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Obesity Trends in Head Start Preschoolers

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OBESITY TRENDS IN HEAD START PRESCHOOLERS

By

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Chapter 1

INTRODUCTION

Statement of the Problem

Obesity is a growing trend that has an adverse impact on the health of Americans (The Trust for America's Health, 2010). Tragically, obesity prevalence is also high within the population of American children. Obese and overweight children are seen more frequently than in the past in American schools, communities, homes, churches, and daycares. Combined obesity/overweight statistics place Mississippi at the top of prevalence lists, with adults at 68.8%, public school students at 45%, and African American Head Start preschoolers at about 38% (Harbaugh, Kolbo, Molaison, Hudson, Zhang & Wells, 2011;The Trust for America's Health, 2010; Molaison et al. 2010). Mississippi is in the top 5 nationally in obesity-related correlates of poverty, stroke, hypertension, certain cancers, kidney disease, and Type-2 diabetes (CDC 2009; The Trust for America's Health, 2010). Mississippi also has the highest percentage of African American citizens (37%) and the lowest income per capita (U.S. Census, 2010). Research has shown that the poor and African Americans are particularly vulnerable to obesity and its effects (Cossrow & Falkner, 2004; Flegal et al. 2010; Ogden et al. 2003; 2012).

Researchers have tried to discover the underlying causes of child obesity, and while they have not found a single definitive cause, a complex of factors including the family, diet and activity balance have been shown to influence child weight (Davison & Birch, 2001). Because of the many poor health outcomes associated with child obesity, it is important for nurses to understand how to prevent it, and to treat it when it occurs (Jordan-Welch & Harbaugh, 2008).

Monitoring trends in obesity can be used to identify populations at risk, and to provide baseline data for comparison and intervention studies (Harbaugh et al. 2011).

Varying factors contribute to high preschooler obesity rates. One factor is the lack of exercise that most children experience in America (Rahman, Cushing & Jackson, 2011; Tattarani & Rauvissin, 2002; Pate, Pfeiffer, Trost, Zieglar, & Dowda, 2004). American schools have placed more emphasis on grades and learning, and less on time spent in physical fitness. Further, in low-income families, children may not have a safe place to play outside at home neighborhoods, nor have play equipment (Tattarani & Rauvissin, 2002; Pate et al. 2004). Technology such as television, videos and games have also contributed to less activity in children, and in the parents (Anderson & Butcher, 2006; Goldfield, Raynor, & Epstein 2002; Tataranni & Rauvissin, 2002).

Another factor contributing to high levels of obesity and overweight in children is the child's diet (Newby, 2007; Tattarani & Rauvissin, 2002). Families do not cook every day as they once did, and live far busier lives. In this generation, life is perceived as being so busy that it is almost considered "normal" to go to a fast food restaurant every night of the week to have a meal. Fast-foods, processed, and already prepared foods are often high in sugars, fats and calories, and are served in large portions, even for an adult. The replacement of milk and water with empty calories in sugar and sport drinks also has been identified as contributing to child obesity (Phillipas & Lo, 2005).

Families are also eating meals in front of the television, which reduces time spent together eating at a table, which is important for monitoring child food quality and quantity (The Trust for America's Health, 2010). . The media can also be blamed for the increase of childhood obesity in America. Everywhere we turn there is an advertisement for foods with high calorie counts that are loaded with sugars and saturated fats. Advertising companies make these foods

so appealing to children; almost to the point where they are all the child ever asks for to eat (The Trust for America's Health, 2010).

Perhaps one of the major problems with childhood obesity lies within the family of the child. Families have a lot of influence over their children through provision of healthy environments, foods, activities and parent role modeling (Gable & Lutz, 2000; Harbaugh, Jordan-Welch, Bounds, Blom, & Fisher, 2007; Strauss & Knight, 1999). This then poses the question; do parents even really know what to teach their children about living a healthy lifestyle? Obesity prevention and treatment solutions must include the family, and in doing so, may have a breakthrough in attempting to fix the problem of increasing childhood obesity rates in America and around the world.

