliefs and self-esteem of overweight children. *J Child Psychol Psychiatry* 1997; **38**: 645–650.
96. Brownell KD. Dieting and the search for the perfect body: Where physiology and culture collide. *Behav Ther* 1991; **22**: 1–12.
97. Davidson KK, Birch LL. Weight status, parent reaction, and self-concept in five-year-old girls. *Pediatrics* 2001; **107**: 46–53.
98. Adams GR, Hicken M, Salehi M. Socialization of the physical attractiveness stereotype: Parental expectations and verbal behaviors. *Int J Psychol* 1988; **23**: 137–149.
99. Crandall CS. Do heavy-weight students have more difficulty paying for college? *J Pers Soc Psychol* 1991; **17**: 606–611.
100. Crandall CS. Prejudice against fat people: Ideology and self-interest. *J Pers Soc Psychol* 1994; **66**: 882–894.
101. Corrigan PW. Mental health stigma as social attribution: Implications for research methods and attitude change. *Clin Psychol Sci Pract* 2000; **7**: 48–67.
102. Irving LM. Promoting size acceptance in elementary school children: The EDAP puppet program. *Eat Disord: Treat Prev* 2000; **8**: 221–232.
103. Teachman BA, Brownell KD. Implicit anti-fat bias among health professionals: is anyone immune? *Int J Obes Relat Metab Disord* 2001; **25**: 1525–1531.
104. Myers A, Rosen JC. Obesity stigmatization and coping: Relation to mental health symptoms, body image, and self-esteem. *Int J Obesity* 1999; **23**: 221–230.
105. Guyll M, Matthews KA, Bromberger JT. Discrimination and unfair treatment: Relationship to cardiovascular reactivity among African American and European American women. *Health Psychol* 2001; **20**: 315–325.
106. Sclafani A, Springer D. Dietary obesity in rats: Similarities to hypothalamic and human obesity syndromes. *Physiol Behav* 1976; **17**: 461–471.
107. Braet C. Treatment of obese children: A new rationale. *Clin Child Psychol Psychiatry*, 1999; **4**: 579–591.
108. Braet C, Van Winckel M. Long-term follow-up of a cognitive behavioral treatment program for obese children. *Behav Therapy* 2000; **31**: 55–74.
109. Wadden TA, Brownell KD, Foster GD. Obesity: Responding to the global epidemic. *JCCP* 2002; **70**: 510–525.
110. Brownell KD, Horgen KB. *Food Fight: The Inside Story of the Food Industry, America's Obesity Crisis, and What We Can Do About It*. McGraw-Hill: New York, in press.