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Evaluation of the Association Between Exposure to Different Forms of Electronic Media with Dietary Intake and Body Mass Index Percentile in Hispanic and American Indian Pre-Schoolers in Rural New Mexico

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EVALUATION OF THE ASSOCIATION BETWEEN EXPOSURE TO DIFFERENT FORMS OF ELECTRONIC MEDIA WITH DIETARY INTAKE AND BODY MASS INDEX PERCENTILE IN HISPANIC AND AMERICAN INDIAN PRE-SCHOOLERS IN RURAL NEW MEXICO

by

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ABSTRACT

BACKGROUND: Obesity is a problem for Hispanic and American Indian children. Sedentary behavior has been linked to increased body weight and poor dietary quality. The purpose of this study was to evaluate the associations between different forms of sedentary behavior involving exposure to electronic media with dietary intake and body mass index (BMI) Percentile.

METHODS: My cross-sectional study used baseline anthropomorphic measures and parent survey data collected as part of the Child Health Initiative for Lifelong Eating and Exercise (CHILE) study. I used multivariate linear regression to evaluate the relationship between different forms of sedentary behavior (time per week spent watching television, watching pre-recorded DVD/video, and playing computer/video games) and dietary intake (servings per day of fruit, vegetables,

whole grain, dairy, and discretionary fats/sugars) and BMI Percentile. All analyses controlled for age, race/ethnicity, and gender.

RESULTS: I found a statistically significant association between duration of television viewing and daily servings of dairy ($p<0.05$) and discretionary fats/sugars ($p<0.001$). There was also a statistically significant relationship between duration of DVD/video viewing and daily servings of dairy ($p<0.005$) and discretionary fats/sugars ($p<0.001$). Statistically significant inverse relationships were seen between duration of computer/video game use and daily servings of fruit ($p<0.01$) and discretionary fats/sugars ($p<0.05$). After adjusting for age, race/ethnicity, and gender, I did not find statistically significant relationship found between duration of any electronic media exposure and BMI Percentile.

CONCLUSIONS: Different forms of electronic media exposure are significantly associated with different dietary intakes, but not with BMI Percentile. My findings add to the understanding of the association between different forms of sedentary behavior, dietary intake, and body weight in Hispanic and American Indian children in rural communities. This knowledge could be used to promote further research into the effects of electronic media use on childhood obesity, and to develop interventions to treat and prevent childhood obesity.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

Chapter 1

Introduction

Section 1: Overview of Obesity in the United States

Since the 1960's, the overall obesity rate for Americans has nearly tripled. Age-adjusted Centers for Disease Control and Prevention (CDC) data for adults from 1960-62 shows that the prevalence of adult obesity was 13.4%. In 2010, the CDC reported the prevalence of adult obesity to be 36.1% (Fryar, Carroll, & Ogden, 2012). This trend is seen in adults and children alike. In 1974, the prevalence of obesity in children age 2-19 years was 5.0% (Fryar et al., 2012). In 2012, the childhood prevalence of obesity was 16.9% (Ogden, Carroll, Kit, & Flegal, 2014).

Obesity has multiple direct and indirect negative consequences for the individual and for society as a whole (W. H. Dietz, 1998; Trogdon, Finkelstein, Hylands, Dellea, & Kamal-Bahl, 2008). As such, this issue is best addressed as a personal health issue as well as a public concern. Developing effective preventive measures and treatments for obesity requires that we improve our understanding of the many factors contributing to the rising prevalence of obesity in the United States.

Section 2: Individual Health Consequences of Obesity

Obesity has many negative effects on the health of individual people. Obese adults are at greater risk than healthy-weight individuals for developing medical conditions such as Type 2 diabetes mellitus, stroke, cardiovascular disease, orthopedic problems, several forms of cancer, and psychiatric issues (Cawley & Meyerhoefer, 2012; Dixon, 2010). Obese patients also suffer more perioperative complications and have lower overall quality of life (Dixon, 2010; Parkin et al., 2012).

Childhood obesity rates are also increasing in the United States. And children are not immune from the negative consequences of obesity. Children who are overweight and obese face difficulties because of their weight. Known health consequences of childhood obesity include increased risk of Type 2 diabetes mellitus, asthma, sleep apnea, precocious puberty, and depression. Obesity has also been linked to lower grades, increased absenteeism, and victimization from bullying (Janssen, Craig, Boyce, & Pickett, 2004; Reilly, 2012; Tremblay et al., 2011).

