Factors Affecting Parents Misperception of Overweight or Obesity in their Children

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FACTORS AFFECTING PARENTS MISPERCEPTION OF OVERWEIGHT OR OBESITY IN THEIR CHILDREN

By
Carol Barnes Reid

A Dissertation in Partial Fulfillment of the Requirements for the
Degree of Doctor of Public Health in Health Education

March 2012
Each person whose signature appears below certifies that this dissertation, in his/her opinion, is adequate in the scope and quality as a dissertation for the degree of Doctor of Public Health.

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ABSTRACT OF THE DISSERTATION

Factors Affecting Parents Misperception of Overweight or Obesity in Their Children

by

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Doctor of Public Health Candidate in Health Education
Loma Linda University, Loma Linda University, 2010

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Background: Treating overweight children may be more difficult when parents themselves do not correctly recognize their child’s weight status (Carnell, Edwards, Croker, Boniface, & Wardle, 2005; Boniface, & Wardle, 2005). While it is a commonly held belief in some cultures that overweight children are healthy, incorrectly assessing overweight in very young children results in unfavorable weight development throughout childhood (Kroje, Struthman, & Günther, 2006). This is due to the increased likelihood that parents may not take the condition of obesity in their child as being serious, or they may fail to seek or accept professional help in correcting the problem (Carnell, et al., 2005).

Purpose: The purpose of this research was to determine if factors such as parents BMI and educational level affect misperception of overweight and obesity in children.

Method: This research utilized a cross sectional, observational design that examined
correlations between a parent’s own BMI and educational levels on perception of their
child’s overweight or obese status. Factors related to parents’ actual performance of weight control behaviors or intentions to change behavior were examined. In the literature review, current research on parental perception of children’s overweight status, and to what extent parents’ own weight status is associated with any disconnect served as a basis for this study.

The study participants included 105 parents of children determined to be overweight or obese. For comparison purposes, 105 parents of normal weight children were included in the study. Using Silhouette Matching Task, parent’s perception of their child’s actual body weight and perceived ideal body weight were measured. Using a 5-point Likert scale, an instrument to measure actual lifestyle changes that have been initiated to address a weight problem or intentions to practice lifestyle changes was used. Participants were required to complete a demographic form that provided information on their sex, ethnicity, level of education, and income. This information was used to measure differences in perception within the group.

Results: Participants who indicated they had at least some college were more accurate in their perception of their child’s weight status as compared with those with a post graduate degree. For other socioeconomic factors such as income, no significant association was found. Parents who were overweight or obese had higher levels of misperception as compared to parents who were of a normal weight. Correlation was observed between health belief model variables of perceived susceptibility and severity and how parents perceived child overweight.

Conclusion: Misperception of a child’s weight is affected by parents BMI, with overweight and obese parents being more likely to misperceive their child’s weight.
Parents with some college appear to be more correct with perception compared to those with a post graduate degree. Income does not appear to play a role in perception. Results from this study provide health educators who are developing intervention programs that address childhood overweight and obesity with an understanding of how variables such as parents own weight status and educational level affect perception. This understanding is important in developing intervention programs that include activities aimed at correcting weight misperception first, before attempting to alter behavior.
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CHAPTER 1
INTRODUCTION

A. Statement of the Problem

Childhood obesity is one of the major public health problems facing the United States and many other industrialized and developing countries worldwide (Wang, 2001). In the United States childhood overweight and obesity occur in all income levels, regardless of age, gender, or racial/ethnic differences (Tyler & Horner, 2008). The Centers for Disease Control and Prevention (CDC) reported that 17% of all children and adolescents in the United States are obese (CDC, 2010).

There are a number of complications associated with obesity. For the overweight child, there is an increased risk of problems with mobility, deterioration of joints, poor physical fitness, difficulty with breathing, and low self-esteem (Tyler & Horner, 2008). Additionally, overweight and obese children are at an increased risk of diseases associated with obesity throughout their lifetime including Type 2 diabetes, which in turn can accelerate the development of other serious illnesses such as cardiovascular disease, stroke, blindness, kidney failure, and limb amputations (Speroni, Tea, Earley, Niehoff, & Atherton, 2008). Polycystic Ovarian Syndrome, a common disorder that affects a number of females of reproductive age, is more likely to occur in overweight girls (Zidenberg & Wright, 2008).

Other issues related to obesity in children include negative effects on physical, social and emotional development (Wittberg, Northrup, & Cottrel, 2009). A major concern is that overweight and obesity existing in childhood is more likely to extend to the adult years (Eriksson, Forsen, Osmond, & Barker, 2003; Hardy, Wadsworth, & Kuh,
As a result, many health professionals have concluded that in order to stem the high incidence of many chronic, non-communicable diseases in adults, increased efforts to prevent and reverse childhood overweight and obesity are needed.

In order to reverse this trend, a concerted effort from health professionals and parents is needed. Researchers admit that the first step in addressing the problem is for parents to acknowledge that their child is overweight or obese, followed by a willingness to accept help (Rhee, DeLago, Arscott-Mills, Mehta, & Davis, 2005). It is felt that a misperception of a child’s weight by parents inhibits the likelihood of intervention leading to behavior change (Howard, 2007).

1. Parental Perception

A number of researchers have found that there is a parental disconnect between actual and perceived weight status in children (Baugcum, Chamberlin, Deeks, Powers, & Whitaker, 2000; Doolen, Alpert, & Miller, 2009; Hackie & Bowles, 2007; Maynard, Galuska, Blanck, & Serdula, 2003; Myers & Vargas, 2000). Although there are methods for determining obesity, how adults perceive the weight of their children may be based on a number of factors. It is hypothesized that parents’ level of education, ethnicity, and income levels are associated with differences in weight perception, as posited by Eckstein et al., (2006) and Myers and Vargas (2000). It is important to investigate the relation of these variables as other researchers have concluded that there are no differences in how weight is perceived based on factors such as ethnicity and parental education (Jansen & Brug, 2006).

Parental perception of child overweight is defined as parents recognizing their child’s overweight status, or having concerns about current or future health problems
that are associated with overweight or obesity in children (Towns & D'Auria, 2009). An essential element in addressing childhood obesity is for parents to be aware of their child’s overweight status, followed by a concern to treat the problem (Rhee et al., 2005). Parental awareness of the problem and willingness to engage in discussions aimed at addressing the issue is intrinsic to the success of helping the affected child (Wald et al., 2007).

Parental perception should be targeted as a point of intervention without which a critical partner in stemming the epidemic of childhood obesity will be missed (Jeffery, Voss, Metcalf, Alba, & Wilkin, 2005). Accepting that a child is overweight is the first step in obtaining treatment and parental involvement has been shown to help with long-term results of behavior change (Towns & D'Auria, 2009). Though parental misperception is widely studied, there is a paucity of extensive research on the reasons for this disconnect as it relates to independent variables such as parental weight status and educational level. Researchers have studied parental perception of their child’s weight status as compared to actual BMI measurement (Wald, et al., 2007). However, research is lacking in regards to factors that may impact a parent’s willingness to discuss the weight problem with a health professional, and whether parental perception of weight may play a role in this process. The overall consensus is that more studies in which researchers examine the reasons for this disconnect are needed so that intervention programs that address the problem of childhood overweight and obesity will be more successful (Doolen, et al., 2009; Maynard, et al., 2003).
2. Perception of seriousness of childhood obesity

A critical part in addressing obesity in children is for parents to seek help from a health professional. In order for this to occur, parents must first accept that their child has a weight problem that is potentially serious on overall health status. Early assessment by health professionals of parents’ willingness and readiness to address the problem, by using specific questions is necessary before intervention is initiated (Dietz, 1999).

Recognizing the health risks associated with childhood obesity is determined to positively affect the likelihood to address the problem. However, not only do many parents of overweight children have an incorrect perception of their child’s weight, but their knowledge and understanding of the health risks associated with obesity is lacking (Etelson, Brand, & Patrick, 2003). It is this lack of knowledge and understanding that results in parents not taking the problem of childhood obesity seriously (Doolen, et al., 2009).

B. Purpose of the Study

The purpose of this study was to determine factors that affect parents’ misperception of overweight or obesity in their children. Specifically, the study examined if factors such as parents’ own BMI and educational level affect perception of children’s weight status. A correlation between a correct perception of overweight status and perceived seriousness, and actual performance of weight control behavior by parents, or their intentions to do so in order to help their child was studied.

The specific independent variables that were examined are parental BMI and levels of education in parents. The effects of these independent variables on the
dependent variable parental perception and how perception of weight impacts perceived severity of overweight and obesity are the main focus of the research. A comparison of perception based on parental socioeconomic status is intended to determine if factors such as education play a role in how parents perceive their child’s weight, seriousness of the condition, and/or willingness to accept help for weight loss.

**C. Research Questions**

1. Are socioeconomic factors such as higher levels of education associated with parents correctly identifying their child as being overweight or obese?
2. Is parental perception of their child’s weight status affected by the parents own weight status?
3. How do the health belief model variables of perceived susceptibility and severity affect how serious parents perceive overweight or obesity in their child?
4. What measures are parents taking to control their child’s weight or what are their intentions to do so?

**D. Theoretical Framework**

The relationship between these variables and the proposed mechanisms by which they correlate were examined. Measurement of parental perception of their child’s weight status and what measures they are currently taking to control their child’s weight were developed using the health belief model (HBM) as a guide.

The health belief model (HBM) is a frequently used health behavior application that was developed initially to help provide explanations regarding to the reasons people choose or refuse to use health services (Mckenzie, Neigher, & Smeltzer, 2005). Primary concepts contained in this theory that predict behavior include susceptibility, seriousness,
benefits and barriers to a behavior, cues to action and, recently, self efficacy (Glanz, Rimer, & Viswanth, 2008).

**Figure 1.** The constructs of the health belief model by Hochbaum, Rosenstock, and Kegels.

The hypothesis of the HBM is that individuals are more likely to engage in health-related actions if they have sufficient motivation, believe that they are vulnerable to a serious health problem, or believe that this health action will be beneficial for reducing the threat (Mckenzie, Neigher, & Smeltzer, 2005). Perception is the key component behind these constructs, as individuals are unlikely to get to the stage of behavior change via action if there are misperceptions related to any health condition. The HBM also hypothesizes that there are a number of modifying factors that play a role in perception. These factors include demographic variables (age, sex, race, etc), socioeconomics, and structural variables such as knowledge about a disease or condition (Mckenzie et al., 2005).
There is limited research on the application of the health belief model applied to weight management even though it is beneficial to apply this model to such research (Daddario, 2007). Daddario reviewed a few studies that applied health belief constructs to specified variables. He discussed one study in which the researcher used the health belief model to design questions that measured perceived susceptibility ("What health risks do you think your weight poses for you?"), perceived seriousness ("what do you think will happen if you don’t lose weight?"), perceived benefits of action ("How do you think you will benefit by the losing of weight?"), barriers to action (What prevents you from losing weight?"), and cues to action ("What will motivate you to lose weight?"). In another study researchers examined perception of overweight and obese postpartum mothers on the benefits and barriers of weight loss (Lambert et al., 2005). Results indicated that participants perceived that weight loss is beneficial in increasing self-esteem, allowing for increased physical activity, improved health, and less societal prejudices. Perceived barriers such as the lack of personal effort, social support and finances were identified as preventing participants from achieving weight loss goals. The researchers found that using the health belief model as a framework was helpful in this study, as they received positive responses for all constructs of the model. From this study, the researchers concluded that misperception on the susceptibility and severity of overweight/obesity in an individual can affect motivation to action.

A review of studies on effects of parental perception related to readiness to initiate changes in eating and physical activity behaviors in their overweight children cited only one study where the transtheoretical model of behavior change was applied (Towns & D'Auria, 2009). However, there is a lack of documentation on the application
of health behavior theories in studying the factors that are involved in parental misperception of their child's weight, how this misperception relates to perceived seriousness of overweight and obesity, and how the accuracy or inaccuracy of perceived seriousness impacts action including the initial step of seeking appropriate help for weight management techniques for the overweight or obese child.

It is against this background that this research sought to analyze the external variables 'parent's BMI' and 'parent's educational levels' as modifying factors that may affect perception (refer to figure 2). The aim was to determine the relationship between modifying factors and individual beliefs that would lead to action. The health belief model was adapted to examine the effects of modifying factors of parents own BMI and educational levels on perceived susceptibility and risk and resulting action if it is already occurring, or the intention to changing behavior.

![Figure 2](image_url)

**Figure 2.** Proposed mechanisms by which parents' own BMI or level of education affects perception of their child's weight, seriousness of overweight, and actions taken to address the weight problem.

The hypotheses of this research are that these external variables play a vital role in whether or not parents' are able to accurately perceive their child as being overweight or
obese, that misperception affects individual beliefs on the seriousness of outcomes related to overweight/obesity, and that the correct perceived seriousness of obesity increases that likelihood of initiating action.

Although a number of researchers have found a disconnect between parental perception and children’s actual weight status, there is a paucity of research that indicates why this misperception exists (Baur, 2005). Some speculate that reasons for misperception may be due to variations in definitions of overweight and obesity by experts (Jansen & Burg, 2006) or the desensitization of the sight of increased body fatness in the westernized world due to increase in prevalence rates of obesity (Editorial, International Journal of Obesity).

Researchers have found that higher levels of education seem to help mothers accurately perceive their child’s weight (Carnell et al., 2005; Rhee et al., 2005). This is because a more highly educated person would be more likely to have the requisite knowledge on not only correctly identifying overweight or obesity, but also seeing these conditions as a risk to health (Baughcum et al., 2000). Other theories on reasons for perceptual distortion include: (a) Parents reluctance to acknowledge that their child’s weight is socially undesirable. (b) If the child appears similar in weight to many other children, parents may not recognize the child as being overweight. (c) The more children are concerned with their weight, the more likely mothers are to underestimate their overweight status (Wald, et al., 2007). These ideas suggest that the reasons for misclassification vary, and may be the result of influences based on socioeconomic and sociodemographic factors (Doolen et al., 2009). Furthermore, there appears to be a generational shift in social norms related to the tendency to correctly self-classify weight.
status in overweight individuals (Burke, Heiland, & Nadler, 2009). In their study, Burke et al. found recently that overweight individuals were less likely to correctly classify themselves as overweight or obese as compared to overweight individuals a decade ago.

