

Overweight children: Can parent education put a halt on this epidemic?

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Dedication

This is dedicated to all who have counseled and encouraged me over the past twenty-seven months. I could not have made it without your support.

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Introduction

Over the past few decades there has been an alarming increase in the number of overweight children in the United States. This seems to be a common trend, not just in children, and not just in our country, but in all ages throughout the world (Ogden, Carroll, & Curtin, 2006). Of all the developed nations, the United States has the highest prevalence of overweight and obese individuals among all ages (Centers for Disease Control & Prevention [CDC], 2006, April 16). Overweight children and obesity among adults has become a national epidemic in this country.

The most recent numbers, which were gathered in 2005–2006 by the National Health and Nutrition Examination Survey (NHANES) for the Centers for Disease Control & Prevention (CDC) National Center for Health Statistics, showed no significant differences in the incidence of overweight children and adolescents between the years 2003–2004 and 2005–2006, but prevalence still remains high (Ogden, Carroll, & Flegal, 2008). Combined studies from the years 2003–2006 reported that 16.3% of children and adolescents ages 2-19 were overweight as compared with 17.1% (12.5 million) in the years 2003–2004 alone. The 2005–2006 survey also reported that 33.3% of adult males and 35.3% of adult females were obese (Ogden, Carroll, & McDowell, 2007, November). When NHANES surveys from 1976–1980 were compared with the 2003–2004 surveys, the data showed about a three-fold increase in the amount of overweight children (CDC, 2008, August 20). Prevalence increased in 2-5 year olds from 5.0% to 13.9%, in 6-11 year olds from 6.5% to 18.8%, and in 12-19 year olds from 5.0% to 17.4%.

Since children are constantly growing, it is very difficult to define a child as overweight. Healthcare providers have used growth charts to help determine if a child's growth is adequate since the late 1970s. Although these charts allow providers to determine a height and weight for

age percentile, it is not an accurate representation of weight status. Body Mass Index (BMI) is the standard used for defining weight status in both children and adults. It is calculated using the following equation: $\text{weight (kg)}/\text{height (m)}^2$. In order to help accommodate for normal growth, the calculated BMI in children ages two through nineteen years is plotted on an age and sex specific growth chart which the CDC developed in 2000. As shown in Figure 1, once the BMI is plotted, a correlating percentile is determined.

BMI is not considered a diagnostic measure for determining overweight and obesity since it does not directly measure body fat, however, it is a reliable guide of body fatness in children (Mei, Grummer-Strawn, & Pietrobelli, 2002). BMI is used to determine weight status and when using the CDC's guidelines, classifies between underweight, normal weight, risk of overweight, and overweight in children, and underweight, normal weight, overweight, and obesity in adults.

The following definitions have been set by the CDC and have become the standard for classifying weight status of children in the United States. Underweight is defined as children who are less than the 5th percentile for the same age and sex. Healthy weight is defined as children who fall between the 5th and 85th percentile for the same age and sex. At risk of overweight is defined as children who fall between the 85th to the 95th percentile for the same age and sex. Overweight is defined as children who fall above the 95th percentile for the same age and sex.

When describing weight categories in children, the CDC does not use the term "obesity" due to its negative connotation. However, the Institute of Medicine uses the term "obese" to classify children who fall above the 95th percentile for the same age and sex, and "overweight" for children who fall between the 85th and 95th percentiles.

BMI should be calculated and plotted at a child's annual well visit. Once a correlating percentile is calculated, the associated weight status should be determined and clearly communicated to the child's parents. Parents should be shown their child's growth chart so they are able to see the illustration of both BMI trends through the years, as well as their child's BMI vs. the age and sex specific standards set by the CDC. It is imperative for parents to know their child's weight status and understand what it means. Discussions regarding feeding strategies, identification of energy imbalances, family involvement, prevention of further weight gain, or weight loss need to take place depending on the child's BMI. Mullen & Shield (2004) recommend using strategies that help to slow or halt weight gain while a child gets taller if a child is identified as at risk for overweight or is overweight with no serious complications. Weight loss is indicated if a child is overweight with complications (Mullen & Shield, 2004).

There are many strategies by which weight loss can be achieved, but children cannot do it without the help of their parents. Unlike weight issues in adults, a child cannot be held solely accountable for their weight. Parents are responsible for providing nutritious foods for their children and they often assume this role with no former training on child-feeding strategies. Since studies show that parents often fail to recognize their child as overweight and are not knowledgeable on proper child-feeding strategies, it is only appropriate that weight loss intervention begins with parent education that targets the family as a whole (May, Donohue, & Scanlon, 2007; Baughcum, Chamberlin, & Deeks, 2000; He & Evans, 2007). Parent education typically consists of addressing multiple factors, such as: eating behavior, physical activity level, nutritional education, parental modeling, and coping with resistance in order to change behaviors within the home. Family-based interventions that include parent education have been shown to

be effective, therefore making them a practical place to begin rather than more extreme intervention options such as surgery and drug treatments (Golley, Magarey, & Baur, 2006; Golan, Weizman, & Apter, 1998; Golan, Kaufman, & Shahar, 2006; Wrotniak, Epstein, & Paluch, 2004; Tanas, Marcolongo, & Pedretti, 2007; Epstein, Valoski, & Wing, 1994). Although these interventions may have a place in the treatment of overweight children, they should not be used as a first line treatment.

The most recent data shows that 16.3% of children and adolescents ages 2-19 were overweight (Ogden et al., 2008). With the incidence of overweight children increasing, healthcare providers need to continue to actively address this issue. A healthcare provider's role in treating overweight children does not stop after calculating a BMI. The provider must communicate risks and actively engage the family in planning necessary lifestyle changes once a problem is identified.

Causes of Overweight Children in the United States

Energy Imbalance, Caloric Consumption vs. Calories Used

Weight status has many contributing factors that make it a difficult topic to address. Weight gain results when a caloric imbalance occurs over a period of time. A caloric imbalance can occur due to increased calories consumed, decreased calories used, or a combination of both. Weight is gained if caloric consumption exceeds caloric expenditure. Poor diet and lack of exercise are the most important causes of caloric imbalance in the United States, resulting in the increase of overweight and obese individuals (Department of Health and Human Services & the United States Department of Agriculture, 2005). Caloric imbalance can also be influenced by behavior, environment, and genetics.