After the family, the next most influential environment for preschoolers is likely the preschool environment, where children spend 6 or more hours per day. The quality of the program can influence child eating and activity. How much activity and what sorts of foods are served? What is taught about healthy habits? Fortunately, children can learn healthy lifestyle habits in school, which may reduce poor lifestyle habits learned at home. This may be especially true for preschool children, who are receptive to positive health messages from both family and school (Gable & Lutz, 2001; Visser, 2005).

Statement of the Purpose

The purpose of this natural comparative study is to see if changes in diet, education, and activity made in a South Mississippi Head Start (HS) preschool from Fall 2007 through Fall 2010 made any changes in the Body Mass Index (BMI) trends in two cohorts of low-income African American 3-year-olds. Cohort 1 BMI trends were measured in Fall 2006 and Spring 2007, before major HS changes in diet, education and activity were made (pre-treatment), and

Cohort 2 was measured in Fall 2010 and Spring 2011, after major changes were made (post-treatment).

Important Terms Defined

Body Mass Index (BMI) is a specific number calculated using a person's weight and height using a standard Centers for Disease Control (CDC) formula: BMI = Weight (in kg)/[Height (in m)]^2 (CDC 2000). The calculated number is then compared to a standard scale describing underweight, normal weight, overweight, and obese. Children have different normal weight to height ratios as they age, and for each gender. For this reason, it is necessary to use standardized BMI Percentiles (BMIPs). This requires an initial BMI calculation that is plotted on a CDC BMIP chart for age and gender. BMIP's are then classified as (1) underweight (BMI is less than the 5th percentile); (2) normal weight (BMI is equal to or greater than the 5th but less than the 85th percentile); (3) overweight (BMI is greater than the 85th but less than the 95th percentile); and (4) obese (BMI is greater than or equal to the 95th percentile) (Kuczmarzki et al., 2000).

Head Starts are federally funded preschool programs for low-income 3 to 5 year olds. They provide health and educational services designed to prepare children for school. Preschoolers are fed breakfast, lunch, and one or two snacks each day. The HS also provides physical activity. Since the recognition of the problem of preschooler obesity and overweight in low-income preschoolers in Mississippi (Harbaugh, Bounds, Kolbo, Molaison, & Zhang, 2009), significant efforts have been made to improve food quality and increase activity.

Changes in Head Start since Fall 2007

Dr. B. Harbaugh performed a qualitative analysis of changes implemented at the HS in Fall 2011. She found that the HS in this study began offering more whole grains, low-fat milk,

vegetables and fruits, and limiting portions of fats, sugars, and juices. Portions were also carefully controlled. In the area of physical activity, HS decreased the number of in-school television and video watching hours, installed a new well-equipped playground, educated parents, teachers and students on healthy eating and exercise, increased supervised playground games and activities, and also increased child BMI screening and counseling for overweight and obese children. Stretching and moving in class during lessons and story-time also was encouraged.

Significance

The American Nurses Association (ANA) states the scope of practice in nursing includes health promotion, assessment, screening, education, outcome evaluation, and referral to other professionals (Jordan-Welch & Harbaugh, 2008). Child obesity has negative health effects, which could result in long-term chronic health problems as the child ages. It is therefore the nurse's responsibility to help prevent and treat childhood obesity, not only to protect children from the effects of disease, but also to protect their future as adults. Unhealthy weight at a young age increases the chance of and time of exposure to chronic weight-related illness. Early weight reduction in obese children may instill healthy habits that extend to later child- and adulthood (Harbaugh et al. 2007). In this case it is important for the nurse to know, understand, and recognize ways to address child obesity in practice.

Research Question

1. Did BMIP trends change after a HS provided a structured diet and activity program aimed at normalizing BMIPs for 3-year olds?

Overview of Methods

An analytical approach will be applied to this natural, comparative study. BMIPs for the 3-year old HS preschoolers were measured at the beginning and end of the school year for a cohort prior to the interventions (Cohort 1) and for a cohort after the interventions (Cohort 2). Trends will be graphed; the data points will be compared using matched and independent t-tests. Conclusions will be drawn from the observed trends.

Summary

Our world today is heavily affected by obesity. It is up to this generation of society, including nurses, to stop the obesity epidemic. The first step is to know more about the problem.