Misperception can be based on the phenomenon called optimistic bias, which is defined as perceiving oneself as being less likely than others to experience negative events (Kos & Clarke, 2001). According to Avis, Smith, and McKinlay (1989), optimistic bias may be the result of cognitive errors (such as a lack of information) or motivational needs (such as defensive denial). In this research, the independent variable “misperception of a child’s weight status”, leading possibly to the dependent variable “actual weight control behaviors” is based on this phenomenon where some parents may not view their child’s overweight status as an adverse health.

E. **Significance to Health Education**

Childhood obesity is a serious problem facing the United States and many other countries worldwide. Reversing this trend requires skill and knowledge from not only pediatric health care providers and health educators, but also parents and primary care givers. To increase the success of these programs, there needs to be increased awareness by parents in correctly assessing their child’s weight status.

Many researchers conclude that parents have to first agree that their child is overweight before they will take the next step to seek and accept help. If parents are unaware that their child has a weight problem, it is unlikely that they will present to the primary physician or other health-care professional in obtaining help for weight management issues (Baur, 2005). Furthermore, there is a need for researchers to investigate the causes of the parental disconnect as to why it exists and how it can be
corrected (Doolen, Alpert, & Miller, 2009).

Findings from this research may help health professionals to understand that variables such as parents own weight and/or educational level can affect perception of their child’s weight. Additionally, since the application of the health belief model in studying parental misperception on their child’s body weight is lacking, this research will provide a framework for understanding the variables being studied.

Having a clear understanding of this is important for developing intervention programs taking into account parental perception. If it is identified that parents misperceive their child’s overweight status based on the variables studied in this research, health professionals will be able to develop intervention programs that include activities aimed at correcting weight misperception first before altering behavior.
CHAPTER 2
LITERATURE REVIEW

A. Overview

Childhood obesity is a major public health problem facing the United States and many other countries worldwide (Hackie & Bowles, 2007; Kroke, Strathmann, & Günther, 2006; Myers & Vargas, 2000; Rolland-Cachera, Deheeger, Maillot, & Bellisle, 2006; Singh, Kogan, Dyck, & Siahpush, 2008). Parental awareness of the problem and willingness to engage in discussions aimed at addressing the issue is intrinsic to the success of helping the affected child (Wald et al., 2007). Treating overweight children may be more difficult when parents themselves do not correctly recognize their child’s weight status (Carnell, et al., 2005). Additionally, incorrectly assessing overweight in very young children results in unfavorable weight development throughout childhood (Kroje, Struthman, & Günther, 2006). Accepting that a child is overweight followed by parental involvement has been shown to help with long-term positive results for weight control in children (Towns & D’Auria, 2009).

Though parental misperception is widely studied, there is a paucity of extensive research on the reasons for this disconnect (Doolen, et al., 2009). In this literature review, the current research on parental perception of children’s overweight status, and to what extent parents’ own weight status and educational level is associated with any disconnect will be examined. Understanding possible correlations are critical since an essential element in addressing childhood obesity is for parents to be aware of their child’s overweight status, followed by a concern to treat the problem (Rhee et al, 2005). Furthermore, researchers concluded that parental perception should be targeted as a point
of intervention, without which a critical partner in stemming the epidemic of childhood obesity will be missed (Jeffery, Voss, Metcalf, Alba, & Wilkin, 2005).

This literature review includes an overview on (a) prevalence rates of overweight and obesity in US children along with causes of obesity in children and the physiological, psychological and financial burdens caused by this problem, (b) an overview of factors that cause weight misperception in general, (c) parental perception of overweight and obesity in children, and (d) risk interpretation and how it impacts parents behaviors in addressing the problem. Finally, there is a summary of the literature with suggestions for areas that require additional research.

B. Health Implications of Childhood Obesity

1. Prevalence

Childhood obesity is defined as an excess in body weight that is associated with adverse health or psychological outcomes (Kushner and Bessesen, 2007). Body Mass Index (BMI), a measure of an individual’s weight in relation to their height, is used in both adults and children to determine weight status. The Centers for Disease Control (CDC) recommends that BMI be used as a screening tool for overweight and obesity in children starting at age 2 years (CDC, 2010). As explained by the CDC, the BMI-age-weight status and corresponding categories identifies children who fall between the 85th and 95th percentile as being overweight and those who fall at or above the 95th percentile as being obese.

It is a well established fact that the prevalence of overweight and obesity in children is increasing worldwide, and begins in many instances from early childhood extending into the adult years and throughout the lifespan (Jolliffe, 2004; Lee et al.; Must
Globally, this trend includes an increased incidence of obesity in regions such as Eastern Europe and the Middle East that traditionally experienced low rates (Ben-Sefer, Ben-Natan, & Ehrenfeld, 2009). Current estimates are that that 17% of all children and adolescents in the United States are considered to be obese, which is triple the rate compared to just a generation ago (CDC, 2010). In the United States childhood overweight and obesity occurs in all income levels, regardless of age, gender, or racial/ethnic differences, with steady increases being noted from the early 1970s (Tyler & Honer, 2008). The federal government has conducted nutrition surveys periodically from the 1960s called the National Health and Nutrition Examination Surveys (NHANES), and found a steady increase in the prevalence of obesity in all age groups (Kushner & Bessesen, 2007). In the United States, children from ethnic minority groups and whose families have a low socioeconomic status have an increased risk of obesity (Blomquist & Bergström, 2007; Haas et al., 2003; Levy & Petty, 2008; Vieweg, Johnston, Lanier, Fernandez, & Pandurangi, 2007). With these high prevalence rates that are repeatedly reported by a number of researchers, the consensus is that obesity and its consequences is considered to be an international public health problem (Haas, et al., 2003; Levy & Petty, 2008; Wittberg, Northrup, & Cottrel, 2009).

2. Risk Factors

The risk factors for childhood obesity can be categorized as avoidable and unavoidable. Avoidable risk factors are related to behaviors such as diets containing increased calories particularly from fats and simple sugars, which is considered one of the main reasons for the development of overweight and obesity (Ben-Sefer, et al., 2009). Unavoidable risk factors includes parental obesity, genetics, or the environment (Jain,
Included in the environment is the predatory marketing of unhealthy food items in the media that are geared specifically towards children. Unless a child is entirely shielded from all electronic media, they are at an increased risk of being exposed to advertisements that promote unhealthy food items that can be associated with undesirable weight gain (Pomeranz, 2010).

Sugar-sweetened beverages may be a key contributor to the epidemic of overweight and obesity, as these substances contain high levels of added sugar while offering low levels of satiety (Malik, Schulze, & Hu, 2006). Sugar sweetened drinks, which are commonly consumed by children, is a concern. Studies show that energy from sweetened beverages accounted for a 50% increase in total energy in children (Crawford, Woodward-Lopez, Ritchie, & Webb, 2008). Researchers have found that children who consumed an excess of sugar-sweetened beverages such as soda had an increase in BMI and frequency of obesity, even after adjusting for other factors such as demographics, lifestyle and other dietary behaviors (Ludwig, Peterson, & Gortmaker, 2001). Other dietary factors such as a high intake of fast food are an issue. It is unfortunate that some neighborhoods with residents from a lower socio-economic status have a greater exposure to fast food restaurants, and researchers have found this increased presence of such establishments may result in a higher incidence of obesity in both adults and children (Smoyer-Tomic et al., 2008).

Decrease in energy expenditure because of a sedentary lifestyle in both adults and children is another avoidable risk factor for the increase in obesity rates (Lioret, Maire, Volatier, & Charles, 2007). With the increase in video games and other sedentary means of entertainment such as television viewing and recreational computer usage, children are
becoming increasingly inactive (Singh, et al., 2008). There is a specific concern for children who reside in the inner cities. These children, who are usually minorities that are already at an increased risk for obesity, often live in areas where it is not safe to engage in physical activity outdoors (Drewnowski, Rehm, Kao, & Goldstein, 2009). The combination of decreased physical activity and diets high in fats and sugars further increases the risk for obesity in minority children (Vieweg, et al., 2007). Encouraging increased physical activity in children is not only important for preventing overweight and obesity, but to improve academic performance (Wittberg, et al., 2009).

The effects of maternal weight on childhood obesity have been widely studied. Studies show that a higher BMI during pregnancy increases growth during childhood along with an increased risk for obesity during adulthood (Eriksson, et al., 2003). According to Gibson et al. (2007) there is an increased risk of overweight and obesity in children with mothers who are overweight and/or single. It is felt that parental obesity increases the risk for childhood obesity, whether through genetics or the environment in terms of feeding and activity practices (Jain, et al., 2001).

3. Health Implications

Even though childhood obesity is a poor predictor of obesity in adulthood since most obese adults were not overweight as children, James (2008) indicated that children who become obese during the early stages of life tend to remain overweight through adulthood. More succinctly, the phenomenon referred to as adiposity rebound, where body fatness in children after age 2 years falls to a minimum around age 6 before rising again. This is a strong predictor of obesity later in life (Eriksson, et al., 2003). Central obesity which is evidenced by increased abdominal adiposity is felt to be the
major risk factor in diseases such as high blood pressure, dyslipidemia, and insulin resistance diabetes (Beilin & Huang, 2008). When central obesity develops during early childhood, there is an increased risk for these diseases later in life. For example, the formation of atherosclerotic plaque in the arteries of very young children leads to heart disease in adults (Ben-Sefer, et al., 2009). Non insulin-dependent diabetes, previously observed mostly in adults, is now seen in a number of children and teenagers, with overweight and obesity implicated as the main cause (CDC, 2010). Researchers suspect that central obesity leads to these and other abnormalities which are referred to as the metabolic syndrome (Beilin & Huang, 2008).

There are a number of other complications associated with obesity in children. For the overweight child, there is an increased risk of problems with mobility and a deterioration of joints (Tyler & Horner, 2008). Orthopedic abnormalities occurs when there is an increased pressure on the unfused growth plates and softer, cartilaginous bones in obese children (Must & Strauss, 1999). Discomfort to the muscles and joints along with premature exercise fatigue are often experienced by obese children, making adherence to any recommendation for increased exercise difficult (McWhoter, Wallman, and Alpert, 2003). It is reasonable to conclude that encouragement of increased physical activity in obese children must take into consideration the physical limitations that can occur as a result of orthopedic abnormalities.

Another consequence of obesity is concern for effects on fertility. Overweight (teenaged) girls are at an increased risk of developing Polycystic Ovarian Syndrome (PCOS), a common disorder that affects 4 to 12% of females of reproductive age and that increases the risk of infertility (Sheehan, 2004). Obesity is noted as one of the risk
factors with complications of insulin resistance in this condition (Kushner & Bessesen, 2007). This has lead to the recommendation by physicians that teenage girls be frequently screened for overweight and obesity (Zidenberg & Wright, 2008). Many obese children develop conditions such as Acanthosis nigricans (AN), a skin disorder that is characterized by an unsightly, velvety, hyperpigmented patch that appears on the neck, axillae and other skin folds, is linked to obesity and suggests insulin resistance in the affected individual (Miura et al., 2006).

Although the health implications of treating obesity and its complications are numerous, another concern is the cost for this care (Kushner, 2007). It is estimated that an obese adult may incur increased health care cost that are about one-third higher than adults of a normal weight (Kushner). A report from the American College of Surgeons stated that obesity raises surgical risk for procedures such cholecystectomy and appendectomy, which increases the cost of treatment (Sullivan, 2010). Using acute appendicitis as an example, Sullivan explained that the complication rate was 21% for the obese patient versus 18.8% for the non-obese patient, resulting in a mean additional cost of $1220.

The overall economic cost associated with obesity has been estimated by the United States Surgeon General at $117 billion (Speroni et al, 2007). For children alone, this cost is estimated at $3 billion annually (CDC, 2010). Kushner further stated that the severely obese patient who requires higher levels of care due to complications is more likely to be lacking in adequate health coverage or have no form of coverage at all since a greater number individuals who fall within this weight category are having lower income levels and cannot afford insurance on their own if it is not provided through work or any
other means. Furthermore, because of this lack of insurance coverage, patients from a lower socioeconomic status (SES) are less likely to receive regular screening for common health risks associated with obesity (American Academy of Pediatric Committee on Nutrition (APA), 2003).

C. Factors that Affect Weight Perception in General

1. Effects of Race and Culture

Perception is generally defined as the mental process used to select, organize, and evaluate stimuli that occur in the external environment which is then used to mold a meaningful experience (Hersey, Blanchard, & Johnson, 2008). In a study conducted on Hispanic mothers of overweight children revealed that a greater percentage of the mothers did not perceive their children as having a weight problem, regardless of the mother’s educational level or age of child (Hackie & Bowles, 2007). In another study on mothers perception of their own weight and the weight of their children, researchers found that Black mothers were more likely to be accepting of overweight in their children as compared to other races (Baugcum, et al., 2000). For parents of overweight adolescents, researchers from one study conducted in the US found that Asian and white mothers were more accurate at weight perception than African American and Hispanic mothers (Boutelle, Fulkerson, Neumark-Sztainer, & Story, 2004).

How an individual perceives his or her body image may have more to do with cultural norms than actual physical dimensions (Ayala, Mickens, Galindo, & Elder, 2007). The role of culture is so significant that even with migration, body weight perception remains fairly constant. In a study that compared maternal perceptions of early childhood ideal body weight between Mexican-origin mothers residing in Mexico
and California, researchers found little difference in perceived actual body size on the basis of country of residence (Guendelman, Fernald, Neufeld, & Fuentes-Afflick, 2010). However, these researchers did find that there are large differences in what mothers perceived as ideal body weight with Mexican-American mothers expressing a stronger preference for a smaller body size in their children as compared to mothers living in Mexico.