Behavior

Although children are born with innate preferences for sweet and salty foods, feeding practices mold children's fondness of particular foods (Birch, Fisher, & Davison, 2003). It is the parents' responsibility to instill healthy lifestyle choices from an early age since children rely on their parents to prepare meals. Preferences for healthy foods can be learned if the foods are familiar and are eaten by adult models (Birch et al., 2003). Krahnstoever Davison, Francis, & Birch (2005) showed that children of parents with high caloric intakes and low activity levels are also more likely to have increased food intakes and low levels of activity which promotes obesity.

A decrease in activity level and an increase in sedentary activity among children is a common problem that can lead to weight gain (Ritchie, Welk, & Styne, 2005). It is necessary

that parents recognize that their own activity level is able to influence their child's interest in physical activities. They must provide encouragement, support, and act as models of an active lifestyle.

Environment

Environment plays a large role in how, what, where, and when a child eats. It is necessary to promote healthy eating and an active lifestyle regardless of the child's environment since being overweight is influenced by lifestyle and eating habits (Kleinman, 2004).

It is common for children to be exposed to many different environments. They often divide their time between home, day care, school, friends' houses, and extracurricular activities. Ritchie et al. (2005) showed that frequent meals outside of the home are associated with weight gain and less nutritional value. It is essential for healthcare providers to stress the importance of well-balanced meals regardless of the environment. Parents need to be role models and advocates in assuring personal nutritional standards are met regardless of the environment if the goal is to instill healthy choices in children starting at a young age.

Genetics

"Four out of five obese people could lose weight if they lived in a less fatness-promoting environment" (Kleinman, 2004). This statistic not only reinforces the impact of environmental influence, but it also demonstrates that genetics can play a role in adiposity. Genes and genetic disorders are rarely the single cause of obesity. Bardet-Biedl and Prader-Willi syndromes are examples of genetic disorders that can be the sole cause of obesity (Goldstone & Beales, 2008).

More often genes require the addition of environmental factors, like lifestyle and behaviors, which increase susceptibility for becoming overweight. Behavioral geneticists have found that eating habits cannot be attributed to genetics alone (Faith, Johnson, & Allison, 1997).

Differences in eating habits are caused by a combination of environmental and genetic factors.

Behavior, lifestyle, and genetics may all play a role in energy imbalances that can result in weight gain. Since behavior and lifestyle are modifiable factors and genetics often requires the addition of these factors to increase the likelihood of becoming overweight, it is only appropriate that successful treatment options target these aspects as an agent for change.

Concurrent and Future Risks and Comorbidities

Further assessment of complications and planning for change should occur if a child is found to be overweight or at risk of becoming overweight. Parents may not understand the comorbidities associated with having an overweight child without patient education. The healthcare provider has waited too long if these discussions do not take place until a problem exists. “An ounce of prevention is easier than a pound of cure” (Hassink & Datto, 2006).

It was originally thought that overweight children are only at risk for adult morbidity and mortality. It is now known that morbidity and mortality are seen in childhood (Kleinman, 2004). There are both short-term morbidity and life-long effects caused by increased adiposity in childhood. Comorbidities and chronic complications that were previously only associated with adult obesity are now seen in youth due to a dramatic increase in the incidence of overweight children (Hannon, Rao, & Arslanian, 2005).

Effects of excess adiposity can be manifested in every organ system in all pediatric age groups (Hassink & Datto, 2006). It is important to evaluate at risk and overweight children for weight-related comorbid conditions. The evaluation of at risk and overweight children should include a complete history and physical exam, a review of systems, a nutrition and activity assessment that focuses on current eating patterns and activity level, and a psychosocial evaluation.

Psychosocial Issues

Teasing, and the psychological stress it causes, has been shown to be as damaging to children as other medical morbidities (Kleinman, 2004). Eisenberg, Neumark-Sztainer, & Story

(2003) show that weight-based teasing has been associated with body dissatisfaction, low self-esteem, depressive symptoms, and suicide attempts.

Although psychological issues are associated with overweight children, low self-esteem and body dissatisfaction most closely correlate with weight status (Goldfield, Mallory, & Parker, 2007). Strauss (2000) found that overweight girls are at a greater risk of low self-esteem that increases with age. Schwimmer, Burwinkle, and Tarni (2003) found that overweight children rated their quality of life lower than their normal weight counterparts. It is important for parents, healthcare providers, and school personnel to recognize and to discuss teasing and its repercussions in overweight children.

Cardiovascular Issues

High cholesterol, hypertension, physical inactivity, increased adiposity, and diabetes mellitus have been identified as risk factors of coronary heart disease. Although cardiovascular disease usually does not appear until middle age, the early stages of these cardiovascular changes take place much earlier (Bindler & Bruya, 2006). The recognized coronary heart disease risk factors that have been linked with obesity in adults are also linked with overweight children (Reilly, 2005). Freedman, Dietz, & Srinivasan (1999) showed that 58% of overweight children between the ages of five and ten years had at least one cardiovascular risk factor, and 25% of children in this age group had two or more risk factors.

Metabolic Syndrome

Metabolic syndrome in adults is defined as having three or more of the following traits: elevated waist circumference, elevated level of triglycerides, reduced HDL, elevated blood pressure, and elevated fasting blood sugar. Specific values have been established based on sex. When three or more of these conditions occur together, there is an increased risk of diabetes, heart disease, and stroke.

Although studies show that metabolic syndrome exists in childhood, there is no standard definition to diagnose it. The Princeton Lipid Research Clinic Follow-up Study conducted by Morrison, Friedman, and Gray-McGuire (2007) confirmed that children who have the traits of metabolic syndrome are more likely to have cardiovascular disease 25 years later. This study verifies the need to screen for metabolic syndrome in children and intervene on the long-term cardiovascular effects.

Type 2 Diabetes

Type 2 diabetes mellitus (DM) and adiposity frequently present together. Excess weight has been linked to increasing insulin resistance. Insulin resistance causes impaired glucose tolerance, which often advances into type 2 diabetes. Hannon et al. (2005) found being overweight is the greatest risk factor for developing type 2 diabetes for children. Between fifty percent and ninety percent of children diagnosed with DM have a BMI greater than the 85th percentile for their age and sex (Kleinman, 2004).