Chapter 2

REVIEW OF LITERATURE

The BMI of any person says a lot about their health status, but does it say even more about a child's health status? To investigate the BMI of children, a review of literature is required. A search of the literature was done using CINAHI, EBSCO host, and the Cochrane library. A wide variety of articles over several past years were read and examined. The phrases childhood obesity and Mississippi preschoolers were used as search criteria with prevalence of as a definer. This chapter explores the issues related to obesity's growing prevalence among children, influences on increasing obesity levels, efforts to change obesity levels, and the potential issues with using BMI as the key measurement of obesity.

Prevalence

Reports of the effects of obesity are in the news every day. As if it is not bad enough to see the increase in adults, we are also seeing a rise in the rates of childhood and adolescent obesity. According to an article written by Davy, Harrell, King, and Stewart (2004), "Among children in the United States aged 6 to 19 years, 30% are overweight or at risk for overweight, and the prevalence rises to 36 to 40% among African-American children within this age range" (p. 571). The American Heart Association has released updates on the growing obesity rates saying that over 10% of toddlers across the U.S. are now considered to be overweight; this statistic, along with others, matches the CDC's claim of rates doubling in the last 40 years (Visser, 2005). Recently, a stabilization in child obesity rates has been detected, but rates remain

high (Ogden et al. 2012). These numbers indicate that child overweight and obesity is a problem that desperately needs to be addressed.

Obesity is a modifiable risk factor for all kinds of health problems such as cardiovascular disease, diabetes, and stroke (Davy et al. 2004). A modifiable risk factor simply means that it is something that can be changed. Making changes to lifestyles of obese children can literally mean life or death for them in the long run. These changes include things such as decreasing saturated fat consumption, increasing dietary fiber intake, and getting more physical activity (Davy et al. 2004).

*Influences on Childhood Ob*esity

There are numerous factors that play a role in the contribution to childhood obesity. These factors range anywhere from socioeconomic status to lack of physical activity to the type of educational institution they attend. A study done by Li and Hooker (2010) found that among children who attended a public school, those coming from a lower socioeconomic status (SES), had higher body mass indexes than children from higher SES status at the same school. They also found that regardless of SES status, children attending a private school tended to have lower BMIs than children attending a public school (Li & Hooker, 2010).

Rahman, Cushing, and Jackson (2011) claim that the environment a child lives in has a significant impact on rising childhood obesity trends. "Lower–socioeconomic status neighborhoods are at higher risk, as these communities often have limited access to recreational facilities and food stores with healthful, affordable options. . ." (Rahman, Cushing & Jackson, p. 51). These authors are trying to explain the fact that even if these families wanted to eat healthier to improve their health status it would be a challenge because of costs and the type of neighborhood they live in.

"The disappearance of physical activity from the daily lives of American adults and children is a complex problem" (Rahman, Cushing & Jackson, 2011, p. 52). Knowing that physical activity is an issue when it comes to obesity in anyone poses the question, why isn't something being done about it? Eastman (1997) suggests that children would be more open to physical activity if others in their family were participating. He also suggests letting children come up with their own ideas of activities to make it fun, therefore creating more of a "want to" when it comes to physical activity.

Researchers also suggest that breastfeeding during infancy influences whether or not a child will be overweight. According to Visser (2005),

> Breast milk has the right amount of fat, sugar, water, and protein that infants need for proper growth and development. Recent studies have shown that the antibodies found in breast milk help to protect infants from viruses and bacteria, and, as a result, these infants are less likely to develop ear infections, diarrhea, and respiratory illnesses. It has also been shown that breastfed infants tend to gain less unnecessary weight.

Although very vague on the mechanism, Visser's observation should be taught to parents so that they can take "early efforts" to set their child on the right path for a healthy life.

Efforts to Make a Change

Sdonal, Dunn, Thomas, Pegram, and Ward (2004) wrote an article about a project called "Color Me Healthy" being done in efforts to get preschoolers and other young children well acquainted with a healthy lifestyle. "Color Me Healthy" is a program developed for children to learn to live a healthy life style in a fun way. The program provides a kit containing posters, brochures, flash cards, and musical CDs. These resources use bright colors and an easy reading

level for children to learn with. The flash cards consist of healthy food names and colors. There are brochures included for teacher and parents as well so that they can promote a healthy lifestyle for the kids watching them. According to researchers, this program has been very successful. "To date, over 4000 child care providers have attended Color Me Healthy training in North Carolina. Ten other states are currently using the curriculum" (Sdonal et al. 2004, p. 328). While popular, the actual effects of the program on children's weight and BMI have not yet been reported.