In 2012, the proportion of all American children ages 2-19 years who were overweight and obese was 31.8%, while the prevalence of obesity alone was 16.9% (Ogden et al., 2006; Ogden et al., 2014). These numbers represent a continuous rise in the prevalence of childhood overweight and obesity over the past four decades (Ogden et al., 2014). Additionally, some specific populations are more greatly affected by overweight and obesity than others. In white non-Hispanic children, the prevalence of overweight and obesity in 2012 was 28.5%, while it was 35.2% in black children and 38.9% in Hispanic children (Ogden et

al., 2014). Nationally representative data for 2012 is not available for American Indian children, but a review of smaller studies of individual tribal groups in 2003 estimated it to be about 35-40% (Ogden et al., 2014; Story et al., 2003). In New Mexico specifically, 2010 surveillance data from the New Mexico Department of Health indicates that the prevalence of overweight and obesity was higher in American Indian (41%) and Hispanic (31.8%) kindergarteners than in non-Hispanic white (24.8%) children of the same age (NMDOH, 2010).

The Hispanic community is a large and growing minority group in the United States. If current trends continue, the disease burden on these children as they mature will continue to increase as childhood obesity rates climb. This could place an increasing burden upon individuals and the entire American healthcare system, which is already facing severe economic difficulties (Cawley & Meyerhoefer, 2012; Trogdon et al., 2008).

Obese children are more likely than their non-obese peers to become obese adults. Previous studies have shown that weight at 5 years of age is a predictor of adult weight (Guo, Wu, Chumlea, & Roche, 2002). The earliest years of a child's life are important ones for learning, and many studies have focused on childhood interventions for obesity prevention and treatment. Therefore, preschool is period of time during which to make lifestyle interventions that potentially have long-lasting results (Waters et al., 2011; Whitlock, O'Connor, Williams, Beil, & Lutz, 2010).

Section 3: Population-Level Impact of Obesity

In addition to its impact on individual health, the rising rates of obesity negatively affect all of society. Obesity is expensive, and the costs continue to rise. In 2005, it was estimated that $190 billion in healthcare costs were directly attributable to obesity. In addition, per capita medical expenditures for all American adults in 2005 were calculated to be $2,741 higher for obese adults than for those who were not obese. This cost is 150% higher for an obese adult versus someone who is not obese (Cawley & Meyerhoefer, 2012).

These figures do not account for indirect expenditures not associated with health care costs. Indirect costs are incurred for multiple reasons, including costs for upgrading public and private facilities and equipment, lost work, and decreased productivity (Dee et al., 2014). Obesity may also lead to stigmatization and decreased productivity which can result in lower salaries and wages for obese individuals (Colditz and Wang, 2008) and higher life insurance premiums for obese and non-obese individuals (Trogden et al, 2008).

Section 4: Causes of Obesity

Many causes have been suggested for the recent rise in obesity rates. Traditionally, body weight has been seen as a balance between calories taken in via food versus calories expended through the body's necessary maintenance functions and physical activity. However, many factors influence eating patterns and physical activity. Genetics can play a role in determining a person's weight, as can numerous environmental and societal factors. Examples include socioeconomic status, peer group, job type, and access to food and healthcare

(Bell, Kivimaki, Batty, & Hamer, 2014; Bickham, Blood, Walls, Shrier, & Rich, 2013; Branscum & Sharma, 2011; Casiano, Kinley, Katz, Chartier, & Sareen, 2012; Conway, Haller, & Lutfiyya, 2012; W. H. Dietz, Jr. & Gortmaker, 1985; Fung et al., 2012; Gittelsohn & Rowan, 2011; Hebden, Chey, & Allman-Farinelli, 2012; Hingle & Kunkel, 2012; Koleilat, Whaley, Afifi, Estrada, & Harrison, 2012; Kreuser, Kromeyer-Hauschild, Gollhofer, Korsten-Reck, & Rottger, 2013).

Television viewing has received much scrutiny for its potential role in contributing to the high rate of obesity in the United States. There are multiple aspects to television viewing that may contribute to the rise in body weight. First watching television is a sedentary behavior. Therefore, it inherently causes the body to expend less energy than physical activity. Second, television viewing is not an interactive, mentally and physically engaging activity. Recent research has found that level of engagement with electronic media is associated with body weight (Bickham et al., 2013). Other studies have focused on how engaging a user via video games or social media could be used to promote healthy behavior (Barnett, Cerin, & Baranowski, 2011; Falbe et al., 2013; Guy, Ratzki-Leewing, & Gwadry-Sridhar, 2011).