There has been a dramatic increase in the incidence of DM among children and adolescents due to the remarkable increase in the number of overweight children in the past few decades

(Hannon et al., 2005). The American Diabetes Association (2000) reports that between eight percent and forty-five percent of newly diagnosed diabetes among children is type 2.

A diagnosis of type 2 diabetes during childhood means earlier manifestations of its chronic complications (Hannon et al., 2005). If DM goes undetected, or if it is not properly managed, it can cause neuropathy, retinopathy, nephropathy, and chronic renal failure. Accelerated atherosclerosis is an unavoidable complication of DM. It is crucial to perform early and thorough screenings of children with a BMI greater than the 85th percentile since type 2 diabetes is often asymptomatic and complications can occur before symptoms appear (Hannon et al., 2005). When children at risk are screened, healthcare providers may detect problems and initiate lifestyle interventions before impaired glucose tolerance develops into DM.

Pulmonary Disorders

Excess adiposity has been linked to an increased incidence of pulmonary disorders among children. Although these disorders can manifest in many ways, obstructive sleep apnea and asthma are common pulmonary complications among overweight children.

Obstructive Sleep Apnea

Obstructive sleep apnea (OSA) is commonly associated with obesity and can be defined as either complete or partial obstruction of the airway during sleep. In individuals with complete obstructive sleep apnea, there are repeated periods during the night in which they stop breathing. In partial obstructive sleep apnea there are periods of slow, shallow breathing. Either complete or partial obstructive sleep apnea can cause restless sleep, daytime lethargy, decreased concentration, and poor school performance (Hassink & Datto, 2006).

The main cause of obstructive sleep apnea in children is enlarged tonsils and adenoids; however, there is now an increase of OSA in overweight children (Chan, Edman, & Koltai, 2004). Overweight individuals are more prone to developing this condition due to the excess accumulation of adipose tissue around the upper airway. This accumulation of adipose tissue causes narrowing and predisposes the airway to obstruction.

Asthma

Asthma is defined as a chronic inflammatory disorder of the lungs. Asthmatics experience reversible, recurring episodes of airway obstruction that may cause labored breathing, wheezing, chest tightness, and coughing. Increased adiposity is linked to an increased diagnosis of asthma as well as an increased exacerbation of asthma (Reilly, 2005). The pathophysiology between asthma and overweight children is not clear, however, the association is established.

The comorbidities and future health risks associated with overweight children are vast and encompass the whole body and mind. Healthcare providers need to be aggressive with diagnosing and addressing overweight children since comorbidities that were once only thought to occur in adults have been shown to occur in overweight children as well (Hannon et al., 2005).

Parents' Attitudes and Current Knowledge

Are Parents Aware that Their Children are Overweight?

The first steps to change are knowledge and recognition that a problem exists. May et al. (2007) found that a parent's child feeding approach is dependent upon personal perceptions of their child's current weight status or risk of becoming overweight, however, studies also show that a parent's ability to correctly identify a child as overweight is very limited (May et al., 2007; Baughcum, et al., 2000; He & Evans, 2007).

May et al. (2007) used parental self-report in attempts to measure maternal perceptions and concerns for weight status. They found that only 23 of 108 children who were defined as overweight by the CDC's standards, were accurately classified as overweight by their mothers. Of the children who were classified as overweight by their mothers, only 58% met the CDC's definition of overweight. Baughcum et al. (2000), in a similar study, examined maternal perceptions of overweight children with the objective to identify factors associated with maternal failure to correctly identify weight status. They found that of the 99 overweight children in the study, only 21% were correctly identify as overweight by their mothers. He & Evans (2007) compared Canadian parental perceptions with children's actual weight and found that 63% of children classified as overweight by the CDC's definition were also labeled as overweight by their parents.

Although misperceptions of weight status cannot be fully explained, He & Evans (2007) found three independent factors that help to clarify possible causes of parents' misperceptions. Ethnicity, sex, and parental weight status have all been shown to influence parents' opinions of

their children's weight status (He & Evans, 2007). Baughcum et al. (2000) found that in addition to ethnicity, sex, and maternal obesity, education level may also play a role.

Different cultures not only have differing preferences for food and eating habits, but they also have diverse perspectives of ideal body weight. Parents who identify with their own culture despite the societal standards in the United States may be more likely to have conflicting definitions of their child's weight status. Weight status may not be measured based on weight and height or share the same BMI cutoffs in other cultures. This makes addressing the issue of overweight children a difficult task.

Gender also seems to play a role in the ability to correctly classify weight status. Parents tend to be more critical of their daughters than of their sons, and are more likely to label their daughters as overweight (He & Evans, 2007). This disparity may be attributed to differences in societal standards between the male and female gender. Cutting, Fisher, & Grimm-Thomas (1999) suggest that a mother's dietary habits, including both environmental triggers for eating and portion sizes, may serve more as a model for her daughters than for her sons. This makes it more likely for daughters to acquire poor eating behaviors leading to an increased likelihood of becoming an obese adult.

Studies suggest that obese parents are more likely to have obese children (Cutting et al., 1999; Treuth, Butte, & Sorkin, 2003; Whitaker, Wright, & Pepe, 1997). Overweight parents are less likely to label their overweight children as obese or overweight (He & Evans, 2007). An explanation why this occurs is not found, but it may be linked to psychological issues, such as depression, stress, guilt, and apathy, which are associated with increased adiposity (Atlantis & Ball, 2008).

Baughcum et al. (2000) found that mothers with less education were less likely to correctly identify their children as overweight. Although Baughcum et al. (2000) did not have a justification for this finding, an explanation for this association may exist. Since education level is often linked to income, less educated mothers may have less access to healthcare.

These findings reinforce the importance of regular and thorough assessment by healthcare providers regardless of the possible causes in misinterpretations of weight status. A child's BMI should be calculated and the weight status should be clearly communicated to both the parents and the child at every well child visit. More parents may recognize their child's true weight status if healthcare providers are more aggressive with diagnosing and treating this epidemic. Rhee, Lago, & Arscott-Mills (2005) showed that once a healthcare provider labels a child as overweight, parents are more apt to recognize that a problem exists. Attempts to correct weight problems may not be taken if parents are not informed by healthcare providers and do not personally view their child's weight status as being problematic.