Other efforts have been made to increase the healthiness in the lives of young children. An intervention effort was made in Memphis, TN to see if celebrities could be used as an incentive for healthy living (Richey, Irwin, Irwin, Miller & Somes, 2010). Children of city schools were given a preliminary test to assess their knowledge on health and to inquire about their own personal health habits. The players of the Memphis Grizzlies were then asked to come in and teach a six week course with the children. During their physical education time, the children were taught various things about living healthy. At the end of the intervention, the children were given the same test as before to see if their knowledge on certain subjects had increased. "Overall, posttest measures indicated that students undergoing this special curricular addition gained knowledge of necessary health information to which they had not been exposed" (Richey et al. 2010, p. 336). It is strongly recommended that other efforts similar to these be made to improve the health status of young children (Richey et al. 2010).

Strikes Against Body Mass Index

Some researchers propose the idea that BMI may not be the best indicator of a person's health status. BMI is a ratio of height to weight. In simple terms, the height is divided by the weight and a number is calculated. That number is then compared to a national standard that

says whether you are underweight, normal weight, overweight, or obese. Some researchers argue that this number is ambiguous because it does not take into account the muscle mass of a person nor the fat placement of a person (Tufts University, 2006). For example, just because a person is almost six feet tall and weighs two-hundred fifty pounds does not necessarily mean that person is overweight. That person could have a lot of muscle on their body and be in great health. Studies have shown that more belly fat contributes to cardiovascular problems as compared to arm and leg fat. This is because belly fat is surrounding vital organs and compromising their blood flow. Studies have also shown that people with lower BMIs were at more risk for certain health problems simply because the BMI scale tells them they're "normal weight". Overall, efforts are being made to find other ways of determining a whether a person is obese or not. Despite periodic debate, BMIP, which accounts for age and gender as well as normal growth trends, continues to be a valid non-invasive measure of adiposity in children (Cole, Faith, Pietrobelli & Heo, 2005).

Chapter 3

METHODOLOGY

Introduction

Though rates seem to be stabilizing, obesity remains an important health issue in American children. The author of this paper, and her advisor, Bonnie Lee Harbaugh, PhD, RN, have come together to gather and analyze data in efforts to understand obesity trends in Mississippi HS preschoolers before and after changes were made in diet and activity.

The Treatment: Changes in Diet and Activity. A previous study was done by Dr. Bonnie Lee Harbaugh and others for HS, so that they could look at BMI trends of children in Head Start centers across the city of Hattiesburg. The results of the unpublished HS report showed that overall children's average BMIPs were low in the Fall of 2006 (46.6^{th} BMIP) and increased in the Spring of 2007 (53.8^{th} BMIP). However, when a subgroup, the obese and overweight children, were examined it showed that average BMIPs were high in the beginning of Fall 2006 school semester (95.8^{th} BMIP) and decreased significantly ($p \leq .05$) during the year (Spring 2007 = 91.4^{th} BMIP). It was also found that those same children did not have a significant, if any, increase in BMIP over the summer, indicating that some knowledge of how to effectively decrease BMIP was gained. Since that initial HS report, the HS has implemented changes in their program to help normalize child weight. The present study compares pre-treatment data from Cohort 1's Fall 2006 data with its Spring 2007 data, and also compares post-treatment Cohort 2's Fall 2010 data with its Spring 2011 data to see if the same BMIP trends in children

still exist today, and if they show a more favorable trajectory towards weight normalization after the HS diet and exercise changes were began.

Objectives

The objectives are as follows:

1. To visualize trends in BMIs of children.

2. To analyze data for the purpose of interpreting the trends of the BMIs and what they suggest about the children and their environment.

Hypotheses

1. Overall BMIPs in all preschoolers will be significantly lower in the Spring than in the Fall in a) Cohort 1 (pre-treatment) and in b) Cohort 2 (post-treatment).