2. Effects of SES and Gender

Socio-economic factors such as level of education impacts perception. In studies that focused on maternal perception of overweight in children, the researchers found that low maternal education was positively associated with misperception, even after adjusting for family income, maternal obesity, race, and gender (Hodges, 2003). Similar results were found with mothers of preschool children with lower levels of education (i.e. less that high school) who were more likely to be overweight or obese and have children with weight problems (Baughcum, et al., 2000). Even though the majority of the mothers in this study perceived themselves as overweight, they did not perceive their child as having a weight problem.

In another study, a gender difference was observed in how weight was perceived by children. Researchers found that obese boys were more likely to underestimate their own body weight along with being less likely to attempt to lose weight as compared to overweight girls (Steen, Wadden, Foster, & Andersen, 1996). In a similar study conducted on adults, researchers found that overweight/obese males were more likely to under assess their weight as compared to overweight/obese females (Kuchler & Variyam, 2003). This suggests that there clearly is a gender bias in regards to obesity perception in
children and adults.

Doolen et al. (2006) reported a lack of studies on the underlying causes for misperception. However, they indicated that some mothers distrust growth charts and had the feeling that these instruments were not applicable to their children. Other mothers mentioned in this report admitted to not having a clear understanding of what overweight meant, while some simply were unwilling to label their child as being overweight.

D. Parental perception of weight in children

An essential element in addressing childhood obesity is for parents to be aware of their child’s overweight status, followed by a concern to treat the problem (Rhee, DeLago, Arscott-Mills, Mehta, & Davis, 2005). Towns and D’Auria (2009) defined parental perception of child overweight as “parental recognition of their child’s overweight status or concerns about current and future health problems associated with child overweight”. A number of studies have been conducted in which researchers sought to ascertain if parents correctly recognized overweight and obesity in their children. The majority of studies on this subject primarily examined maternal perceptions, while some included father, grandmothers, and other guardians. These studies have been conducted in a number of countries with similar results being found, suggesting that there are universally held beliefs that influence parental misperception (Doolen, et al., 2009).

1. Mothers’ Perception

Data from the Third National Health and Nutrition Examination Survey (NHANES) was used to study maternal perception of their child’s weight (Maynard, et
al., 2003). In this study researchers found that about one third of the mothers reported their overweight child as being of a normal weight. These researchers further determined that there was an increased odds of overweight girls being correctly identified as overweight versus overweight boys, and that younger children were more likely to be incorrectly classified as compared to older children. In comparing weight perception of children by normal weight and overweight mothers, researchers found that normal weight mothers were more inclined to correctly identify their child as being overweight (Boutelle, Fulkerson, Neumark-Sztainer, & Story, 2004). An interesting observation that was evident in a review of researches on parental perception is that even when parents (particularly mothers) were able to correctly identify themselves as overweight, they could not do the same for their children (Baughcum et al., 2000; Towns & D’Auria).

On the other hand, Jefferey, Voss, Alba, and Wilkin (2005) found no difference in weight perception of children in overweight or normal weight mothers. In the study by Boutelle et al. (2004), teenagers responded to a survey while mothers answered questions over the telephone in regards to demographic data and their own weight and height. Jeffery et al. (2005) examined a much younger age group (mean age 7.4 years) and parents completed a questionnaire which required an estimation of the child’s weight and their own weight. The differences observed in this study could be based on the fact that different age groups were examined, as it is hypothesized that parents are more likely to have the correct perception of their child’s weight when the child is older than 8 years of age (Rhee et al., 2005).

A number of other studies have been conducted on parents of younger children, with consistent findings. Myers and Vargas (2000) studied parental perception of obese
pre-school children that were enrolled in the women, infant, and children (WIC) and child health clinic in Arlington Virginia. At that time it was estimated that 21% of the children enrolled were obese. For the study parents were given a questionnaire that measured their responses on perception of their child’s weight. The researchers found that 43% of the parents thought that their child’s weight was appropriate while 35% held disbelief that their child was considered obese. A replication of this study conducted in Southern Nevada yielded similar results (Hackie & Bowles, 2007). These researchers found that 61% of the mothers failed to recognize their child as being overweight. The majority of mothers in both studies were Hispanic, suggesting, as previously discussed, that culture plays a significant role in how parents perceive their children’s weight. For Hispanics and African Americans, researchers found that many parents had a preference for larger body types and did not identify their child’s weight as a problem (Towns & D'Auria, 2009). Baughcum et al. (2000) studied maternal perception of weight in preschool children and found that even when 95% of the mother felt that they themselves were overweight, 79% failed to recognize a weight problem in their child.

2. Perception of Teenagers’ Weight

Considering that approximately 20% of adolescents in the United States is thought to be overweight (Boutelle, et al., 2004), an understanding of parents perception of their teenagers weight is also relevant. Studies that included older children have similar findings to those conducted in younger children. In one study where participants were adolescents enrolled in the Project EAT (Eating Among Teens) and their mothers/female guardians, 60% of the mothers correctly assessed their child’s weight status while 35% underestimated weight status (Boutelle, et al., 2004). Results from this
study also indicated that mothers of female teenagers were more likely to underestimate weight as compared to mothers of male teenagers. This clear bias may be the result of parents having the opinion that overweight is more acceptable in boys than girls (Maynard, et al., 2003) since they were more inclined to correctly assess their sons as compared to their daughters.

In a study that included both younger and older children ages 2 to 17 years, researchers measured parental perception of overweight and at risk for overweight (AROW) children. The instruments used included measuring perception based on words and sketches. It was interesting to note that few parents used words to describe their child as overweight, but did choose a heavier sketch to indicate their weight perception (Eckstein et al., 2006).

3. *Perception in Other Countries*

Parental perception of their child’s weight has been studied in a number of other countries. In a study conducted in England, only 1.9% of parents of overweight children and 17.1% of those with obese children perceived their child to be overweight (Carnell, et al., 2005). The children in this study were 3-5 years of age and the findings were consistent across differing educational levels of parents, ethnicity, or gender of children. In a similar study conducted in Australia, 89% percent of the parents of overweight children ages 5-6 and 63% of parents of overweight children ages 10-12 were unaware that their child was classified as overweight (David, Anna, Amanda, & Jo, 2006).
4. *Children’s Gender and Parental Perception*

There are conflicting reports on whether or not parents perceive the weight of girls differently than boys. In reviewing the literature on parental weight perception studies, Towns and D’Auria (2006) reported that some researchers found no relationship between the child’s gender and how weight was perceived. However, other researchers sited in this review found that parents were more likely to recognize and correctly classify girls as being overweight more so than boys. Additionally, Towns and D’Auria referred to one study where the researchers determined that both fathers and mothers were more accurate in classifying girls as overweight, but inaccurate in classifying boys.

E. **Risk Interpretation and Consequences**

It is the individual’s perception of a health situation that impacts his or her interpretation of risk (Association of Reproductive Health Professionals, 2006). Perceived risk is included in many models of health behavior, which assume that perceived susceptibility or vulnerability of risk serve as a motivating factor to health behavior change (Daddario, 2007). Obesity risk is referred to as an individual’s awareness of the harmful health consequences that are likely to occur in obese individuals (Kan & Tsai, 2004). If the individual has a misperception of a condition and related serious consequences, behavior change is unlikely to occur.

Even when some parents are able to state the risk factors associated with obesity, there is still a disconnect with their child’s actual and perceived weight. To prove this, in questioning parents about their child’s weight status, Myers and Vargas (2001) found that many parents stated that childhood obesity increased the risk of heart disease, yet the majority of these same parents did not correctly perceive their child as being overweight.
If parents do not recognize that their child is overweight or obese, they will be less likely to provide the support and care needed to help reverse the weight problem (Carnell, et al., 2005). This is especially important for mothers as they play a critical role in shaping early dietary and activity behaviors of their young children (Jain, et al., 2001). For parents who do take steps to preventing obesity in their children, results from one study indicated that parents with lower educational levels are less likely to do so (David, et al., 2006). In their study Jeffery et al (2006) found that not only were most parents unaware that their child was overweight, but they were also unconcerned about their child’s weight, that is, it simply was not an issue to them.

There are conflicting results on the risk interpretation and consequences of obesity in children. For example, researchers found that a significant number of Hispanic mothers who misperceived their child’s weight status did nothing to control what their children ate (Hackie & Bowles, 2007). Additionally, researchers found that a greater number of parents who underestimated the weight of their overweight child were more likely to be less concerned about their child’s weight status (Tschamler, Conn, Cook, & Halterman). Other researchers found that even when parents correctly perceived their child as being overweight, they were still not concerned, though reasons for this were not discussed (Genovesi et al., 2005). Doolen et al. (2009) reported that some mothers did not believe that an overweight child would necessarily develop into an overweight adult later in life; they simply refused to accept their child is overweight. This might be as a result of an optimistic bias in which the risk is minimized or not seen at all. Even though many parents misperceive their child’s weight, researchers found that overweight parents of very young children appeared to be more concerned about their child’s having weight
issues later on in life (Carnell, et al., 2005). Inversely, in one study researchers were surprised to find that a significant number of parents were concerned that their overweight child would develop heart disease later in life (Myers & Vargas, 2000). The majority of parents in this study had a lower educational level, but yet appeared to have a good understanding of the health risks associated with obesity, making the results unexpected for these researchers.

In the case of childhood obesity, researchers in one study have found that some parents are of the opinion that babies will outgrow their fatness, or view an overweight child as being healthy (Guendelman, Fernald, Neufeld, & Fuentes-Afflick; Myers & Vargas, 2000). A misunderstanding of growth charts can potentially impact risk interpretation. In one study researchers found that some mothers mistakenly concluded that the higher a child’s weight plotted on the growth chart, the healthier the child and the more competent the parent (Baughcum, et al., 2000). The issue of distrust for growth charts was determined to be a reason for misperception by mothers in a study conducted by Jain et al. (2001)

There appears to be a difference in how serious childhood overweight is perceived by some parents. In one study where researchers investigated risk interpretation in the parents of children who were overweight or at risk for overweight, there was an increased concern for children ages 6 years or older as compared to younger children ages 2 to 5 years (Eckstein, et al., 2006). The difference in the level of concern is likely to the common perception in many cultures that an overweight younger child or infant is healthier and more attractive. Eckstein et al. (2006) used logistic regression to measure how worried parents were of their child’s weight. They found that parents of older
children were more worried if they perceived that overweight would inhibit their child from being able to be physically active. Some parents in this study mentioned a doctors concern for their child’s overweight status as a cause for their own concern.

One consequence of misperception is the effect on feeding practices. If a parent sees an overweight child as being normal in weight they will continue to overfeed that child while a child perceived as being underweight may be subjected to overfeeding (Kroke, Strathmann, & Gunther, 2006).

**F. Measures to Address Child Overweight and Obesity**

Parental involvement in preventing childhood obesity is critical because they shape behaviors in their children by playing as role models (Lopez-Dicastillo, Grande, & Callery, 2010). Before a realistic plan can be put in place, parents have to accept that their child has a weight problem and be willing to make the necessary changes for any intervention which should be individualized (Myers & Vargas, 2000). Health professionals must ensure that during the process of developing interventions, parental perceptions and circumstances are considered, and there is evidence that corrective actions being considered is effective, in order to convince parents of the need for change (Lopez-Dicastingo, Grande, & Callery). Some parents believe that they influence their child’s behaviors as it relates to eating and physical activity, but researchers have found that the parents of overweight children are more likely to feel that there is little they can do to change these behaviors (Eckstein, et al., 2006). Other parents have cited that a roadblock to changing behaviors in their children include physical environment factors such as a lack of accessibility to healthy foods, and interpersonal factors such as differing
views and practices on eating habits by parents (mother versus father), relatives, and other caretakers (Dwyer, Needham, Simpson, & Heeney, 2008).

As parents do become aware of the risks associated with childhood obesity, they may seek to obtain help from health professionals (Edmunds, 2005). According to Edmunds, the level of sensitivity by the health professional in helping the parents is a critical step in their willingness to even discuss the problem. In studying parental perception of their experiences with health professionals in addressing this problem, Edmunds found that responses from the child’s primary physician ranged from a high level of sympathy with referrals to get help, to a total lack of interest in addressing the matter. He concluded that the health professional’s reaction has the potential to significantly affect a parent’s willingness to obtain help.

Health professionals, particularly the child’s primary physician must take an active role in addressing the problem thereby increasing the likelihood that parents will seek or accept help (Edmunds, 2005). The health professional should include an evaluation to assess the family’s readiness for change and, depending on the severity of the obesity, therapy should be available to advance the readiness for change (Connolly, Gargiula, & Reeve, 2002).

There is a paucity of research in which parents’ willingness to accept help for their child is measured. However, some researchers have studied parents’ attitudes towards intervention activities for their child. In a clinical setting, researchers found that parents were concerned about their child’s weight status and held the opinion that if overweight/obesity is identified by the hospital in a child, action should be taken (McLean, Wake, & McCallum, 2007). In another study, parents voiced a concern for
overweight in their children and supported school interventions that included nutrition education and physical fitness classes (Jaballas et al., 2010).

G. Conclusions

The increasing incidence of obesity in children is a serious public health issue. Childhood obesity is found to lead to obesity throughout the lifecycle, thereby increasing the likelihood of many chronic non-communicable diseases in which overweight is a major risk factor, such as heart disease and diabetes. The cost associated with treating conditions related to overweight and obesity is significant and will continue to be a financial burden to the healthcare systems unless a reversal in the trend of childhood obesity does not occur.

The literature is consistent with studies in which researchers have found that many parents do not correctly recognize their child as being overweight or obese. This disconnect between actual weight and parental perception occurs throughout infancy to the adolescent years. Results are consistent in the studies conducted worldwide on this subject. Even though parental misperception of a child’s weight is well documented, there is a lack of studies conducted to determine the specific reasons for this disconnect.