It is up to the healthcare provider to intervene and define the appropriate weight status of the child if only 21% of parents in the United States are recognizing their children as overweight. The healthcare provider has the tools and the knowledge to calculate accurate weight status and to communicate it to the parents. The provider also needs to stress to parents the increased risks that are linked to excess adiposity in children. Rhee et al. (2005) showed that by acknowledging a problem, parents not only recognize that a problem exists, but are more motivated to make the appropriate changes.

Readiness for Change

A discussion regarding interventions should follow once a parent is informed that their child is overweight or at risk of becoming overweight. Large financial, time, and behavioral sacrifices are demanded of many treatment interventions, therefore it is necessary that both the parents and the child are committed to making a change.

Assessing a parent's readiness for change may help predict successful outcomes of treatment. Rhee et al. (2005) remodeled the five stages of change, originally designed by Prochaska and colleagues (1983, 1997) to assess the appropriate time to suggest changes in a family's child feeding strategy. Rhee et al. (2005) found that most parents were not ready to make difficult changes in lifestyle until the child was eight years of age or older. A more promising finding was parents that believed their child's weight status was a true health problem were more determined to make a change (Rhee et al., 2005). This shows how influential health-care providers can be in helping to fight this epidemic. If providers explain weight status, the associated co-morbidities, and the changes that need to take place to correct the health issue, they may be able to mold behaviors for a child's future.

Concerns and Attempts at Prevention

Birch & Fisher (1998) found child-feeding strategies, even in well-intended parents, have the potential to negatively influence a child's energy balance. Well-intended parents often use stringent child-feeding strategies, which can disrupt a child's responsiveness to internal cues of satiety and hunger (Birch & Fisher, 1998). Johannsen, Johannsen, & Specker, (2006) found parents often use two primary methods of control, restriction and pressure, to influence a child's

feeding practice. Restriction is defined as limiting the types of food available and restricting the total amount of portion sizes accessible to the child. Pressure is used when parents force children to eat specific types of food or pressure a child into eating a specific portion size. Parents often combine these strategies with rewards. Parents frequently require children to eat a set portion size and reward the child for doing so with a food type that is limited. Children are taught to focus on their parents' external cues and possible rewards than to rely on their internal cues of hunger when stringent parental control is used. A child's ability to respond to internal cues are altered and ignored when restriction and pressure are used (Johannsen et al., 2006).

May et al. (2007), Fisher & Birch (1999), and Birch & Fisher (1998) all show that parental food restriction in response to a concern is associated with overweight children and disrupts a child's ability and responsiveness to listen to internal cues of hunger. Fisher & Birch (1999) found that restricting access to food is not an effective means for discouraging intake. Among 3-to-5 year old girls, those who reported the greatest restriction to certain snack foods were associated with the highest intake when those snacks were made available (Fisher & Birch, 1999). Another study by Birch & Fisher (1998) showed that a child's preference for high-fat foods may be increased and acceptance of a variety of foods may become limited when parental controls were used.

Satter (1995) finds that some children carry genes that contribute to fatness, however, she believes genes only let a child become overweight, they are not the sole cause of overweight children. She contributes weight issues in children to parental interference with the feeding process, lack of structured feeding, or both. Parents need to learn that their responsibility in child-feeding is not to dictate exactly what and how much a child eats, but to provide appropriate

foods in a positive and supportive environment. A child should become responsible to decide what and how much to consume. Children are able to adjust their intake based on their own energy needs when they are allowed to choose appropriate foods.

There are barriers that prevent parents from appropriately addressing their child's weight. Parents often fail to recognize their child as being overweight. If a parent is not aware that their child has a weight issue, healthcare providers must make them aware of the issue. Some parents acknowledge that their child is overweight, but feel it is not extreme enough to make lifestyle changes until the child is older. Rhee et al. (2005) showed an increased readiness for change when parents are aware that a problem exists and concern has been expressed to them. Well-intended parents often make attempts to take their child's weight issues into their own hands but lack the proper training on appropriate child-feeding strategies. All of these barriers contribute to the incidence of overweight children, and parent education has proven to be beneficial. Healthcare providers need to play an active role in encouraging families to make healthy lifestyle changes.

Parent and Family Based Intervention

The provider needs to engage both the parents and the child in planning for a change once risk factors have been identified. Many studies regarding interventions to treat overweight children have been performed, and a standard still has not been defined. Intervention should start in the home since parents mold their children's preference for food (Birch et al., 2003) and influence physical activity. Family involvement is thought to be of the greatest importance in treating overweight children (Epstein et al., 1994).

Golley et al. (2006) conducted a 12-month study to evaluate effectiveness of parenting-skills training as a strategy in treating overweight children. It was hypothesized that children of parents who participated in a family-based weight management program would have a lower BMI and weight circumference when compared to the control group. A total of 111 overweight Australian children ages six to nine years old were used in the study.

The study consisted of three groups, parenting-skills training with lifestyle education, parenting-skills training alone, and a control group. Both intervention groups targeted parents of the children to implement change. Parenting-skills training consisted of attending the Positive Parenting Program. This program was designed to promote parent competence on managing child behavior. Parents attended four weekly 2-hour sessions, then four weekly 1-hour sessions, then received three monthly 15-20 minute phone sessions. Those placed in the parenting-skills training with lifestyle education were asked to attend an additional seven sessions that focused on family-focused healthy eating. Specific attention was given to the following areas: label reading, modifying recipes, snacks, being active, roles and responsibilities of eating, managing appetite,

and self-esteem issues. While parents attended the seven sessions, the children in this group attended activity sessions in which they participated in aerobic activity.

BMI and waist-circumference were measured at baseline, six, and twelve months. At twelve months, total BMI for each group was reduced by 9% in the parenting-skills training with lifestyle education group, 6% in the parenting-skills training only group, and 5% in the control group. Of the children in the control group, 19% had a decrease in their BMI at twelve months, compared with 24% in the parenting-skills training only, and 45% in the parenting-skills training with lifestyle education. Waist circumference was decreased significantly at 12 months in the two intervention groups, but not in the control group. Although the study's results indicated a decrease in BMI in all groups, waist circumference was significantly decreased only in those groups with parent education. This indicates that parent-skills training and lifestyle education may be an effective means to approach overweight children.