2. BMIPs of Healthy subgroups in a) Cohort 1 (pre-treatment) and in b) Cohort 2 (post-treatment) will be significantly lower in Spring than in the Fall.

3. BMIPs of Overweight/Obese subgroups in a) Cohort 1 (pre-treatment) and in b) Cohort 2 (post-treatment) will be significantly lower in Spring than in the Fall.

4. There will be no significant differences between Cohort 1 (pre-treatment) and Cohort 2 (post-treatment) Fall values for 2006 and 2010 in the a) overall group, b) the Healthy group and the c) Overweight/Obese group.

5. Cohort 2 (post-treatment group) Spring BMIPs will be significantly lower than those of Cohort 1 (pre-treatment) in the Overweight/Obese group.

Design

This study uses a natural comparative design with a convenience sample. The study is a natural comparative study because the changes were made by HS over a period of 3 years, then

pre and post change data were compared. This design does not account for other changes in family or community that may have influenced the outcomes, nor does the design exert any control over the variables. The only controls possible in this study are to compare Fall 06 and Fall 10 data to see if they are comparable starting points, and to examine only incoming 3-year olds who are just beginning the HS program.

Setting

The setting for the study was all HS preschools in one South Mississippi county.

Research Participants

Participants of this study include incoming 3-year old H.S.preschoolers. All of these children have to meet low socioeconomic status household status as determined by a HS formula to be able to attend HS. At registration, each participant's parents or guardians signed a consent form that enables HS to release health information to providers and researchers, with the stipulation that information confidentiality be protected whenever possible by the HS Director. The HS Director gave written permission for the data to be used. IRB was applied for, with an Exempt status. All data were collected by trained HS staff, and only identifying numbers were used to match children with data.

The majority of the children (98%) in this study were African American. Cohort 1 consisted of 218 HS 3-year-olds (54% male) who were measured and BMI calculated when they began HS in the Fall of 2006, and at the end of the year in Spring of 2007. Cohort 2 consisted of 248 HS 3-year-olds (51% male) who were measured and BMI calculated when they began HS in the Fall of 2010, and at the end of the year in Spring of 2011. Cohort 1 had 139 preschoolers classified as Healthy, 68 classified as Obese/Overweight, and 11preschoolers classified as

Underweight. Cohort 2 had 156 preschoolers classified as Healthy, 83 classified as Obese/Overweight, and 9 preschoolers classified as Underweight.

Data Collection and Procedure

Data that had already been collected by HS staff were requested from HS that included all 3-year olds' gender, age, race, height and weight. No names or specific HS schools were associated with the data. The HS staff removed names and substituted unique identifying numbers, so researchers were blinded to the names. The childrens' information was entered in to a SPSS file, and BMI and BMIP values were calculated using Centers for Disease Control (2000) formulas and charts and entered into the data base. The dependent variable in the study will be the BMIP of the children and the independent variable will be the changes made in the Head Start environment.

Data Analysis

The BMIs that were calculated were compared to a standard national BMIP chart based on gender and age. Based on the percentile received after calculation, each child was then classified as underweight, healthy weight, overweight or obese. Matched pair *t*-tests were used to determine differences between Cohort 1 Fall and Spring values, and between Cohort 2 Fall and Spring values for the larger group of all preschoolers and for the subgroup of Overweight/Obese preschoolers. Independent *t*-tests were used to determine differences between Cohort 1 and 2 Fall values and between Cohort 1 and 2 Spring values for the larger group of all preschoolers and for the subgroups of Healthy and Overweight/Obese preschoolers. Only preschoolers with complete data sets were used in analyses. A significance value of p=.05 was established *a priori* for all *t*-tests. The BMIP values were graphed in order to visualize any trends.

Chapter 4

RESULTS

Results by Hypotheses

1. Overall BMIPs in all preschoolers will be significantly lower in the Spring than in the Fall in a) Cohort 1 (pre-treatment) and in b) Cohort 2 (post-treatment).