Strategies for reversing the growing trend of childhood overweight and obesity must involve parents. This is important because parents, particularly mothers, play a significant role in how health behaviors related to diet and physical activity are formed. If parents are unable to correctly assess their child’s body weight, intervention programs will more likely fail. Not only must parents recognize that their child is overweight, but they must also be willing to accept available help if needed and actually perform desirable weight control behaviors in order to treat the problem.
There is a lack of a standardized method for assessing parental perception of a child’s weight, which is an area that can be considered for further study and development. Parental BMI is mentioned in some studies as a factor that affects perception, but there are conflicting reports on findings. Some researchers conclude that overweight parents are more likely to underestimate their child’s overweight status while other researchers found no association between these two variables.
CHAPTER 3
METHODS

A. Study Design

This observational study used a correlational, cross-sectional design to determine factors that affect parents’ misperception of overweight or obesity in their children. Specifically, the study examined how factors such as parents’ own BMI and educational level affect perception of children’s weight status. A correlation between a correct perception of overweight status and perceived seriousness, and actual performance of weight control behavior by parents, or their intentions to do so in order to help their child was studied.

B. Subject Selection and Recruitment

Children who attend two pediatric medical practices in Washington DC were assessed for overweight and obesity using physician records and BMI-for-age growth charts. The parents of the children (ages 6 – 16 years) determined to be overweight or obese were invited to participate and formed the study group. Parents of normal weight children from the same practices were also invited to participate and were included in the study group for comparison purposes. Exclusion criteria included non-biological parents, parents who did not reside with the child at the time of the study, guardians, or lack of participant consent.

The process for recruiting subjects took place entirely at the pediatrician’s office. Each medical practice is independently owned and operated by a physician, with one practice having approximately 2000 patients and the other about 3000 patients. Approval was sought from each physician who responded to the request in writing.
The existing practice is that at the time of visit, each child is weighed and measured by the medical assistant who documents this information in the electronic medical record. After the child’s anthropometric measures were taken and recorded by the medical assistant, parents were invited by the investigator to participate in the study at the time of the visit by word of mouth. Biological parents (both fathers and mothers) were included in the study, but only one parent for each child was allowed to complete the questionnaire.

C. Procedures for Data Collection

A pilot testing of the questionnaire was conducted with ten parents (five each from both offices) to ensure that the questions were clear and understood. This test revealed one typographical error which was corrected before the study proceeded. Data collection proceeded using this survey instrument which was self-administered and anthropometric measures of participants were recorded.

Before the collection of any questionnaire or anthropometric measures, consent forms approved by Loma Linda University Institutional Review Board were provided to participants who signed and returned them to the investigator. After agreeing to participate, the parents were provided with the questionnaire and anthropometric measures (height and weight) were collected at the pediatrician’s office by the medical assistant at the time of the child’s visit, to be used in calculating their BMI. It was estimated that no more than 10 minutes would be required to complete the questionnaire. Before each participant filled out the questionnaire, height and weight for both the child and parent were recorded on the cover sheet. No identifiers such as names were included on any form in order to ensure confidentiality.
Data was collected at 3 separate times, for 3 weeks in the month of June and 2 weeks in July and September. The investigator kept a log to ensure that an adequate amount of both samples (parents of overweight and parents of normal weight children of both genders) was obtained.

Classification for overweight and obesity in children was based on Centers for Disease Control and Prevention (CDC) guidelines for height, weight, and BMI. A BMI equal to or greater than the 85th percentile to less than the 95th percentile is classified as overweight and equal to or greater than the 95th percentile is classified as obesity in children (Doolen, Alpert, & Miller, 2009; Towns et al., 2009).

Table 1. Centers for Disease Control and Prevention – BMI Classification for Children

<table>
<thead>
<tr>
<th>Weight Status Category</th>
<th>Percentile Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>Less than 5th percentile</td>
</tr>
<tr>
<td>Healthy Weight</td>
<td>5th percentile to less than 85th percentile</td>
</tr>
<tr>
<td>Overweight</td>
<td>85th percentile to less than 95th percentile</td>
</tr>
<tr>
<td>Obese</td>
<td>Equal to or greater than 95th percentile</td>
</tr>
</tbody>
</table>

Height was obtained by use of a stadiometer and weight by a computerized digital scale available at both practices. For each child, BMI and percent BMI were automatically calculated after relevant data was entered in the electronic medical record system.

Overweight and obesity in adults was defined as having a BMI of at least \( \leq 25 \) or \( \geq 30 \) respectively. The BMI for each parent was manually calculated by the investigator using the formula: weight in kilograms divided by height in meters squared.

Table 2. Centers for Disease Control and Prevention – BMI Classification for Adults

<table>
<thead>
<tr>
<th>BMI</th>
<th>Weight Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 18.5</td>
<td>Underweight</td>
</tr>
<tr>
<td>18.5 – 24.9</td>
<td>Ideal</td>
</tr>
<tr>
<td>25 – 29.9</td>
<td>Overweight</td>
</tr>
<tr>
<td>30 and above</td>
<td>Obese</td>
</tr>
</tbody>
</table>
D. Study Variables

To determine if a correlation exists between variables as seen in figure 2., the dependent variables were:

1. Parental perception of child’s weight (Individual Beliefs - Perceived Susceptibility and Perceived Risk).
2. Weight control measures taken by parents to address child’s weight problem (Action – Behavior Change)

The Independent variables are:

1. Parent’s own BMI (Modifying Factor)
2. Parent’s level of education (Modifying Factor)

All participants provided information on their gender, ethnicity, educational levels, and income. This information was used for comparison purposes to determine if there were any differences observed in the correlation between variables based on the aforementioned socioeconomic levels and sociodemographic factors within the group of participants.

E. Instrumentation and Measurement

The survey instrument included 4 sections. In the first section participants provided demographic information on their gender, ethnicity, educational and income level. This information was used to describe the study group and to determine if there was a correlation between parent’s own educational level and weight perception. In the second section participants were presented with a set of silhouette pictures of boys and girls that range from very thin to very obese and are age specific. Participants were asked to choose the silhouette that looked most like their child, and the silhouette that was most
like their perceived ideal for their child.

The third section contained a series of questions that assessed parental level of concern about the health risks associated with overweight in their child, using a 5-point Likert scale (with responses options of strongly agree, agree, neutral, disagree, or strongly disagree). The final section included questions that assessed what actions parents were currently taking to change behaviors that affect their child’s weight or their intentions to do so.

1. **BMI Calculations and Anthropometric Measures**

   Children’s BMI percentiles was computed based on the Centers for Disease Control and Prevention 2000 Reference (Centers for Disease Control and Prevention, Atlanta, GA) and then categorized into 4 groups according to their BMI percentile (5\textsuperscript{th} percentile, 5–84\textsuperscript{th} percentile, 85–94th [AROW], or above 95\textsuperscript{th} [overweight]). The height and weight of parents were obtained by trained medical assistants. BMI in adults was determined by dividing weight in pounds by height in inches squared and multiplying the obtained figure by the constant 703.

2. **Parental Perception of Child’s Body Weight**

   Parental perception of children’s body weight was measured using body image sketches designed by Scott Millard that were previously used in a study where parental perception of their child’s weight and health was investigated (Eckstein, et al., 2006). There were separate sketches for males and females with four age groups: ages 2-5, 6-9, 10-13 and 14-17. Participants were also provided with a sketch to identify what body image they perceived to be ideal for their child.
3. Perception of Susceptibility and Risk in Overweight Children

Perception of the child’s susceptibility and health risks associated with overweight and obesity was measured using an instrument with a 5-point Likert scale of appropriate operational definitions to specific questions, with responses options of “very serious”, “serious”, “neutral”, “somewhat serious”, and “not serious”.

4. Weight Control Behaviors by Parents

Actual performance of weight control behaviors along with intentions by parents to address overweight and obesity in children were assessed using an adaptation of the Weight Control Behavior Scale (WCBS) which contains subscales on healthy and unhealthy behaviors (French, Perry, Leon, & Fulkerson, 1995).

F. Data Entry and Analysis

Data was entered into an a database using the Statistical Packages for the Social Sciences (SPSS) Version 17. After data entry was completed, data cleaning was done specifically to identify response set which is described as people responding to questionnaire in ‘yea-saying” or socially desirable, predictable ways that have little or nothing to do with the posed question (Windsor, Clark, Boyd, & Goodman, 2004). Missing data imputations was a consideration for analysis. Shadish, Cook, and Campbell (2002) explained that one method for handling missing data is based on the simple concept of substituting the sample mean for a missing data point. The authors expressed concern with this method based on the assumption that data are missing at random, which is not always the case. To prevent this occurrence, having the participants fully complete the questionnaires and forms, as well as obtaining the parents height and weight while in the office helped prevent missing data.
Descriptive statistics were performed on the variables parental BMI, parental perception of child’s weight, perceived susceptibility and seriousness of childhood obesity and practice of body weight control behaviors. This analysis included measures of central tendencies and percentages.

For the first research question, “Are socioeconomic factors such as higher levels of education associated with parents correctly identifying their child as being overweight or obese, logistic regression analysis was be conducted to determine if the independent variable (parental level of education) impacts perception of the child’s weight. The regression equation for this analysis was:

Parental perception of child’s weight = β₀ + β₁(parental education).

For the second research question, “Is parental perception of their child’s weight status affected by the parents own weight status?” logistic regression analysis was conducted to determine if the independent variable (parental BMI) impacts perception of the child’s weight. The regression equation for this analysis was:

Parental perception of child’s weight = β₀ + β₁(parental BMI)

ANOVA was used to analyze differences within the groups in terms of perception in those parents with a high school education or less and those parents with at least a post high school education, and differences in responses between fathers and mothers. Chi square analysis examined the proportion of participants who were correct versus incorrect in perception of their child’s overweight or obese status.

For the third research question, “How do health belief model variables perceived susceptibility and severity affect how serious parents perceive their child’s overweight status?”, correlation was determined between statements measuring perceived
susceptibility and severity ("My child is at risk for having a weight problem"). "Overweight/obesity in not a serious problem in children", "Overweight/obesity can cause serious health problems for adults", "Overweight/obesity in children can lead to diabetes", "Overweight/obesity can lead to heart disease", "Children who are overweight will usually outgrow their weight problem", "Overweight children are more likely to have problems in their social relationships…", with statements measuring how serious parents perceived their child’s overweight status ("My child has a normal weight", "I am not worried about my child’s weight now").

For the final research question, "What measures are parents taking to control their child’s weight or what are their intentions to do so?", participants’ responses to the list of behaviors on the questionnaires was totaled and frequencies and percentages were determined. ANOVA was used to determine if there is a difference in weight control behaviors between parents of overweight children and parents of normal weight children.

G. Power Analysis

A sample size of 210 (105 for parents of overweight children and 105 for parents of normal weight children) was determined using G*Power Analysis, where the analysis is based on an alpha of 0.05, effect size of 0.3 (medium effect) and the resulting power level of 0.80. An additional 30% of participants were included in case of the need to exclude any participants, for a total of 274 (rounded to 137 participants for each group).

H. Strengths and Limitations of Study

1. Strengths

Even though a number of studies have been conducted where researchers examined parents’ perception of their child’s overweight status, many admitted that the
reasons for misperception have not been fully studied. The conclusion of this study may provide possible answers to questions concerning some the issues that affect parental perception of weight in their children. Based on the location of the physicians' offices, a diverse population was studied with differences in socioeconomic and ethnic backgrounds. By obtaining anthropometric of both patients and their parents, along with the completion of the questionnaire at the time of visit, a more reliable data collection process occurred. If the option of participants filling out the questionnaires was used, there would be the increased chance of forms being misplaced or not returned. Additionally, since parents were measured in the pediatrician's office for their height and weight at the same time when the questionnaires were completed, there was increased accuracy with the anthropometric measurements versus a self report which typically results in an underestimation of weight (Stommel & Schoenborn, 2009).

2. Limitations

The limitation of the study is the applicability of the results to other areas. Since the study was conducted in the Washington D. C. area with participants associated with two medical practices, it might not be possible to generalize results to other areas.

I. Research Ethics

Approval for this study was obtained from Loma Linda University Institutional Review Board (IRB) before the commencing of any aspect of the study. Since this was an observational study and not a true experiment in which there is an intervention applied to the participants, there was a decreased chance of harm to the study group. Signed, informed consent was obtained for participation in the study after the participants were identified and only those who agreed to participate were included. To maintain
confidentiality, the BMI of children identified as being overweight was only shared with their parents. Questionnaires used did not include names, addresses, or any other identifying information. Parents had the right to refuse to answer any question on the questionnaire to maintain respect for persons. The sample size was overestimated by 30% to account for any questionnaire that had to be excluded. Additionally, the data collection time had to be extended to ensure that the desired sample size was obtained.
CHAPTER 4

FIRST PUBLISHABLE PAPER

Parental Weight Misperception in Overweight Children: Assessing the impact of parental BMI and Educational Level on perception.

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For Submission to the: Journal of the Academy of Nutrition and Dietetics
ABSTRACT

Background: A critical step in addressing a weight problem in children is for parents to correctly acknowledge that their child is overweight or obese. However, results from a number of studies indicate that there is a disconnect between parents’ perception of their child’s weight status and actual weight.

Objective: To determine factors that affect parents’ misperception of overweight or obesity in their children. Specifically, the study examined if factors such as parents’ own body mass index (BMI) and educational level affect perception. A correlation between a correct perception of overweight status and perceived seriousness, and actual performance of weight control behavior by parents, or their intentions to practice these behaviors in order to help their child was studied.

Design: This observational study used a correlational, cross-sectional design.

Participants: Parents of children in the Washington D.C. area determined to be overweight or obese formed the study group. Parents of normal weight children were included for comparison purposes.

Statistical Analysis: Descriptive statistics, correlation, and binary logistic regression analyses were performed. A $P$ value $< 0.05$ was considered statistically significant and 95% confidence intervals were calculated for odds ratio (OR).