Golan et al. (1998) conducted a similar study that examined parents as the "sole agents of change" in the treatment of childhood obesity. Since every family member is influential and influenced by others, this study targeted parents as key components of change. Children did not have an active role in the process and were not responsible for initiating change. This study consisted of sixty obese grade school children whose parents agreed to participate in the study and attend regular group sessions. The children were randomly assigned to two groups, an experimental group (parents as the agents for change) and a control group (children as the agents for change). Parents in the experimental group were responsible for attending fourteen 1-hour group sessions in which the following topics were addressed: limits of responsibilities, eating behavior modifications, nutritional education, cognitive restructuring, parental modeling, problem

solving, opportunities for physical activity, decrease stimulus exposure, decreasing fat content, and skills to cope with resistance. All family members were encouraged to also attend five separate 15-minute individual family sessions. During these sessions, all children in participating families were measured for height and weight. This was done so that overweight children would not be singled out and personally responsible for their own weight loss. The children in the control group were prescribed a personal diet and were required to attend thirty 1-hour group sessions in which the following topics were addressed: physical activity, eating behavior modification, stimulus control, self monitoring, nutritional education, problem solving, and cognitive restructuring.

After 12 months, weight loss was determined by deducting the final percentage of overweight status from a child's baseline status. Weight loss in the experimental group was 14.6%. Seventy-nine percent of the children lost >10% of their excess weight, and 35% reached non-obese status. In the control group, weight loss was 8.1%, 38% of the children lost >10% of their excess weight, and 14% were able to reach non-obese status. At a six-month follow up, children in the control group only maintained 40% of weight loss as compared to 85% in the experimental group. The dropout rate was nine times higher in the control group and was attributed to stress, tension, and irritation caused by the study. Six of the nine children from the control group who left the study did so at their parents' wishes due to increased frustration and tension in the home. The other three children who left the control group reported stress and irritation, and could not adhere to the diet.

This study shows that a family-based approach that incorporates both knowledge about healthy foods and eating behaviors is a successful way to correct weight status in overweight

children. When parents are responsible for making changes at a family level, children are less apt to be resistant to change. It is very difficult to help a child successfully lose weight, and children struggle without the support of their parents (Golan et al., 1998).

Golan et al. (2006) took what was learned in the previous study and extended knowledge by comparing a parent and child versus parent-only weight loss intervention in hopes to answer the question “do the children need to be involved at all?” This study included thirty-two overweight children, ages six to eleven, whose parents agreed to attend program meetings. The children were divided into three age groups: children aged 6 and 7 years, 8 and 9 years, and 10 and 11 years. They were then randomized into the two research groups. After being placed, there was no difference in children’s sex or BMI between the groups.

The program lasted a total of six months. Both intervention groups were responsible for attending a total of sixteen, one-hour support and education group sessions. The sixteen one-hour group sessions were broken down as follows: ten weekly, followed by four biweekly, and then two monthly sessions. The focus was on nutrition education and the role of parents as models during the first three sessions. During the next two sessions, parents received training in using an authoritative feeding style in which parents are assertive but not restrictive. Behavior modification and ways to positively influence a child’s food preferences were addressed in sessions 6 and 7. Sessions 8 and 9 helped find solutions to problems implementing changes at home. Ways to handle the media and cognitive restructuring were discussed in sessions 10 and 11. Session 12 focused on ways to handle resistance. The last four sessions allowed groups to collaborate and share their successes and difficulties. In the parents-only intervention group, children did not attend sessions, however, changes were intended to address the entire family. In

addition to the sixteen group education sessions, both groups also attended a 40-50 minute personal family session each month. Both programs encouraged healthy eating, increased physical activity, and decreased sedentary behaviors. A follow-up meeting was conducted 1-year after the program ended.

Measurements of both children and parents were taken at baseline, at the end of the program, and at the one-year follow-up. Children were determined to be overweight by using the following formula: $(\text{children's current BMI} - \text{children's 50}^{\text{th}} \text{ percentile BMI}) / \text{children's 50}^{\text{th}} \text{ percentile BMI} \times 100$. At the end of intervention, children's overall weight change in the parents-only group was -9.5% compared to -2.4% in the parent and child treatment group. No significant change in the weight status was seen in parents of either group. At the 1-year follow up, weight decreased by 12% in the parents-only group and increased by 0.4% in the parent and child treatment group.

In addition to BMI, the parents also completed two questionnaires, one at baseline and one upon the conclusion of the program. The first questionnaire attempted to measure factors in the home that could contribute to an obesity-promoting environment. The second questionnaire assessed parenting style. When the environmental questionnaires completed after conclusion of the program were compared to baseline questionnaires, both groups reported increased physical activity, decreased sedentary behavior, and decreased snacking between meals. However, a 22% reduction in overall obesity-promoting factors was seen in the parents-only group compared to a 15% reduction in the parent and child group. No significant change in parenting style was found when questionnaires were compared.

A regression analysis was performed in attempts to explain differences between the groups. Forty-nine percent of variability in change of weight status was explained by the level of attendance (28%), the treatment group (10%), and improvement in obesity-promoting factors in the home (11%). In addition to the explained variables that contributed to differences in success between the groups, Golan et al. (2006) also suggests that when additional subjects become involved in implementing change, it may become unclear as to who is responsible for change. This study suggests that parent education, without the involvement of children, can be a successful way to help overweight children achieve a healthier weight. It reinforces that parent education is a successful way to address the issue of overweight children.

The above studies all confirm that parent education and involvement in interventions are successful, but Wrotniak et al. (2004) examined if parental change can influence weight loss among their children. Wrotniak et al. (2004) performed a secondary data analysis of three family-based studies in attempts to assess if changes in parental BMI can predict change in a child's BMI. This analysis included 142, eight to eleven year old children and one participating parent who were recruited to participate in 1 of 3 family-based weight control intervention programs at the University of Buffalo. Each study lasted 2 years and participants were assessed at baseline, 6, 12, and 24 months. All data was collected using identical procedures and then combined for this study.

Children included in the study were required to have a calculated BMI greater than the 85th percentile while their parents were required to have a calculated BMI of greater than the 70th percentile. Parents who were not considered to be overweight or obese could lose excess weight and most were interested in losing weight even if they did not have a BMI greater than the 85th

percentile. All parents were encouraged to be more active and make healthier food choices, ensuring everyone could make positive health changes regardless of their weight status. The three studies trained and educated families on the Traffic Light Diet and physical activity. The Traffic Light Diet classifies foods as green, yellow, and red. Green foods are low fat and high nutrient, yellow foods have between 2-5 grams of fat per serving and are to be eaten in moderation, and red foods have >5 grams of fat per serving or a high sugar content and should be decreased.