Additionally, television viewing is frequently accompanied by snacking, often on high-calorie processed foods. Participating in sedentary activities in which eating plays a role could lead to increased overall food consumption (Swinburn & Shelly, 2008). The majority of television programming involves commercial advertisements, many of which promote high-calorie processed foods. These commercials are intended to entice people to purchase and

5

consume these foods; and as a result people may consume more of these foods even when they are not viewing television (Brand, 2007; Committee on Communications & Strasburger, 2006; Hingle & Kunkel, 2012).

Section 5: Proposed Research

Background. Media has been used in the past to promote healthy lifestyles, but a better understanding of how exposure to different electronic media formats influence dietary behavior can inform more effective media interventions in the future.

The objective of this study is to determine how frequency of exposure to different forms of electronic media influences dietary intake and body weight. I examined this relationship by conducting secondary analysis of data from the baseline survey from the Child Health Initiatives for Lifelong Eating and Exercise (CHILE) study. CHILE was a five-year long, evidence-based intervention study aimed at preventing obesity in American Indian and Hispanic children enrolled in 16 Head Start (HS) centers in rural New Mexico. CHILE focused on school-based, family, and community interventions to improve overall dietary intake and increase physical activity in rural New Mexican schoolchildren.

Purpose and Aims. The purpose for successful completion of my proposed research will contribute a missing, fundamental part to our understanding of how different forms of electronic media exposure influence dietary intake and BMI. The acquisition of such knowledge is critical to the development of improved interventions to reduce the rate of obesity in children.

My study has two aims. The first aim is to determine if BMI Percentile is significantly correlated with sedentary behavior involving exposure to different forms of electronic media. The second aim is to determine if dietary intake is significantly correlated with sedentary behavior involving exposure to different forms of electronic media.

When the proposed studies for my aim have been completed, I expect that the influence of electronic media exposure upon dietary intake of specific foods and BMI Percentile will be better understood. This greater understanding would be of importance, because it would allow the development of improved and much-needed methods of using electronic media to prevent childhood obesity.

Research Design. The approach I used was secondary analysis of baseline survey data obtained from the primary caregivers of children participating in the CHILE study. I analyzed the CHILE data using a cross-sectional study design. I used responses from primary caregivers concerning a child's frequency of electronic media use and foods eaten in the home. Descriptive statistics were calculated for demographic and general health information. The independent variables were type of electronic media exposure (hours per week of television, DVD/recorded video, and computer/video game use). The dependent variables were dietary intake (servings per day of vegetables, fruit/100% fruit juice, dairy, whole grains, and discretionary fats/sugars); and BMI Percentile.

Expected Outcomes. My expected outcome was that increased duration of exposure to electronic media would correlate with higher intake of discretionary fats/sugars; lower intake of fruits/100% fruit juice, vegetables, dairy, and whole grains; and increased BMI Percentile. Furthermore, I hypothesized that different forms of electronic media would correlate differently with dietary intake and BMI Percentile. Testing this hypothesis will contribute to attainment of the overall objective of determining how exposure to different types of electronic media influences dietary intake of different foods and body weight, thereby leading to effective ways of leveraging media to positively influence eating behavior in children.

Section 6: Directions for Future Research

Associations have been found between exposure to food commercials and dietary intake and BMI (Hingle & Kunkel, 2012; Swinburn & Shelly, 2008). Children spend several hours each day exposed to various forms of electronic media (Vandewater et al.). Because the use of electronic media in American society is increasing, and the level of exposure children have to it is increasing, it is important to examine patterns of electronic media use and the effects this has on lifestyle behaviors. This includes studying not only the use of electronic media itself, but also the contexts in which children are exposed to it.

Chapter 2

Review of Related Literature

<u>Section 1: Introduction</u>

Pre-school (ages 2-5 years) is a time of rapid growth and development for children. This is an age when many habits are formed, such as level of physical activity, dietary habits, and food preferences. As a result, pre-school is a time when interventions to shape healthy living habits could be highly effective. Because the habits formed at this age are more likely to follow a child into adulthood than habits formed later in life, parents, teachers, and other caretakers can play a major role in teaching and modeling healthy lifestyle habits that children should adopt.