Results: Participants who indicated they had at least some college were more accurate in their perception of their child’s weight status ($p<.05$) as compared to those with other levels of education for which there was no significant findings. For other socioeconomic factors such as income, no significant association was found. Parental BMI was shown to
have no significant effect on perception. Correlation was observed between health belief model (HBM) variables of perceived susceptibility and severity and how serious parents perceived child overweight (p<0.05).

Conclusions: In counseling parents on correcting overweight/obesity in children, the dietitian should first assess how the parent perceives their child’s weight status.

INTRODUCTION

Childhood obesity is a major public health problem worldwide (1). In the United States high rates of overweight and obesity occur among all income levels, races, genders, and ethnicities (1), with one in seven children being described as obese according to the CDC (2010).

There are a number of complications associated with obesity including an increased risk of problems with mobility, deterioration of joints, poor physical fitness, difficulty with breathing, and low self esteem (2). Additionally, overweight and obese children are at an increased risk of diseases associated with obesity throughout their lifetime including Type 2 diabetes, which in turn can accelerate the development of other serious illnesses such as cardiovascular disease, stroke, blindness, kidney failure, and limb amputations (3). Polycystic Ovarian Syndrome, a common disorder that affects a number of females of reproductive age, is more likely to occur in overweight girls (4).

A major concern is that overweight and obesity existing in childhood is more likely to extend to the adult years (5, 6). As a result, many health professionals have concluded that in order to stem the high incidence of many chronic, non-communicable diseases in adults, increased efforts to prevent and reverse childhood overweight and obesity are needed.
In order to reverse or prevent this trend, a concerted effort from health professionals and parents is needed. Researchers admit that the first step in addressing the problem is for parents to acknowledge that their child is overweight or obese, followed by a willingness to accept help (7). It is felt that a misperception of a child’s weight by parents inhibits the likelihood of intervention leading to behavior change (8).

Perception is generally defined as the mental process used to select, organize, and evaluate stimuli that occur in the external environment which is then used to mold a meaningful experience (9). A number of researchers have found that there is a parental disconnect between actual and perceived weight status in children (10, 11, 12, 13, 14). Despite proven methods for determining obesity, how adults perceive the weight of their children may be influenced by various factors including parents’ level of education, ethnicity, and income levels (14, 15).

Although a number of researchers have found a disconnect between parental perception and children’s actual weight status, there is a paucity of research that explains why this misperception exists (16). Some speculate that reasons for misperception may be due to variations in definitions of overweight and obesity by experts (17) or the desensitization of the sight of increased body fatness in the westernized world due to increase in prevalence rates of obesity (16). In studies that focused on maternal perception of overweight in children, the researchers found that low maternal education was positively associated with misperception, even after adjusting for family income, maternal obesity, race, and gender (18). Similar results were found among mothers of preschool children with lower levels of education (i.e. less that high school) who were more likely to be overweight or obese and have children with weight problems (10).
METHODS

This study was conducted in the Washington D. C. area at two pediatric medical practices. Children who attend the practices were assessed for overweight and obesity using physician records and BMI-for-age growth charts. The parents of the children (ages 6 – 16 years) determined to be overweight or obese were invited to participate and formed the study group. Parents of normal weight children from the same practices were also invited to participate and were included in the study group for comparison purposes. The total number of participants was 210. After agreeing to participate in the study by written consent, parents were given a survey instrument and their height and weight were recorded.

The survey instrument included four sections. In the first section participants provided demographic information on their gender, ethnicity, educational and income levels. This information was used to describe the study group and to determine if there was a correlation between parent’s own educational or BMI level and weight perception. In the second section participants were presented with a set of silhouette pictures of boys and girls that ranged from very thin to very obese and were age specific. Participants were asked to choose the silhouette that looked most like their child, and the silhouette that was most like their perceived ideal for their child. These silhouette sketches were designed by Scott Millard and previously used in a study where parental perception of their child’s weight and health was investigated (15).

The third section contained a series of questions that assessed parental level of concern about the health risks associated with overweight in their child, using a 5-point Likert scale, with response options of strongly agree, agree, neutral, disagree, or strongly
disagree. The final section included questions that assessed what actions parents were currently taking to change behaviors that affect their child’s weight, or their intentions to do so.

**STATISTICAL METHODS**

Data entry and analysis were conducted using SPSS (version 17) to examine sample characteristics and determine if there was a correlation between parents own BMI and educational levels and 1. Perception of their child’s weight, 2. Perception of child’s susceptibility related to overweight/obesity and , 3. Perception of health risks associated with childhood obesity. Frequencies and percentages were computed for demographic data. Differences in perception based on BMI and education were conducted using Logistic regression. Correlations between perceived susceptibility/severity and actual behaviors were studied.

**RESULTS**

Demographic data of the survey participants are described in table 1. For the children who were initially assessed in order for their parents to be invited to participate, 98 (46.7%) were male and 112 (53.3%) were female. Analysis of the weight of the children revealed that 105 (50%) had a BMI percentage of 5-85 and were considered to be of a normal weight, 22 (10.5%) had a BMI of >85 – 95 and were considered overweight, and 83 (39.5%) had a BMI percentage >95 and were considered to be obese. The majority of the participants (parents) were found to be overweight or obese. For parents with a BMI of 19-24, only 51 (24.3%) fell within this range; for a BMI of 25 – 29, 80 (38.1%) were in this category and considered overweight; for a BMI of >30, 79 (37.6%) of the participants were in this category and considered obese. This high level of
overweight and obese highlighted the significant weight problem facing adults and children in the United States today.

[Place Tables 1 and 2 here]

**Weight Perception**

To answer the first research question “Are socioeconomic factors such as higher levels of education associated with parents correctly identifying their child as being overweight or obese?”, binary logistic regression was used to explore the data to determine if there was any association, as outlined in table 2. The data was analyzed with the dependent variable being perception of actual weight which was measured using the silhouettes, and the independent variable education, income, and parent BMI. From the selection of the silhouette, perception was determined to be correct or incorrect. An association was observed between perception and education only for those with parents with some college (P<0.05). Further analysis using crosstabulation revealed that the majority of individuals who had an income over 100k also had a post graduate degree. However this did not result in increased accuracy for perception. For those with some college, the majority of them had income ranging from 22k to 70k. These results are consistent with studies by other researchers who found that low maternal education was positively associated with misperception, even after adjusting for family income, maternal obesity, race, and gender (17). Similar results were found with mothers of preschool children with lower levels of education (i.e. less that high school) who were more likely to be overweight or obese and have children with weight problems (10).

[Place Table 3 here]
Logistic Regression and correlation was used to analyze the association between parents BMI with weight perception. Results indicated that both overweight and obese parents were more likely to misperceive their child’s weight as compared to parents with a normal weight. Crosstabulations were used to analyze parents BMI level and weight perception. For parents with a BMI of 19-24 (N=51), 28 parents had the correct perception while 23 did not; for parents with a BMI of 25 – 29 (N=80), 42 had a correct perception while 36 did not; for parents with a BMI >30 (N=79), 28 had a correct perception while 51 did not.

Crosstabulations were also used to analyze weight perception and children’s BMI percentage. For children with a BMI percentage of 5 – 85% (N=105), 49 parents correctly chose the silhouette which best described their child’s actual weight and 56 did not; for children with a BMI percentage of >85-95 (N=22), 10 parents chose the correct silhouette while 11 did not; for children with a BMI percentage >95 (N=83), 38 parents chose the correct silhouette and 44 did not. Further analysis of the responses revealed that participants who misperceived their child’s weight in all categories underestimated the weight.

HBM/Seriousness and Severity of Obesity

Table 4 shows frequencies and percentages for responses to statements that assessed parental level of concern about the health risks associated with overweight in their child, parents perception on their ability to provide a healthy diet for their children, and self efficacy on being able to provide a healthy diet for their child. Correlation was utilized to investigate any trends related to an association between the health belief model variables of perceived susceptibility/severity of obesity and how serious parents perceive
child’s overweight. Correlation was observed between disagreement to the statements “My child is at risk for having a weight problem”, “Overweight/obesity is not a serious problem in children”, and “Children who are overweight will usually outgrow their weight problem” with “I am not worried about my child’s weight”. Correlation was also observed between agreement to the statements “Overweight/obesity in children can lead to diabetes”, “Overweight children are more likely to have problems in their social relationships with other children who are not overweight”, and “Overweight children are likely to become overweight adults” with “My child is at risk for overweight” (P<.05).

[Place Table 4 here]

**Health Behaviors to correct address overweight/obesity**

The majority of parents indicated at least an attempt to practice healthy choices in regards to providing nutritious foods and encouraging increased physical activity in their children. In response to the statement “During the next month, I intend to purchase fast-food for my family no more than one time for the week”, 4 parents (1.9%) indicated that they would not try; for the statements “During the next month, I will limit my children from watching the television are you willing to limit TV watching to less than one hour daily” or “limit computer usage to less than one hour per day…” 11 (5.2%) and 10 (4.8%) indicated that they would not try. These last two aforementioned statements were the only ones for which parents mentioned an unwillingness to try the desired behavior. This finding raises the concern that some parents may not fully comprehend the relationship between excessive television viewing and computer usage in children and overweight and obesity.
Perception on parents’ ability to provide a healthy diet was measured to analyze self efficacy. This analysis, though not a part of the research questions, was determined to be important in order to obtain a clearer understanding about parental perception towards corrective action for addressing overweight and obesity in children. The majority of the participants indicated that they were able to control what their child ate (74%), understood how to plan healthy meals (97%), and could afford healthy foods (95%). However, for the question measuring a parent’s ability to prepare healthy meals, 97 parents (46%) agreed while 113 parents (54%) disagreed on their ability to carry out this task. For the statement “I do not have time to prepare healthy meals…”, 108 parents (51%) agreed while 102 parents (49%) disagreed.

DISCUSSION

This research examined possible reasons for parental misperception of overweight or obesity in their children. Overall, income did not affect perception whereas only one specific educational level was associated with increased accuracy in perception (P<0.05). These findings are inconsistent with other researchers who found that parents from lower income levels had higher levels of misperception as compared to parents who were from higher income levels (10, 19). An interesting finding was the association between education and perception. An association was only found between those with some college and no significant association with those who were college graduates or postgraduates. This is consistent with previous results from other researchers who have found that a higher education (above high school) is associated with increased likelihood of parents perceiving their child’s weight correctly (10,17). However, the same result was not found for parents who were college graduates or had post graduate degrees. A
reasonable reaction to these findings is to question why participants with some college were more accurate in perceiving weight as compared to those with higher levels of education. It would be interesting to investigate if there are any factors that contributed to this finding and therefore further study in this area is encouraged.

Perceptions of susceptibility and seriousness of obesity in children were examined along with self efficacy for providing a healthy diet to children. We analyzed health behaviors that were being practiced by parents and found that most participants were already practicing ideal health behaviors or indicated that they were willing to do so. For the parents who indicated an unwillingness to decrease television viewing and computer usage, the concern by health professionals is that excesses in these activities are associated with increased incidence of overweight and obesity in children (20).

The strength of this study is that self report of height and weight was not utilized, which resulted in increased accuracy of these measures used to compute BMI. Additionally, by having the participants complete the questionnaire at the time of visit to the pediatrician, missing data was not an issue. A limitation of the study is that honest responses to all questions and statements could not be ensured. Furthermore, since the data was obtained in one geographical area, the results cannot be generalized.

CONCLUSION

In investigating factors that affect parent misperception of overweight and obesity in children, we found that parents with some college were more accurate in their perception as compared with those with other levels of education. There was no association found between perception and income or parents own BMI level. We also found that there was a correlation between health belief model variables of the
seriousness and severity of overweight and obesity in children and parental weight perception.

The results from this study may assist dietitians in having a better understanding of factors that are associated with parents having a misperception of their child’s weight. This is important because a correct perception of weight is a critical step in providing nutrition education to parents so that they can obtain the knowledge necessary to facilitate change. However, further study is suggested to examine if there are other factors that affect misperception. Additionally, with the number of parents that underestimated their child’s weight, it would be relevant to determine if underestimating weight affects how parents address behaviors related to weight gain in children.
Table 1. Demographic Frequencies and distributions of the study participants (N=210)

<table>
<thead>
<tr>
<th></th>
<th>Correct Percept.</th>
<th>Incorrect Percept.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
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<tr>
<td>Male</td>
<td>54</td>
<td>25.7</td>
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<tr>
<td>Female</td>
<td>156</td>
<td>74.3</td>
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<td><strong>Ethnicity</strong></td>
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<td>45</td>
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<td>Black, African American</td>
<td>138</td>
<td>65.7</td>
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<tr>
<td>White, Latino</td>
<td>16</td>
<td>7.6</td>
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<td>Asian: Chinese, Japanese</td>
<td>1</td>
<td>0.5</td>
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<tr>
<td>Southeast Asian</td>
<td>5</td>
<td>2.4</td>
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<tr>
<td>Other Asian</td>
<td>3</td>
<td>1.4</td>
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<td>Pacific Islander</td>
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<td>0.5</td>
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<td><strong>Education</strong></td>
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<td></td>
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<tr>
<td>Grade 8 or less</td>
<td>3</td>
<td>1.4</td>
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<tr>
<td>Less than high school</td>
<td>7</td>
<td>3.3</td>
</tr>
<tr>
<td>HS or GED</td>
<td>28</td>
<td>13.3</td>
</tr>
<tr>
<td>Some College</td>
<td>70</td>
<td>33.3</td>
</tr>
<tr>
<td>College Grad</td>
<td>60</td>
<td>28.6</td>
</tr>
<tr>
<td>Post Grad</td>
<td>42</td>
<td>20</td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td></td>
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<tr>
<td>Less than 10k</td>
<td>8</td>
<td>3.8</td>
</tr>
<tr>
<td>10k to 25k</td>
<td>9</td>
<td>4.3</td>
</tr>
<tr>
<td>25001 to 40k</td>
<td>29</td>
<td>13.8</td>
</tr>
<tr>
<td>40001 to 55k</td>
<td>37</td>
<td>17.6</td>
</tr>
<tr>
<td>55001 to 70k</td>
<td>35</td>
<td>16.7</td>
</tr>
<tr>
<td>70001 to 85k</td>
<td>17</td>
<td>8.1</td>
</tr>
<tr>
<td>85001 to 100k</td>
<td>22</td>
<td>10.5</td>
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Table 2. Frequencies and Percentages for BMI in Children and Parents