Regression analysis was performed and determined that change in parental BMI was influential on change in a child's BMI at baseline to six months, and baseline to 24 months. After both 6 months and 2 years, children of parents with the greatest BMI change had the greatest decrease in weight for height as well as decrease in percentage overweight. Although this study is a regression analysis of three separate family-based child weight-loss interventions, it supports the inclusion and confirms the need for parents to be involved in weight-loss programs. It also suggests that when parents act as models for their children, weight loss is more likely (Wrotniak et al., 2004).

Tanas et al. (2007) examined the sustainability of a new family-based intervention program that was carried out by a single physician. Since group therapy requires prolonged teamwork and is not always available to the public, Tanas et al. (2007) designed an in-office, single physician intervention. Although this study is a retrospective, non-randomized, non case-controlled clinical study and results cannot provide definite evidence, it can offer insight as to whether family-based interventions are feasible to handle in a primary care setting. The study consisted of 190 overweight caucasian children, ages 3 to 18 years old, and their parents. After BMI was calculated, children were classified based on the following definitions: overweight (BMI

ranging from the 85th to the 94th percentile), obese (BMI >95th percentile), and severely obese (BMI >99th percentile). Children were placed into one of two groups: 85 families of overweight children participated in the therapeutic education program (TEP) and 105 families of overweight children received a more traditional dietetic program.

The TEP was carried out by a single pediatrician and consisted of three steps: an initial assessment and education, a therapeutic education session in small groups, and a second assessment session. The initial assessment lasted an hour and assessed a child's eating behavior, physical activity, psychological condition, and current knowledge and beliefs regarding weight issues and treatment. The physician also addressed parental point of view regarding lifestyle behaviors of members of the family. The pediatrician encouraged a healthier lifestyle for all family members instead of targeting the child and focusing on weight loss. The second step was a two-hour therapeutic education group session for parents, which taught the group about the importance of parents as role models for healthy living. Parents were trained on self-monitoring skills, positive reinforcement techniques, and how to adjust their lifestyle. The last step was a second assessment attended by single families and scheduled to take place 2 months after the parents-only group session. The pediatrician met with the family for 40 minutes to discuss weight related risks specific to the child, give positive feedback for all improvements, and talked about barriers encountered during the program thus far. A personalized follow-up schedule was designed dependent upon the severity of risks and associated complications for the child. Those with low risks were asked to follow up every six months. Adolescents, children who were severely overweight, and those who failed initial treatments were asked to follow-up every four months. Patients who showed eating habits linked to psychological issues were asked to attend

an education session every two weeks for the three months. After the first year, follow-up included a yearly clinical assessment. The dietetic therapy (DT) included a clinical assessment, advice on physical therapy, and a diet prescription given by a professional dietitian. Follow-up was the same as the TEP group.

The program lasted a total of three years and participants' BMI were recorded at both baseline and after the 3-year follow-up. Although there are scientific problems with this study and comparison between TEP and DT may not be accurate, it is still beneficial to focus on the successes of conducting a family-based intervention for overweight children that is done by a single physician. At the 3-year follow-up of TEP, 72.9% of children either maintained their prior BMI or managed to lose weight while in the program. In the TEP intervention group, the number of severely obese children decreased by 19%, the number of obese children decreased by 16.5%, 11.8% stabilized their weight, and another 11.8% gained weight. In the DT group only 42.8% of children either maintained their prior BMI or lost weight, while 25.7% of children in this group gained weight. This study suggests that a primary care provider's role is not limited to just identifying a weight problem in children, but can also be extended to educate families on healthy lifestyle choices and to help provide successful treatment for overweight children.

Epstein et al. (1994) conducted a ten-year follow up of 158 families who had participated in one of four family-based behavior modification treatment studies at the University of Pittsburgh. Follow-up found that weight could be maintained throughout adolescence and adulthood. Although Epstein et al. (1994) showed that weight loss can be maintained long-term, this may not always be the case. Wilfley, Stein, & Saelens (2007) performed a study to determine both short-term and long-term efficacy of weight loss maintenance approaches

following family-based weight loss treatment for overweight children. The study examined the effects of extending intervention after participation in family-based weight loss programs. A total of 204 healthy 7-12 year-old children who were classified as overweight and had previously participated in a family-based intervention were used in the study. At least one parent had to agree to participate and attend sessions with the child.

Children were placed in one of three maintenance conditions, the control, behavioral skills maintenance (BSM), or social facilitation maintenance (SFM). BSM training focused on a behavioral approach and acknowledged that different skills are needed to maintain weight loss versus losing weight. This training emphasized self-regulation and relapse prevention. SFM training helps parents and children find peer networks that will help support a healthy lifestyle. The focus of SFM is to address psychological factors, such as teasing and body image, which may be barriers to weight maintenance. It was hypothesized that children in the maintenance groups would have better weight maintenance both short-term and long-term over the control group, with SFM having the highest yield. The maintenance groups included 20-minute family treatment in which both the parent and the child participated and 40-minute individual parent and child sessions. Assessments were made at baseline, 5 months, 9 months, 1-year, and 2-years. The short-term results showed both BSM and SFM active maintenance groups had a significantly higher maintenance BMI z score than those in the control group. The long-term results showed the baseline to 2-year follow-up maintenance BMI z scores were significantly better in the SFM group and no significant difference was seen between the BSM and the control group.

Many studies have been performed in hopes to find the most successful way to treat overweight children and to confirm that parent education plays a role in the treatment of overweight children. Golley et al. (2006) shows family-based interventions that include parenting-skills training with lifestyle education may be superior to other treatment types. Additional studies confirm the importance of parental involvement and even suggest children do not need to be involved with the intervention (Golan et al., 1998, 2006). Wrotniak et al. (2004) show that a decrease in parental BMI is strongly linked to higher success of weight loss in children, confirming how influential parents may be on their child's weight status. Although many of these studies are highly specialized and may not be realistic or accessible in many parts of the country, Tanas et al. (2007) provides optimism for healthcare providers and parents. Their study suggests that successful treatment can be conducted by a single pediatrician and managed in an office setting. Epstein et al. (1994) and Wilfley et al. (2007) show that weight loss achieved in these family-based studies may be carried into adolescents and possibly adulthood.