Promoting healthy lifestyle choices is of particular importance for American Indian and Hispanic populations. Although some success has recently been documented in reversing obesity rates for preschool children ages two to five years of age, the prevalence of obesity in other age groups has either increased or remained stagnant. Additionally, the decrease in obesity prevalence in preschool children was not seen in Hispanic children. No information was collected on American Indian children in this study (Ogden et al., 2014). Data from other studies, however, suggest that rates of obesity for American Indian children are high as well (Broussard et al., 1995; Compher, 2006; Cruz, Davis,

9

Fitzgerald, Canaca, & Keane, 2014; Davis et al., 2013; Gittelsohn & Rowan, 2011; Story et al., 1999; Story et al., 2003; Story, Strauss, Zephier, & Broussard, 1998).

Section 2: Television, Media, and Advertising

Sedentary behavior has been correlated with obesity in multiple studies. Some studies have shown that the duration of television viewing in itself increases the risk of being overweight and obese (Bickham et al., 2013). Other studies have found this effect to be true only for certain ethnicities and genders (Janssen et al., 2005; Swinburn & Shelly, 2008; Tandon et al., 2012). This seems to indicate that television viewing is neither all good nor all bad in respect to its effects of body weight and eating behavior, and that the characteristics of a particular audience could play a role in shaping how the use of media affects health.

Television viewing and exposure to television advertisements can influence consumer purchasing and lifestyle behaviors. Exposure to food advertising has been shown to influence eating behavior and lead to obesity in children (Education, 2001; Hingle & Kunkel, 2012). In 2006, it was reported that he average American child views 40,000 advertisements per year (Committee on Communications & Strasburger, 2006).

Advertisements are frequently incorporated into the programming children encounter while watching television and using computers. Previous research has shown that children are more greatly influences by advertising messages than

adults, and young children are frequently unable to distinguish advertisements from factual programming (Committee on Communications & Strasburger, 2006; Hingle & Kunkel, 2012). Advertisements have long been used to market processed food to children and influence eating behavior, but it is also possible to use media as a tool to improve diet (Guy et al., 2011; McKetta & Rich, 2011).

For the past several decades, television has been used to promote healthy lifestyle as well as to sell products and services. Health promotion on television has often taken the form of public health messages. However, these interventions have not stopped the climb of obesity rates. Furthermore, there is concern that corporate affiliations have undermined such efforts, acting more as promotion for their products than as promotion of healthy behavior (Brand, 2007; Committee on Communications & Strasburger, 2006; Hingle & Kunkel, 2012). Understanding the influences of different electronic media formats, with and without corporate involvement and advertising, on dietary intake is a vital step in developing strategies to prevent immediate and future health problems for children. The results from the research my study is undertaking has long-term potential to improve diet through electronic media interventions in Hispanic and American Indian children.

Children are especially at risk of long-term health consequences from obesity, as the longer they live with this condition the greater the health consequences become. In addition, obese children are more likely than their normal weight peers to become obese adults. The prevalence of childhood overweight and obesity has tripled since 1980, and currently stands at about 30%

of Americans under age 18 years, although this varies by age, ethnicity and gender (Ogden et al., 2014).

Many factors contribute to obesity in children. Excess calorie intake, media exposure, and sedentary behavior have all been implicated as causative factors. Most studies have treated all types of sedentary behavior as equal in their effects on body weight, but few studies have parsed out if different sedentary behaviors affect body weight differently. One way that sedentary behaviors may differ in their influence on dietary behavior is if they involve exposure to media advertising. Media advertisements are known to influence eating behavior in children. American children spend approximately 4 hours 30 minutes each day watching television, an amount which is steadily rising (Bickham et al., 2013).

Media's influence on obesity in Hispanic children, specifically, has been less-studied than media influence on non-Hispanic white children. This is despite the fact that the rate of obesity in Hispanic children is over 30%, versus about 20% in non-Hispanic white children (Moodie et al., 2013; Ogden et al., 2014). Recent research indicates that the rise in obesity is less due to increased sedentary behavior than it is caused by changing dietary patterns and an increasing number of calories in the modern diet (Pontzer et al., 2012). It has also been shown that children who watch television are statistically more likely to have a higher BMI than are children who primarily spend their sedentary time playing video games or using other forms of electronic media (Bickham et al., 2013). Therefore, it may be that exposure to influences that encourage increased

food consumption such as food advertisements on television, rather than sedentary behavior in and of itself, is the major cause of increased calorie intake and body weight in children over the past three decades.