<table>
<thead>
<tr>
<th>BMI Percentage (children)</th>
<th>N</th>
<th>%</th>
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<tr>
<td>&gt;5-85</td>
<td>105</td>
<td>50.0</td>
</tr>
<tr>
<td>&gt;85-94</td>
<td>22</td>
<td>10.5</td>
</tr>
<tr>
<td>95+</td>
<td>83</td>
<td>39.5</td>
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</table>

<table>
<thead>
<tr>
<th>BMI (Parents)</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>19-24</td>
<td>51</td>
<td>24.3</td>
</tr>
<tr>
<td>25-29</td>
<td>80</td>
<td>38.1</td>
</tr>
<tr>
<td>&gt;30</td>
<td>79</td>
<td>37.6</td>
</tr>
<tr>
<td>Table 3</td>
<td>Binary Logistic regression with Dependent variable Weight Perception</td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>---------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>S.E.</td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over 100K = reference</td>
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<td></td>
</tr>
<tr>
<td>25k or less</td>
<td>0.606</td>
<td>0.508</td>
</tr>
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<td>25k to 40k</td>
<td>0.405</td>
<td>0.345</td>
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<tr>
<td>40k to 55k</td>
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<td>0.508</td>
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<td>55k to 70k</td>
<td>0.182</td>
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<td>70k to 85k</td>
<td>0.208</td>
<td>0.373</td>
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<td>85 to 100k</td>
<td>-0.272</td>
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<tr>
<td>Education</td>
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<tr>
<td>Post graduate = reference</td>
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<td></td>
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<tr>
<td>HS or less</td>
<td>-0.427</td>
<td>0.332</td>
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<tr>
<td>Some College*</td>
<td>0.588</td>
<td>0.249</td>
</tr>
<tr>
<td>College graduate</td>
<td>-0.134</td>
<td>0.259</td>
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<tr>
<td>Parent BMI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19-24 = reference</td>
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<td></td>
</tr>
<tr>
<td>25-29*</td>
<td>-0.796</td>
<td>0.367</td>
</tr>
<tr>
<td>&gt;30*</td>
<td>-0.700</td>
<td>0.325</td>
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Note: $p < 0.05$
Table 4. Frequencies and distributions of perception of overweight severity and seriousness

<table>
<thead>
<tr>
<th>Perception and Impacts</th>
<th>Agree</th>
<th>Disagree</th>
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<tr>
<td>Child's risk for overweight</td>
<td>128 (61)</td>
<td>82 (39)</td>
</tr>
<tr>
<td>Overweight/obesity not serious in children</td>
<td>68 (32.4)</td>
<td>142 (67.6)</td>
</tr>
<tr>
<td>Overweight/obesity can lead to diabetes</td>
<td>201 (95.7)</td>
<td>9 (4.3)</td>
</tr>
<tr>
<td>Overweight/obesity can lead to heart disease</td>
<td>202 (96.2)</td>
<td>8 (3.8)</td>
</tr>
<tr>
<td>Children will outgrow overweight</td>
<td>126 (60)</td>
<td>84 (40)</td>
</tr>
<tr>
<td>Overweight/obesity can cause social problems</td>
<td>186 (88.6)</td>
<td>24 (11.4)</td>
</tr>
<tr>
<td>Parent not worried about child's wt</td>
<td>139 (66.2)</td>
<td>71 (33.8)</td>
</tr>
<tr>
<td>Overweight children likely become overweight adults</td>
<td>195 (92.9)</td>
<td>15 (7.1)</td>
</tr>
</tbody>
</table>
References


CHAPTER 5
SECOND PUBLISHABLE PAPER

The Association Between Parents Perception of Weight and the Use of Weight Control Strategies to Correct or Prevent Overweight in Children

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For Submission to the: Journal of Nutrition Education and Behavior
Abstract

Objective: To determine if parents' perception of their child's weight affects use of weight control strategies for their children.

Design: Observational study with correlational, cross-sectional design.

Setting: Two pediatric medical practices in Washington D.C.

Participants: Two hundred and ten parents of patients ages 6-16 years.

Variables Measured: Parents' BMI, education, income, weight perception, weight control behaviors.

Analysis: Descriptive statistics, correlation, and binary logistic regression analysis.

Results: Parents who had at least some college were more accurate in their perception of their child's weight status (p<.05) as compared to parents with post graduate degrees. Parents with a correct perception were less likely to limit sugar sweetened beverages and juices. Parents with lower levels of education and income were more likely to practice most of the desirable weight control strategies as compared to parents with the highest income and education.

Conclusions and Implications: A correct perception of weight in children is associated with desirable weight control strategies. Demographics can affect health behavior practice. These findings may help health educators understand the important relationship between parental weight perception, income and educational levels, and the likelihood of practicing desirable behaviors in the home to treat or prevent overweight or obesity in children.

Key Words: Misperception, child overweight or obesity, weight control strategies, Health Belief Model.
Introduction

Childhood obesity is a major public health problem facing the United States and many other countries worldwide. Parental awareness of the problem and willingness to engage in discussions aimed at addressing the issue is intrinsic to the success of helping the affected child. Treating overweight children may be more difficult when parents themselves do not correctly recognize their child’s weight status. Additionally, incorrectly assessing overweight in very young children results in unfavorable weight development throughout childhood. Accepting that a child is overweight followed by parental involvement has been shown to help with long-term positive results for weight control in children.

If parents do not recognize that their child is overweight or obese, they will be less likely to provide the support and care needed to help reverse the weight problem. This is especially important for mothers as they play a critical role in shaping early dietary and activity behaviors of their young children. For parents who do take steps to preventing obesity in their children, those with lower educational levels are less likely to do so. In their study Jeffery et al (2006) found that not only were most parents unaware that their child was overweight, but they were also unconcerned about their child’s weight, that is, it simply was not an issue to them.

There are conflicting results on the risk interpretation and consequences of obesity in children. For example, researchers found that a significant number of Hispanic mothers who misperceived their child’s weight status did nothing to control what their children ate. Additionally, researchers found that a greater number of parents who underestimated the weight of their overweight child were more likely to be less
concerned about their child’s weight status. Other researchers found that even when parents correctly perceived their child as being overweight, they were still not concerned, though reasons for this were not discussed. Doolen et al. (2009) reported that some mothers did not believe that an overweight child would necessarily develop into an overweight adult later in life; they simply refused to accept their child is overweight. This might be as a result of an optimistic bias in which the risk is minimized or not seen at all. Even though many parents misperceive their child’s weight, researchers found that overweight parents of very young children appeared to be more concerned about their child’s having weight issues later on in life.

Other researchers found that some parents are of the opinion that babies will outgrow their fatness, or view an overweight child as being healthy. A significant number of parents in another study were concerned that their overweight child would develop heart disease later in life. The majority of parents in this study had a lower educational level, but yet appeared to have a good understanding of the health risks associated with obesity, making the results unexpected for these researchers.

Parental involvement in preventing childhood obesity is critical because they shape behaviors in their children by being role models. Before a realistic plan can be put in place, parents have to accept that their child has a weight problem and be willing to make the necessary changes for any intervention which should be individualized. Health professionals must ensure that during the process of developing interventions, parental perceptions and circumstances are considered, and there is evidence that corrective actions being considered is effective, in order to convince parents of the need for change.
One consequence of misperception is the effect on feeding practices. If a parent sees an overweight child as being normal in weight they will continue to overfeed that child while a child perceived as being underweight may be subjected to overfeeding. Some parents believe that they influence their child’s behaviors relating to eating and physical activity, but researchers have found that the parents of overweight children are more likely to feel that there is little they can do to change these behaviors. Other parents have cited that a roadblock to changing behaviors in their children include physical environment factors such as a lack of accessibility to healthy foods, and interpersonal factors such as differing views and practices on eating habits by parents (mother versus father), relatives, and other caretakers.

As parents do become aware of the risks associated with childhood obesity, they may seek to obtain help from health professionals. According to Edmunds, the level of sensitivity by the health professional in helping the parents is a critical step in their willingness to even discuss the problem. Health professionals, particularly the child’s primary physician must take an active role in addressing the problem thereby increasing the likelihood that parents will seek or accept help. The health professional should include an evaluation to assess the family’s readiness for change and, depending on the severity of the obesity, therapy should be available to advance the readiness for change.

**METHODS**

The theoretical framework used to guide this research was the health belief model (HBM). The HBM is a frequently used health behavior application that was developed initially to help provide explanations regarding to the reasons people choose or refuse to use health services. Primary concepts contained in this theory that predict behavior
include susceptibility, seriousness, benefits and barriers to a behavior, cues to action and, recently, self efficacy. The hypothesis of the HBM is that individuals are more likely to engage in health-related actions if they have sufficient motivation, believe that they are vulnerable to a serious health problem, or believe that this health action will be beneficial for reducing the threat. Perception is the key component behind these constructs, as individuals are unlikely to get to the stage of behavior change via action if there are misperceptions related to any health condition. The HBM also hypothesizes that there are a number of modifying factors that play a role in perception, which include demographic variables (age, sex, race, etc), socioeconomics, and structural variables such as knowledge about a disease or condition.

For this research an analysis of the external variables ‘parent’s BMI’ and ‘parent’s educational levels’ as modifying factors that may affect perception were examined. The aim was to determine the relationship between modifying factors and individual beliefs that would lead to action. The health belief model was adapted to examine the effects of modifying factors of parents own BMI and educational levels on perceived susceptibility and risk and resulting action if it is already occurring, or the intention to changing behavior.

This study was conducted in the Washington D. C. area at two pediatric medical practices. Children who attend the practices were assessed for overweight and obesity using physician records and BMI-for-age growth charts. The parents of the children (ages 6 – 16 years) determined to be overweight or obese were invited to participate and formed the study group. Parents of normal weight children from the same practices were also invited to participate and were included in the study group for comparison purposes.
The total number of participants was 210. After agreeing to participate in the study by written consent, parents were given a survey instrument and their height and weight were recorded.

The survey instrument included four sections. In the first section participants provided demographic information on their gender, ethnicity, educational and income levels. This information was used to describe the study group and to determine if there was a correlation between parent’s own educational or BMI level and weight perception. In the second section participants were presented with a set of silhouette pictures of boys and girls that ranged from very thin to very obese and were age specific. Participants were asked to choose the silhouette that looked most like their child, and the silhouette that was most like their perceived ideal for their child. These silhouette sketches were designed by Scott Millard and previously used in a study where parental perception of their child’s weight and health was investigated. 16

The third section contained a series of questions that assessed parental level of concern about the health risks associated with overweight in their child, using a 5-point Likert scale, with response options of strongly agree, agree, neutral, disagree, or strongly disagree. The response options were collapsed to agree and disagree during analysis. The final section included questions that assessed what actions parents were currently taking to change behaviors that affect their child’s weight, or their intentions to do so.

STATISTICAL METHODS

Data entry and analysis were conducted using SPSS (version 17) to examine sample characteristics and determine if there was a correlation between parents own BMI and educational levels and perception of their child’s weight status. An association
between perception and the use of a number of weight control strategies was analyzed. Frequencies and percentages were computed for demographic data and weight control strategies being utilized. Differences in weight control strategies based on perception were conducted using Logistic regression.

RESULTS

Demographic data and characteristics related to weight status of the survey participants are described in table 1. The weight status for the children used to determine which parents would be invited to participate in the study is also described in table 1. The majority of the participants were female (74.3%), and this is consistent with most studies on parental perception of children’s weight. In this study, obesity rates exceeded the national average for both parents and children.

[Place Table 1 here]

Health Behaviors to Address Overweight/Obesity

Table 2 shows frequencies and percentages for responses to statements that assessed health behaviors that, if practiced, would assist with weight control in children. The majority of parents indicated at least an attempt to practice healthy choices in regards to providing nutritious foods and encouraging increased physical activity in their children, however a number indicated that “I will try” suggesting that these behaviors were not yet practiced.

[Place Table 2 here]

As shown in Table 3, logistic regression was used to analyze the responses of parents indicating that they were practicing specific weight control strategies in the home and weight perception. There was no statistical significance between perception and the
practice of desirable weight control strategies overall. The only exception related to the limiting of juice and sweetened beverages which were behaviors less likely to be practiced by parents with a correct perception as compared to parents with an incorrect perception.

[Place Table 3 here]

Demographics and Health Behavior

An association between the demographic variables (income and education) and the practice of weight control strategies was analyzed using logistic regression. In the original HBM, factors such as demographics have a direct impact on perception, which in turns affects behavior. For this study, the direct association between the above mentioned demographic variables and behaviors was also analyzed without the inclusion of perception. For education, the constant was parents with a post graduate education; for income the constant was parents with income greater than one hundred thousand dollars annually. The unexpected finding is that for a number of the desirable health behaviors, parents with lower educational and income levels were more inclined to practice the desirable health behaviors as compared to those parents with post grad education or income > 100k. The exception to these findings was that parents with lower incomes were all less likely to buy less sugar sweetened beverages or limit juice and sweetened beverages. There was a similar finding for education in that parents with lower levels of education were more inclined to practice desirable health behaviors as compared to parents with a post graduate degree. As previously noted, the only exception was for parents with some college or high school or less who were found to be less likely to buy less sugar sweetened beverages or limit juice and sweetened beverages.
Parental Self Efficacy and Health Behavior

Perception on parents’ ability to provide a healthy diet was measured to analyze self efficacy. This analysis was determined to be important to obtain a clearer understanding about parental perception towards corrective action for addressing overweight and obesity in children. The majority of the participants indicated that they were able to control what their child ate (74%), understood how to plan healthy meals (97%), and could afford healthy foods (95%). However, for the question measuring a parent’s ability to prepare healthy meals, 97 parents (46%) agreed while 113 parents (54%) disagreed on their ability to carry out this task. For the statement “I do not have time to prepare healthy meals…”, 108 parents (51%) agreed while 102 parents (49%) disagreed.