These hypotheses were not supported. Matched pair *t*-test analyses revealed that in the larger group of all preschoolers, there were no significant differences between BMIPs between Fall and Spring measurements in a) Cohort 1 (*t*= 1.24, p=.542, df= 217), and also in b) Cohort 2 (*t*= 1.43, p=.348, df= 247).

2. BMIPs of Healthy subgroups in a) Cohort 1 (pre-treatment) and in b) Cohort 2 (post-treatment) will be significantly lower in Spring than in the Fall.

These hypotheses were not supported. Matched pair *t*-test analyses revealed that in the Healthy subgroup of Cohort 1, BMIPs were actually greater in the Spring than in the Fall (*t*= 2.14, p= .042, df=138), as were those in Cohort 2 (*t*= 2.27, p= .030, df=155). (See Figure 1).

3. BMIPs of Overweight/Obese subgroups in a) Cohort 1 (pre-treatment) and in b) Cohort 2 (post-treatment) will be significantly lower in Spring than in the Fall.

All hypotheses were supported. Matched pair *t*-test analyses revealed that in the Overweight/Obese subgroup of Cohort 1, BMIPs were significantly lower in the Spring (*t*=1.99, p= .046, df= 67), as were those in Cohort 2 (*t*= 2.65, p=.01, df=82). (See Figure 2)

4. There will be no significant differences between Cohort 1 (pre-treatment) and Cohort 2 (post-treatment) Fall values for 2006 and 2010 in the a) overall group, b) the Healthy group and the c) Overweight/Obese group.

All hypotheses were supported. Independent *t*-test analyses revealed that BMIPs were not significantly different for Cohort 1 and Cohort 2 in the Fall 2006 and Fall 2010 in a) all preschool sample (*t*= 1.15 , p= .581, df= 464), b) in the Healthy subgroup (*t*= 1.02, p= .654, df=293), or c) in the Overweight/Obese subgroup (*t*= 1.42, p=.640, df=149).

5. Cohort 2 (post-treatment group) Spring BMIPs will be significantly lower than those of Cohort 1 (pre-treatment) in the Overweight/Obese group.

The hypothesis was supported. Independent *t*-test analysis revealed that Cohort 2's Spring BMIPs were significantly lower than Cohort 1's in the Overweight/Obese group (t= 2.40, p= .040, df= 149).

Chapter 5

DISCUSSION

While the BMIP trends suggest that BMIPs in the Overweight/Obese group were positively affected by changes in the HS environment, there are limits to what conclusions can be drawn about the results of this study. This study design does not allow for a definitive answer of whether or not the interventions instituted by the HS over the 3 year period caused or affected BMIP change. However, the findings do suggest that the interventions addressing healthy eating, activity, and health information used in this Head Start Program may have benefitted the preschoolers who were/are Overweight/Obese. Overweight/Obese preschoolers moved to significantly healthier BMIPs during both pre and post intervention timeframes, and even more so after the interventions were began. These findings suggest that obese/overweight preschoolers leave some of the influence of obesiogenic home environments when they attend the structured environment of Head Start, and that certain nutritional and activity interventions may accelerate their move to healthier BMIPs. Since these Overweight/Obese preschoolers in both Cohorts did not have significant differences between BMIPs when they started school, it suggests that the interventions may have been a factor in the decrease in BMIPs. Other factors that could be playing a role in the decrease of the BMIP are family structure, food insecurities, and family income.

Analysis of the data benefitted from examining subgroups of BMIP categories. No differences were found between Fall and Spring BMIP data points for each cohort when only the whole, larger group was examined. BMIP trend differences only showed when subgroups were examined separately, because the larger subgroup's average BMIP rose (Healthy BMIP) and the

smaller's average BMIP (Overweight/Obese) declined sharply, thus each subgroup trend canceled the other in the analysis of overall group change.

Interestingly, Healthy BMIP preschoolers came into the school year under the 50th percentile, then their BMIPs moved upward during the school year. This may be a result of eating more nutritionally beneficial foods at Head Start on a more regular basis than at home. Since these children already had a healthy BMIP, these results might indicate that the healthy meals and snacks at HS are providing them with more food than they normally would have the ability to access, thus causing an increase in BMIP.