Suggestions for Healthy Lifestyle Habits

A healthy feeding environment requires structure, supportive limit setting, an appreciation for a child's own capabilities to self regulate, and patience (Kleinman, 2004). In addition, parents must also be knowledgeable about the recommended food groups and serving sizes.

There are currently several nutritional guides that have been developed by the United States Department of Agriculture that provide recommendations for healthy eating among the pediatric population. Two of the most commonly used guides are, *The Dietary Guidelines for Americans, 5th edition* and the *Food Guide Pyramid*.

The Dietary Guidelines for Americans, have been published by the Department of Health and Human Services (HHS) and the United States Department of Agriculture (USDA) every five years since 1980. These guidelines were designed for individuals ages two years and older, and address nine topics (Department of Health and Human Services & the United States Department of Agriculture, 2005, January). Although this document is very educational, the information provided is geared "toward policymakers, nutrition educators, nutritionists, and healthcare providers rather than to the general public" (Department of Health and Human Services & the United States Department of Agriculture, 2005, January). Detailed recommendations were made for the following categories: adequate nutrients within calorie needs, weight management, physical activity, food groups to encourage, fats, carbohydrates, sodium and potassium, alcoholic beverages, and food safety.

The Food Guide Pyramid, is published by the Center for Nutrition Policy and Promotion (CNPP), an agency of the USDA. *The Food Guide Pyramid* was first published over 10 years ago as an attempt to improve nutritional aspects of Americans. The CNPP's goal is to promote dietary guidance, as well as conduct research in the area of nutrition. The USDA retired the

former pyramid and replaced it with a new pyramid that uses a personal approach to develop healthy eating and exercise guidelines. This new pyramid accounts for an individual's age, sex, weight (optional), height (optional), and physical activity in order to design a pyramid plan specific to an individual. The personal plan includes: a suggested calorie intake, breakdown of the five food groups (grains, vegetables, fruits, milk, and meat and beans) with a recommended amount from each group, specified amount of physical activity, and tips on healthy eating.

Weight and height is not taken into account for children ages two through eight years. Plans for this age group are based on average height and weight for children of the same age and gender (Figure 2). All of the information in Figure 2 is based on a 5-year-old male. The USDA also has designed *MyPyramid for Kids*, which targets children ages six through eleven years, and *MyPyramid for Preschoolers*, which targets children ages two through five years. These personal plans provide children with additional learning material about healthy eating and exercise.

It is imperative that parents are knowledgeable about both proper child feeding strategies as well as healthy food choices and a child's nutritional needs. The *Dietary Guidelines for Americans* and the *Food Guide Pyramid* are two excellent guides to assist parents and children in making appropriate choices for nutritious meals. These guides are free sources of information and can be found online.

Conclusion

Parent education may be a promising way to help halt the epidemic of overweight children. Educating parents is the responsibility of healthcare providers. It begins with calculating a child's BMI and informing parents of the corresponding percentile. Parents must then be counseled about the risks that are associated with overweight children. Parent education involves engaging parents in discussions regarding a readiness to change. It also involves advising parents on proper feeding techniques. Research shows that family-based interventions that focus on parent education are successful in helping overweight children lose weight as well as make changes within the home that promote a healthier lifestyle for the child and the family. Although studies using parent and family-based interventions are optimistic regarding weight loss among children, very few studies provide specific techniques and education materials that can be used in an office setting. Further research should be conducted that provides detailed instructions on parent and family-based interventions. Even though there is a need for further research, current studies show that if parents are educated about weight status, comorbidities, food nutrition, and child feeding strategies, there may be hope for halting this national epidemic.

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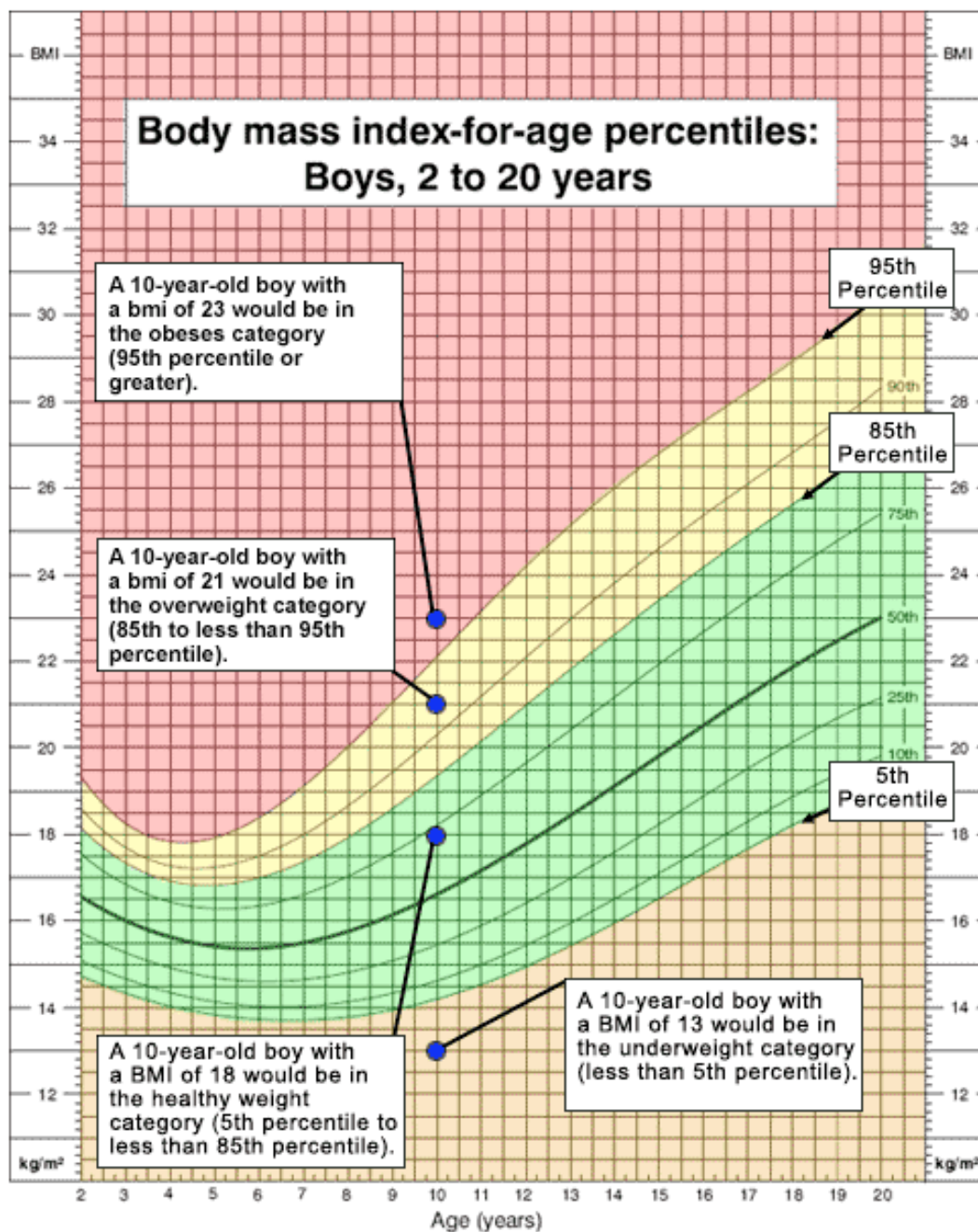