Discussion

This research analyzed the relationship between parental perception of weight in their children, and the use of weight control strategies to correct or prevent overweight. An association between demographic variables and the practice of desirable health behaviors by parents was also analyzed. Although the majority of parents indicated that they were already practicing these strategies, statistical significance was determined for certain behaviors as it related to perception. More succinctly, parents with a correct perception had a greater odds of purchasing less fast food and limiting computer usage as compared to parents with an incorrect perception. These findings are consistent with previous studies in which it was found that parents who perceived their child as overweight were more likely to model desirable behaviors aimed at addressing overweight. An unexpected finding was that parents with a correct perception had
decreased odds for the limiting of sugar-sweetened beverages and juice, and for encouraging less television viewing. Previous studies do not support this finding.

**Implications for Research and Practice**

The importance of parental perception of overweight and obesity in children is well documented in the literature. The association between parental perception and the use of weight control strategies in the home is becoming an area of interest for researchers. Even though the results from this study concluded that parent’s perception was associated with some behaviors, the unexpected findings related to a decrease of some behaviors in parents who did have a correct perception warrants further investigation.

Some valid questions were raised in this research: 1. Why do parents who misperceive the weight of normal weighted children under-estimate the weight, and does this underestimation affect health behavior?; and 2. Are these findings consistent in a wider geographical area? The literature indicates that when parents acceptance that their child is overweight is an important step for them to obtain treatment for their child, which includes nutrition education. Additionally, parents’ willingness to seek help is another area which warrants further investigation.
Table 1. Demographic Frequencies and distributions of the study participants (N=210)

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>%</th>
<th>Correct Percept.</th>
<th>Incorrect Percept.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>54</td>
<td>25.7</td>
<td>24</td>
<td>44</td>
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<tr>
<td>Female</td>
<td>156</td>
<td>74.3</td>
<td>74</td>
<td>47</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White, Non-Latino</td>
<td>45</td>
<td>21.4</td>
<td>33</td>
<td>73</td>
</tr>
<tr>
<td>Black, African American</td>
<td>138</td>
<td>65.7</td>
<td>50</td>
<td>36</td>
</tr>
<tr>
<td>White, Latino</td>
<td>16</td>
<td>7.6</td>
<td>10</td>
<td>63</td>
</tr>
<tr>
<td>Asian: Chinese, Japanese</td>
<td>1</td>
<td>0.5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Southeast Asian</td>
<td>5</td>
<td>2.4</td>
<td>2</td>
<td>40</td>
</tr>
<tr>
<td>Other Asian</td>
<td>3</td>
<td>1.4</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>Pacific Islander</td>
<td>1</td>
<td>0.5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade 8 or less</td>
<td>3</td>
<td>1.4</td>
<td>2</td>
<td>67</td>
</tr>
<tr>
<td>Less than high school</td>
<td>7</td>
<td>3.3</td>
<td>5</td>
<td>71</td>
</tr>
<tr>
<td>HS or GED</td>
<td>28</td>
<td>13.3</td>
<td>16</td>
<td>57</td>
</tr>
<tr>
<td>Some College</td>
<td>70</td>
<td>33.3</td>
<td>25</td>
<td>36</td>
</tr>
<tr>
<td>College Grad</td>
<td>60</td>
<td>28.6</td>
<td>32</td>
<td>53</td>
</tr>
<tr>
<td>Post Grad</td>
<td>42</td>
<td>20</td>
<td>18</td>
<td>43</td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 10k</td>
<td>8</td>
<td>3.8</td>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td>10k to 25k</td>
<td>9</td>
<td>4.3</td>
<td>4</td>
<td>44</td>
</tr>
<tr>
<td>25001 to 40k</td>
<td>29</td>
<td>13.8</td>
<td>13</td>
<td>45</td>
</tr>
<tr>
<td>40001 to 55k</td>
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<td>55001 to 70k</td>
<td>35</td>
<td>16.7</td>
<td>14</td>
<td>40</td>
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<td>70001 to 85k</td>
<td>17</td>
<td>8.1</td>
<td>6</td>
<td>35</td>
</tr>
<tr>
<td>85001 to 100k</td>
<td>22</td>
<td>10.5</td>
<td>28</td>
<td>53</td>
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</table>
Table 2. Frequencies and distributions of weight control strategies

<table>
<thead>
<tr>
<th>Strategy</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buy Less Junk Food</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I already do this</td>
<td>148</td>
<td>70.5</td>
</tr>
<tr>
<td>I will try</td>
<td>62</td>
<td>29.5</td>
</tr>
<tr>
<td>Encourage increased activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I already do this</td>
<td>150</td>
<td>71.4</td>
</tr>
<tr>
<td>I will try</td>
<td>60</td>
<td>28.6</td>
</tr>
<tr>
<td>Buy Less Sugar-sweetened Beverages</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I already do this</td>
<td>136</td>
<td>64.8</td>
</tr>
<tr>
<td>I will try</td>
<td>74</td>
<td>35.2</td>
</tr>
<tr>
<td>Limit Juice and sweetened Beverages</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I already do this</td>
<td>133</td>
<td>63.3</td>
</tr>
<tr>
<td>I will try</td>
<td>75</td>
<td>35.7</td>
</tr>
<tr>
<td>Prepare Healthier Meals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I already do this</td>
<td>111</td>
<td>52.9</td>
</tr>
<tr>
<td>I will try</td>
<td>99</td>
<td>47.1</td>
</tr>
<tr>
<td>Purchase Less Fast Food</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I already do this</td>
<td>120</td>
<td>57.1</td>
</tr>
<tr>
<td>I will try</td>
<td>86</td>
<td>41</td>
</tr>
<tr>
<td>Limit TV Watching</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I already do this</td>
<td>55</td>
<td>26.2</td>
</tr>
<tr>
<td>I will try</td>
<td>144</td>
<td>68.6</td>
</tr>
<tr>
<td>Limit Computer Usage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I already do this</td>
<td>81</td>
<td>38.6</td>
</tr>
<tr>
<td>I will try</td>
<td>119</td>
<td>56.7</td>
</tr>
<tr>
<td>Increase Intake of Fruits and Vegetables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I already do this</td>
<td>122</td>
<td>58.1</td>
</tr>
<tr>
<td>I will try</td>
<td>88</td>
<td>41.9</td>
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</table>
Table 3. Logistic Regression with Dependent Variable Weight Control Strategies

<table>
<thead>
<tr>
<th>Strategy</th>
<th>B</th>
<th>S.E.</th>
<th>Sig.</th>
<th>OR</th>
<th>Lower</th>
<th>Upper</th>
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<tr>
<td>Purchase Less Junk Food</td>
<td>0.375</td>
<td>0.307</td>
<td>0.222</td>
<td>1.455</td>
<td>0.797</td>
<td>2.653</td>
</tr>
<tr>
<td>Encourage Activity</td>
<td>-0.903</td>
<td>0.287</td>
<td>0.002</td>
<td>2.467</td>
<td>1.405</td>
<td>4.330</td>
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<tr>
<td>Limit juice/sweet drinks</td>
<td>-0.169</td>
<td>0.277</td>
<td>0.542</td>
<td>0.844</td>
<td>0.490</td>
<td>1.455</td>
</tr>
<tr>
<td>Prepare healthy meals</td>
<td>0.549</td>
<td>0.282</td>
<td>0.051</td>
<td>1.732</td>
<td>0.997</td>
<td>3.007</td>
</tr>
<tr>
<td>Purchase less fast food</td>
<td>-0.329</td>
<td>0.315</td>
<td>0.295</td>
<td>0.719</td>
<td>0.388</td>
<td>1.333</td>
</tr>
<tr>
<td>Limit TV</td>
<td>1.269</td>
<td>0.289</td>
<td>0.054</td>
<td>1.743</td>
<td>0.990</td>
<td>3.069</td>
</tr>
<tr>
<td>Limit Computer</td>
<td>-0.012</td>
<td>0.280</td>
<td>0.588</td>
<td>1.164</td>
<td>0.672</td>
<td>2.016</td>
</tr>
</tbody>
</table>

Note: *p* <0.05
References


CHAPTER 6
CONCLUSION

A. Summary

This study examined factors that affect parents' perception of overweight and obesity in their children, to determine if their own weight status (determined by BMI) or educational levels are associated with misperception. Health Belief Model variables of perceived susceptibility and severity were analyzed to determine how serious parents perceive overweight or obesity to be in their children. Additionally, measures parents were taking to control their child's weight or their intentions to do so were studied. Interest in this topic was as a result of the high levels of childhood obesity that persist despite frequent discussion in the media, along with the variety of interventions that are documented in the literature. Although parental misperception is widely studied, there is a paucity of extensive research on the reasons for this disconnect as it relates to independent variables such as parental weight status and educational level. It is against this background that I was interested in investigating these factors as it related to misperception.

Results from this study showed that parents' own weight status is correlated with a correct perception. This is consistent with other studies in which weight was found to be a significant factor in parental weight perception. Specifically an important finding in this research and prior studies is that parents who are overweight or obese are more likely to misperceive their child's weight, especially if the child is overweight or obese. This finding suggests that many parents continue to be inaccurate in their perception of their child's weight, and this appears to be affected by the parent's own weight status.
In regards to an association with education and perception, parents with some college were found to be more accurate in their perception of their child's weight. Other researchers had found that parents with higher levels of education were more accurate in their perception of their child's weight, but the interesting finding in this study is that parents with some college were more accurate than those with a post graduate education. For other socioeconomic factors such as income, no significant association was found. This finding is consistent with prior studies in which researchers found no difference in perception based on income. In this study, those in the higher income brackets (>100K) had higher levels of education (college graduate or post graduate), but this did not translate to increased perception as compared to those from lower income levels or those who had only some college education.

Correlation was observed between health belief model variables of perceived susceptibility and severity and how parents perceived child overweight.

B. Limitations

The limitation of the study is the applicability of the results to other areas. Since the study was conducted in the Washington D. C area with participants associated with two medical practices, it might not be possible to generalize results to other areas.

C. Strengths

The strength of this study is that self report of height and weight was not utilized, which resulted in increased accuracy of these measures. Additionally, by having the participants complete the questionnaire at the time of visit to the pediatrician, missing data was not an issue. A limitation of the study is that honest responses to all questions and statements could not be ensured.
D. Future Studies

Determining the factors that affect parents’ misperception of overweight and obesity remain unclear. Results from previous studies and this research are inconsistent in some areas. Future study is needed to address some of the surprising findings from this research.

The results from this study raised some questions which warrant further investigation:

1. Are parents in general becoming more accurate in the perception of their child’s weight, despite their own weight status?
2. Do parents with some college more correctly perceive their child’s weight than parents who are college graduates or post graduates, and if so, what factors are involved in such a finding?
3. What are the factors that affect underestimation of weight in both normal and overweight children by parents?
4. Does an underestimation of a child’s weight affect how parents practice ideal health behaviors in the home?
5. Can these findings be generalized to wider geographical areas?

E. Conclusion and Implications

Misperception of a child’s weight is affected by parents’ level of education, but not income. Other factors such as parents’ weight status as defined by BMI, appear to affect misperception. Results from this study would likely provide health educators who may be developing intervention programs that address childhood overweight and obesity, with an understanding of how variables such as parents own weight status and
educational level affect perception. Conclusions that overweight and obese parents are more likely to misperceive their child’s weight may be correct. Additionally, the expectation that parents with advanced tertiary education have increased accuracy in perception may be incorrect. This understanding is important in developing intervention programs that include activities aimed at correcting weight misperception first before attempting to alter behavior. The unexpected findings may encourage health educators to conduct additional research to see if these results are consistent in other geographic areas.

A critical part in addressing obesity in children is for parents to seek help from a health professional. In order for this to occur, parents must first accept that their child has a weight problem that is potentially serious on overall health status. Early assessment by health professionals of parents’ willingness and readiness to address the problem, by using specific questions is necessary before intervention is initiated (Dietz, 1999). Recognizing the health risks associated with childhood obesity is determined to positively affect the likelihood to address the problem. However, not only do many parents of overweight children have an incorrect perception of their child’s weight, but their knowledge and understanding of the health risks associated with obesity is lacking (Etelson, Brand, & Patrick, 2003). It is this lack of knowledge and understanding that results in parents not taking the problem of childhood obesity seriously (Doolen, et al., 2009).
REFERENCES


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APPENDIX A

IRB APPROVAL

INSTITUTIONAL REVIEW BOARD
Exempt Notice

OFFICE OF SPONSORED RESEARCH • 11188 Anderson Street • Loma Linda, CA 92350
(909) 558-4311 (voice) • (909) 558-0131 (fax)

To: Modeste, Naomi
Department: Health Promotion & Education
Protocol: Factors that affect parents' misperception of overweight or obesity in their children

Your application for the research protocol indicated above was reviewed administratively on behalf of the IRB. This protocol is determined to be exempt from IRB approval as outlined in federal regulations for protection of human subjects, 45 CFR Part 46.101(b)(2).

Stipulations:

Please note the PI's name and the IRB number assigned to this IRB protocol (as indicated above) on any future communications with the IRB. Direct all communications to the IRB c/o the Office of Sponsored Research.

Although this protocol is exempt from further IRB review as submitted, it is understood that all research conducted under the auspices of Loma Linda University will be guided by the highest standards of ethical conduct.

Signature of IRB Chair/Designee: R. L. Rigsby
Date: 2/30/11

Loma Linda University Adventist Health Sciences Center holds Federalwide Assurance (FWA) No. 000047 with the U.S. Office for Human Research Protections, and the IRB registration no. 1 (0100026). This Assurance applies to the following institutions: Loma Linda University, Loma Linda University Medical Center (including Loma Linda University Children's Hospital, LLU Community Medical Center), Loma Linda University Behavioral Medicine, and affiliated medical practice groups.