Further research is necessary to facilitate any final conclusions concerning what factors may have contributed to the changes seen. Previous research has mainly focused on the problem of overweight/obese kids and the factors contributing to the problem. This study contributes to the research base by suggesting how to fix the problem. This study does open the door for more research to follow. Perhaps if these interventions persist with the preschoolers, it will prevent them from becoming Overweight/Obese schoolagers, teenagers, and eventually adults. Other questions that could possibly be researched include: Which interventions work best on which preschoolers, and what are the family/home factors that are influencing the situation?

Summary

The results of this study illustrate the value of examining BMIP change by subgroups of preschoolers, which may be needed to detect change in BMIP categories that may not be apparent when examining the whole group. The trends in BMIP will enable HS staff to see that their interventions may be making an important difference, though that will need further study. Studies such as this helps nurses design interventions that may normalize BMIPs of children, and gives them baseline information on which to design more experimental studies. This information

will assist nurses of America to help treat and prevent chronic diseases and other medical conditions related to a lifetime of obesity.

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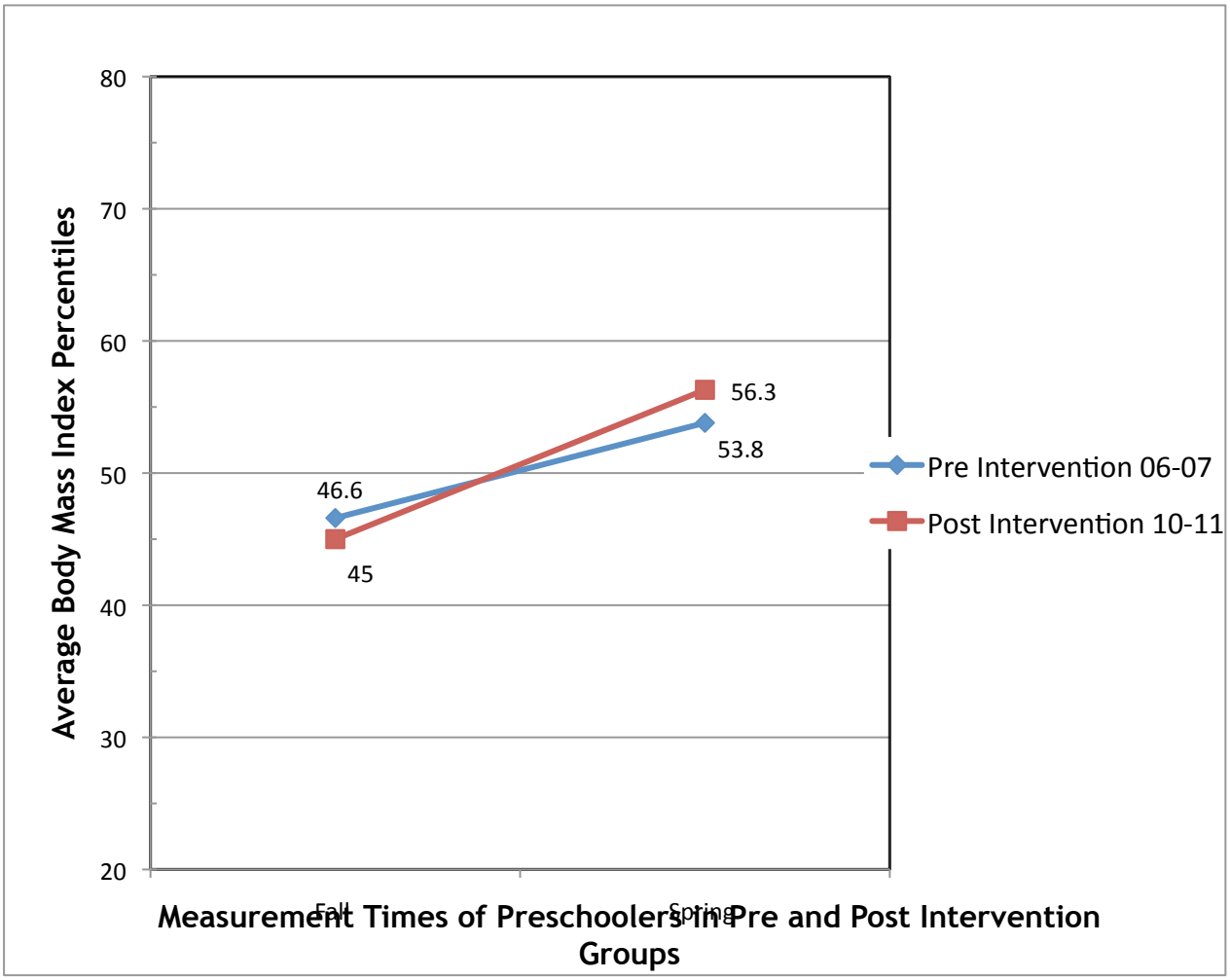