Figure 1. Body mass index-for-age percentiles: Boys, 2 to 20 years. Sample BMIs with interpretation based upon a 10-year-old male.

¹ From “About BMI for Children and Teens” by Centers for Disease Control and Prevention, 2008, September 5, retrieved November 26, 2007 from http://www.cdc.gov/nccdphp/dnpa/healthyweight/assessing/bmi/childrens_BMI/about_childrens_BMI.htm. In the public domain.

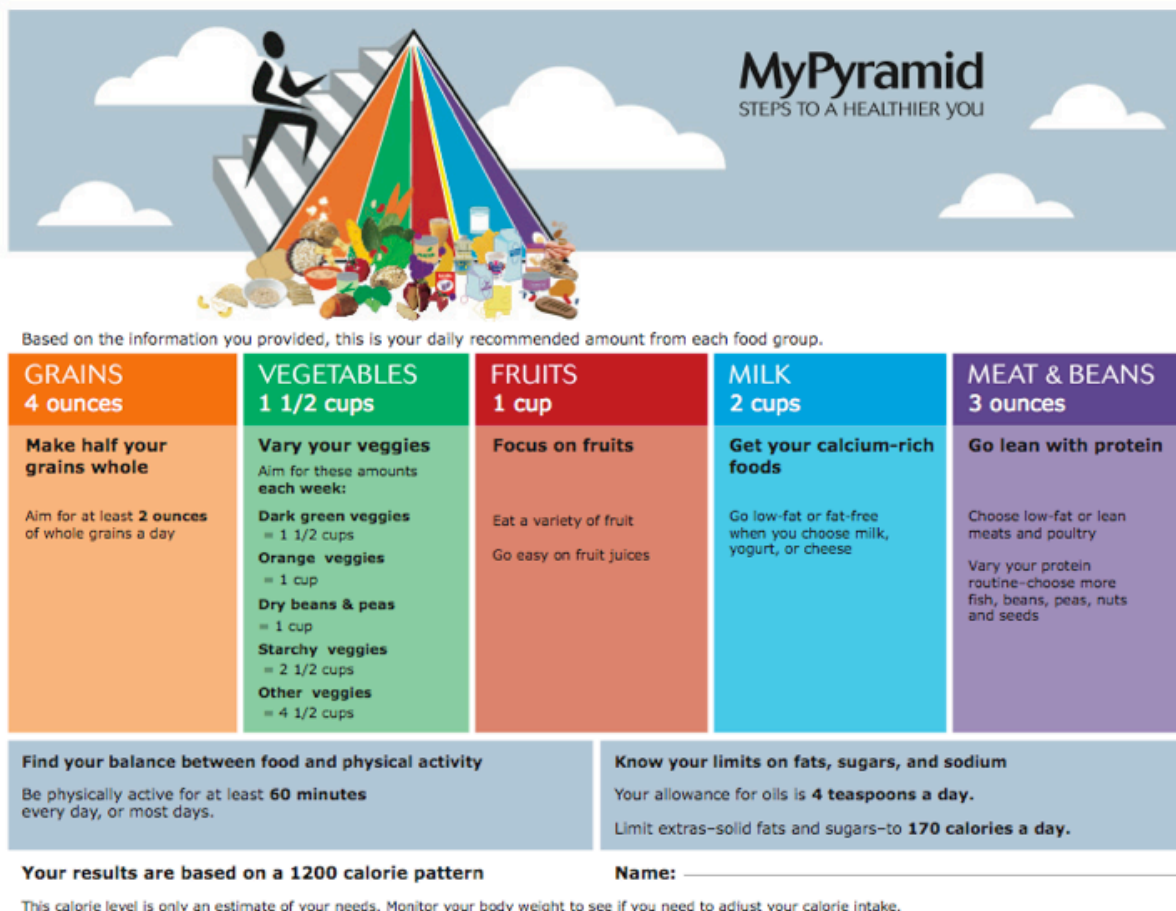


Figure 2. Sample MyPyramid. MyPyramid based upon recommendations specific for a 5-year-old male.

² From “My Pyramid Plan,” by United States Department of Agriculture, 2008, October 14, retrieved January 4, 2008 from http://www.mypyramid.gov/downloads/results/results_1200_under9.pdf. In the public domain.

Abstract

Objective: To examine incidence, contributing factors, comorbidities of overweight children, and to determine if parent education and family-based treatment is an effective means to address this national epidemic.

Method: MEDLINE was used when collecting both background information and finding original research articles. The following terms were used to search for research articles in MEDLINE: overweight, childhood, parent, family, intervention, prevalence, comorbidities, causes, feeding, metabolic syndrome, obstructive sleep apnea, asthma, cardiac, diabetes, psychosocial, education, and attitudes. Articles that explained causes, comorbidities, and directly helped to answer the research question were included. Those articles that were dated or were not relevant were excluded. Original research articles were preferred. Government sites that provide the most recent statistics as well as national nutritional recommendations were also used in the paper.

Results: Studies suggest that family-based treatment and parent education is a necessity in the treatment of overweight children.

Conclusion: Family-based treatment as a means to address overweight children is an excellent and promising option. Children cannot make difficult lifestyle changes without the support of their parents. Healthcare providers need to aid parents in understanding appropriate weight status and providing parents with the resources necessary to make a change.