IRB Chair: Rhodes L. Rigsby, M.D.
Department of Medicine
(909) 558-2341, rrigsby@llu.edu

IRB Administrator: Linda G. Halabrad, M.A., Director
Office of Sponsored Research
Fax: 43077, Fax 801-31, phalabrad@llu.edu

IRB Specialist: Mark Testerman
Office of Sponsored Research
Fax: 43047, Fax 801-31, mtesterman@llu.edu

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APPENDIX B

INFORMED CONSENT (I)

LOMA LINDA UNIVERSITY
School of Public Health

Informed Consent (I)

Factors Affecting Parents Misperception of Overweight or Obesity in their Children

☐ PURPOSE AND PROCEDURES

You are invited to take part in a research study being conducted by a Loma Linda University student. The purpose of the study is to find out how parents feel about their children's weight. The study will seek to determine if factors such as your own weight, level of education, income, or race/ethnicity impacts your understanding about your child's weight status.

If you agree to participate, you and your child's height and weight will be taken by the medical assistant in this pediatrician's office and you will be asked to fill out a simple questionnaire that has 30 questions. It will take you about 10 minutes to fill out the questionnaire.

☐ RISKS

There are no physical risks associated with participating in the survey process. However, breach of confidentiality could be considered a risk, thus the information we obtain from your survey will remain strictly anonymous.

☐ BENEFITS

Although you will not benefit directly from this study, the results will help pediatricians, and other health professionals learn about what parents think about their children's weight, and plan programs to reduce obesity in children.

☐ PARTICIPANTS' RIGHTS

Participation in this research is strictly voluntary. This means that you can change your mind at any time. You can also refuse to answer any questions on the questionnaire that you do not want to answer. If you agree to be a part of the survey process and then change your mind, you do not have to fill out the questionnaire. We will not be offended. There is no penalty if you withdraw. There will be no retaliation, or other consequences from the doctor's office or the student-researcher (Carol Reid).

Loma Linda University
Adventist Health Sciences Center
Institutional Review Board
Approved 3/30/2011
#090887 Chair R. L. M. L. Moore

_______ Initial

_______ Date
Factors Affecting Parents Misperception of Overweight or Obesity in Their Children

☐ CONFIDENTIALITY
Confidentiality is very important. Your answers to the survey questions are all confidential information. To protect your identity, a code will be used to link your child's height and weight information to your questionnaire. Your name or anything else to identify you will not be included on the questionnaire. If you agree to become part of this study, only the researcher will have direct access to your answers on the questionnaire.

☐ IMPARTIAL THIRD PARTY CONTACT
If you wish to contact an impartial third party not associated with this study regarding any question or complaint you may have about the study, you may call Mrs. Anthea Francis at 240-401-2669 for information and assistance. Mrs. Francis is a pharmacist with the American Pharmacological Society in Maryland.

☐ INFORMED CONSENT STATEMENT
I have read the consent form and have listened to the verbal explanation given by the investigator. My questions about this study have been answered to my satisfaction. I am giving my voluntary consent to participate in this study. Signing this consent form does not waive my rights nor does it release the investigators, institution, or sponsors from their responsibilities. I may call Carol Reid during routine office hours at 301-262-8573 if I have any additional questions or concerns. I will be given a copy of this consent form for my records.

☐ SIGNATURE

_____________________________  __________________________
Signature of subject             Date

Loma Linda University
Adventist Health Sciences Center
Institutional Review Board
Approved 1/30/2011

#510354, Chair R. J. Siegel, M.D.

_____Initial
_____Date

Page 2 of 2
APPENDIX C

INFORMED CONSENT (2)

LOMA LINDA UNIVERSITY
School of Public Health

Informed Consent (2)
Factors Affecting Parents Misperception of Overweight or Obesity in their Children

☐ PURPOSE AND PROCEDURES

You are invited to take part in a research study being conducted by a Loma Linda University student. The purpose of the study is to find out how parents feel about their children’s weight. The study will seek to determine if factors such as your own weight, level of education, income, or race/ethnicity impacts your understanding about your child’s weight status.

If you agree to participate, you and your child’s height and weight will be taken by the medical assistant in this pediatrician’s office and you will be asked to fill out a simple questionnaire that has 30 questions. It will take you about 10 minutes to fill out the questionnaire.

☐ RISKS

There are no physical risks associated with participating in the survey process. However, breach of confidentiality could be considered a risk, thus the information we obtain from your survey will remain strictly anonymous.

☐ BENEFITS

Although you will not benefit directly from this study, the results will help pediatricians, and other health professionals learn about what parents think about their children’s weight, and plan programs to reduce obesity in children.

☐ PARTICIPANTS’ RIGHTS

Participation in this research is strictly voluntary. This means that you can change your mind at any time. You can also refuse to answer any questions on the questionnaire that you do not want to answer. If you agree to be a part of the survey process and then change your mind, you do not have to fill out the questionnaire. We will not be offended. There is no penalty if you withdraw. There will be no retaliation, or other consequences from the doctor’s office or the student-researcher (Carol Reid).

Loma Linda University
Adventist Health Sciences Center
Institutional Review Board
Approved 3/10/2011
# 51003EY, Chair P. Chiquist

Initial
Date
Factors Affecting Parents Misperception of Overweight or Obesity in Their Children

☐ CONFIDENTIALITY

Confidentiality is very important. Your answers to the survey questions are all confidential information. To protect your identity, a code will be used to link your child's height and weight information to your questionnaire. Your name or anything else to identify you will not be included on the questionnaire. If you agree to become part of this study, only the researcher will have direct access to your answers. Although your doctor is related to the researcher, she will not have access to your answers or know whether or not you participated.

☐ IMPARTIAL THIRD PARTY CONTACT

If you wish to contact an impartial third party not associated with this study regarding any question or complaint you may have about the study, you may call Mrs. Anthea Francis at 240-401-2669 for information and assistance. Mrs. Francis is a pharmacist with the American Pharmacological Society in Maryland.

☐ INFORMED CONSENT STATEMENT

I have read the consent form and have listened to the verbal explanation given by the investigator. My questions about this study have been answered to my satisfaction. I am giving my voluntary consent to participate in this study. Signing this consent form does not waive my rights nor does it release the investigators, institution, or sponsors from their responsibilities.

I may call Carol Reid during routine office hours at 301-262-8573 if I have any additional questions or concerns. I will be given a copy of this consent form for my records.

☐ SIGNATURE

__________________________________________
Signature of subject

__________________________________________
Date

[Signature and date fields completed]

Loma Linda University
Adventist Health Sciences Center
Institutional Review Board
Approved 3/18/2001

Initial

Date

Page 2 of 2
APPENDIX D

QUESTIONNAIRE

Factors Affecting Parents Misperception of Their Child’s Weight

Study Questionnaire

Instructions: This questionnaire consists of four (4 sections). At the end of each section, please go to the next. There are a total of 30 questions. Please do not write in the box below.

<table>
<thead>
<tr>
<th>Child’s Age</th>
<th>Sex: M F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child’s Height</td>
<td>Weight</td>
</tr>
<tr>
<td>Parent’s Sex: M F</td>
<td></td>
</tr>
<tr>
<td>Parent’s Height</td>
<td>Weight</td>
</tr>
</tbody>
</table>
Parent Perception of Their Child's Body Weight Questionnaire

Section I: Please answer the following questions about yourself.

1. What is your gender?
   □ Male       □ Female

2. What is your ethnicity?
   □ White, non-Latino (or non-Hispanic)      □ White, Latino (or Hispanic)
   □ Black, African American                  □ Asian: Chinese, Japanese
   □ Southeast Asian: Vietnamese, Cambodian, Hmong, Laotian, Chinese Vietnamese
   □ Other Asian (not Chinese, Japanese, or Southeast Asia)
   □ Pacific islanders (Samoa, Filipino, etc)
   □ Native American (American Indian)
   □ Other (please specify) _____________________

3. How many years of school have you had?
   □ 8th grade or less
   □ Less than High School degree
   □ High School degree or GED
   □ Some college
   □ College Graduate
   □ Post-graduate work or degree

4. What is your annual (yearly) household income (before taxes)
   □ less than $10,000
   □ $10,000 - 25,000
   □ $25,001 - 40,000
   □ $40,001 - 55,000
   □ $55,001 - 70,000
   □ $70,001 - 85,000
   □ $85,001 - 100,000
   □ over $100,000
Section II: Questions 5 and 6 refer to the diagrams below. Please answer each question based on the diagrams. Please use the sketch labeled “female” for your daughter or “male” for your son.

5. Which picture do you think looks like your daughter or son (circle the picture)

Females

<table>
<thead>
<tr>
<th>Ages</th>
<th>Picture</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-9</td>
<td><img src="female_6-9.png" alt="Picture" /></td>
</tr>
<tr>
<td>10-13</td>
<td><img src="female_10-13.png" alt="Picture" /></td>
</tr>
<tr>
<td>14-17</td>
<td><img src="female_14-17.png" alt="Picture" /></td>
</tr>
</tbody>
</table>

Males

<table>
<thead>
<tr>
<th>Ages</th>
<th>Picture</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-9</td>
<td><img src="male_6-9.png" alt="Picture" /></td>
</tr>
<tr>
<td>10-13</td>
<td><img src="male_10-13.png" alt="Picture" /></td>
</tr>
<tr>
<td>14-17</td>
<td><img src="male_14-17.png" alt="Picture" /></td>
</tr>
</tbody>
</table>
6. Which picture do you think is ideal for your child? (Circle the picture).

**Females**

<table>
<thead>
<tr>
<th>Ages</th>
<th>Picture</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-9</td>
<td><img src="image1.png" alt="Picture" /></td>
</tr>
<tr>
<td>10-11</td>
<td><img src="image2.png" alt="Picture" /></td>
</tr>
<tr>
<td>14-17</td>
<td><img src="image3.png" alt="Picture" /></td>
</tr>
</tbody>
</table>

**Males**

<table>
<thead>
<tr>
<th>Ages</th>
<th>Picture</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-9</td>
<td><img src="image4.png" alt="Picture" /></td>
</tr>
<tr>
<td>10-11</td>
<td><img src="image5.png" alt="Picture" /></td>
</tr>
<tr>
<td>14-17</td>
<td><img src="image6.png" alt="Picture" /></td>
</tr>
</tbody>
</table>
Section III: Please indicate how much you agree or disagree with each statement by placing a check mark in each box on the scale to the right of each statement. There is no right or wrong answer. Your responses will remain anonymous.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Somewhat Agree</th>
<th>Neither Agree or Disagree</th>
<th>Somewhat Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. My child has a normal weight.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>8. My child is at risk for having a weight problem.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>9. Overweight/obesity is not a serious problem in children</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>10. Overweight/obesity can cause serious health problem for adults.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>11. Overweight/obesity in children can lead to diabetes.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>12. Overweight/obesity can lead to heart disease.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>13. Children who are overweight will usually outgrow their weight problem.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>14. Overweight children are more likely to have problems in their social relationships with other children who are not overweight.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>15. I am not worried about my child’s weight right now.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>16. Overweight children are likely to become overweight adults</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td>Strongly Agree</td>
<td>Somewhat Agree</td>
<td>Neither Agree or Disagree</td>
<td>Somewhat Disagree</td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>---</td>
<td>----------------</td>
<td>----------------</td>
<td>---------------------------</td>
<td>--------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>17. I have no problems with trying to control what my child eats.</td>
<td>□ □</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>18. It is hard for me to prepare healthy meals for my child.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>19. I know how to plan healthy meals for my child.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>20. I can afford healthy foods such as fresh fruits and vegetables for my family.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>21. I do not have the time to prepare healthy meals for my family.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>
Section IV: Please read each weight control strategy listed below. Indicate whether you already do this, you will try, or you will not try this strategy for family. Place an ‘X’ in the box next to behaviors you are practicing. Think of behaviors you have practiced for your child in the past year to encourage a healthy weight.

<table>
<thead>
<tr>
<th>Weight Control Strategy</th>
<th>I already do this</th>
<th>I will try</th>
<th>I will not try</th>
</tr>
</thead>
<tbody>
<tr>
<td>22. During the next month, I intend to buy less junk food when I shop</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23. During the next month, I will encourage my children to be active on most days</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24. During the next month, I intend to buy less sugar-sweetened beverages</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25. During the next month, I intend to limit the amount of juice and sweetened beverages (regular soda, kool-aid, sports drinks, etc) that my child drinks to less than 2 cups per day</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26. During the next month, I intend to prepare healthier meals at home</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27. During the next month, I intend to purchase fast-food for my family no more than one time for the week</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28. During the next month, I will limit my children from watching the television for more than one hour every day</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29. During the next month I will limit my children from using the computer for less than one hour per day (this hour does not include time used for school work)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30. During the next month, I intend to increase the intake of fruits and vegetables in more children every day, to more than three servings.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Thank you for your participation!

[Note: The image contains additional notes and signatures but they are not relevant to the natural text representation.]
Michelle Barnes Marshall MD, P.C.
Pediatrics and Adolescent Medicine

December 20, 2010
Loma Linda University
School of Public Health
Loma Linda, CA 92350

TO WHOM IT MAY CONCERN:

This is to certify that permission is granted to Carol Reid to collect data from my patients and their parents for her doctoral dissertation research.

Yours Sincerely,

Michelle Barnes Marshall MD

2440 M ST, NW, STE 317, Washington, DC 20037  Tel: 202-775-5990  Fax: 202-775-5993
December 20, 2010

Loma Linda University
School of Public Health
Loma Linda, CA 92350

TO WHOM IT MAY CONCERN:

This is to certify that permission is granted to Carol Reid to collect data from my patients and their parents for her doctoral dissertation research.

Yours Sincerely,

Kim A. Kelly M.D., P.C.
4467 Old Branch Avenue Suite 103
Temple Hills, MD 20748
Office 301-702-2003 Fax 301-702-2324