Figure 1. Healthy BMIP Preschoolers' BMIP change (paired t-tests) from Fall to Spring in 2006-2007 and in 2010-2011.

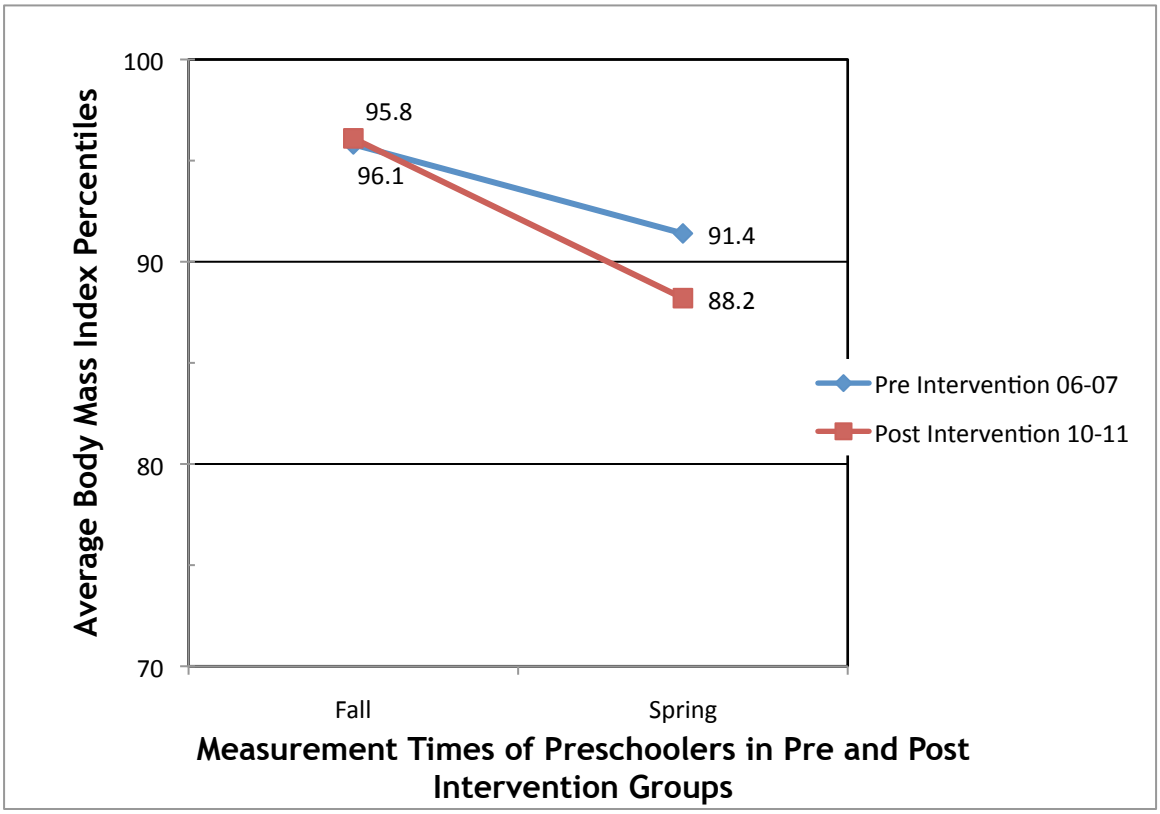

Figure 2. OBESE/OVERWEIGHT Preschoolers' BMIP changes (paired t-tests) from Fall to Spring in 2006-2007 and in 2010-2011.