Most of the published research has focused on television advertisements and children's viewing behavior. However, children's viewing habits are changing with the advent of recorded video and computer/internet use. Although several television stations which air child-specific programming have in recent years removed advertisements for commercial food products from children's programming, rates of childhood obesity continue to rise. Therefore, other factors appear to be influencing dietary intake and body weight. Few studies have been done on specific sedentary activities and compared them to one another, such as on recorded video viewing versus commercial television viewing. There have been few studies examining particular types of sedentary behavior specifically in American Indians and Hispanics in rural communities.

Section 3: Hispanic & American Indian Children

Obesity greatly affects American Indian and Hispanic children, particularly in rural, low-income areas. The prevalence of overweight and obesity continues to rise in these groups. In particular, from 2003-2010, data from the CDC indicates that the prevalence of extreme obesity in preschool-aged children decreased in all groups, except for American Indian/Alaska Natives (Pan, Blanck, Sherry, Dalenius, & Grummer-Strawn, 2012). While many studies have associated certain behaviors with dietary intake and obesity in general, fewer

have looked at American Indians and Hispanic children specifically (Hebden et al., 2012; Story et al., 2003; Tremblay et al., 2011). Additionally, much of the population data for American Indians, particularly that for children, is incomplete or not entirely current. As such, many larger studies done on populations outside the United States, such as those done on indigenous communities in Canada and Australia, are sometimes extrapolated to evaluate American Indian communities. However, it is unknown whether risk factors associated with other ethnic groups within and outside the United States can be accurately applied to American Indian populations.

Section 4: Conclusion

Currently, the data regarding the causes of poor diet quality and overweight/obesity among Hispanic and American Indian populations, particularly American Indian children, is lacking. However, obesity effects these children to a greater extent than it does other groups of people in the United States. The American Indian and Hispanic populations are unique communities. In order to effectively address their health needs, it is vital to determine which factors influence health and lifestyle choices. If we can identify these influences, we can develop interventions to effectively address their specific needs.

Chapter 3

Methodology

Section 1: CHILE Study Background Information

The data used for my analysis came from the Child Health Initiative for Lifelong Eating and Exercise (CHILE) study (Davis et al., 2013). CHILE was a multi-level, transcommunity, evidence-based intervention aiming to prevent obesity in pre-school age children enrolled in Head Start programs at 16 sites in rural New Mexico.

The Head Start programs included in the CHILE study were recruited by researchers through a community engagement process. In order to qualify for participation in CHILE, Head Start centers had to meet certain criteria (Cruz et al., 2014). First, they had to be located within a rural (population under 50,000) Hispanic or American Indian pueblo community in New Mexico. In addition, they had to have at least 80% retention over two years and enroll at least 20 three-year-old children. Centers were ineligible if they also housed pre-K programs at the time of the study. Head Start programs located within 150 miles of the study center in Albuquerque were prioritized, however centers located up to 176 miles away were ultimately included in order to reach the recruitment goal of 16 centers. Participating centers were stratified on BMI and race/ethnicity (American

Indian or Hispanic), and then randomly assigned to intervention (n=8) or control (n=8) groups (Cruz et al., 2014).

The children participating were of pre-school age, and ranged from 2 years to 5 years of age. CHILE focused primarily on recruiting children who were of Hispanic and American Indian ethnicities, although children of other ethnicities were included.

CHILE utilized a socio-ecological approach in its methodology. The goals of CHILE were to increase physical activity and improve dietary intake in study participants. The study interventions involved a comprehensive group of interventions that included training for teachers and school food preparers, a classroom curriculum, participation of local grocery stores, family engagement, and support from health care providers (Cruz et al., 2014; Davis et al., 2013).

Prior to the intervention components of CHILE, baseline anthropometric data were collected on the height, weight, and BMI of participating children. A survey was administered to the parent/primary caretaker of each child prior to CHILE implementation, as well as at several intervals throughout the length of the study. The parent/primary caretaker was defined as the adult "who spends the most time with the child." This survey collected demographic data, as well as in-depth information concerning dietary intake, eating patterns, and physical activity. This survey was administered in-person at a Head Start center to a participating child's parent/primary caretaker by a CHILE investigator. Survey interviews lasted approximately 1-2 hours and were given in either English or

Spanish, depending upon the parent/caretaker's language of preference (Cruz et al., 2014).

Dietary intake over the previous week was assessed using a modified Block Kids 2004 Hispanic Food Frequency Questionnaire. The Hispanic version of the questionnaire was used for all ethnicities, as no similar validated food questionnaire specific to American Indian children was available at the time. It was assumed that the diets of Hispanic and American Indian children in New Mexico are similar. The questionnaire was modified during a pre-study assessment using a multiple-pass 24-hour dietary recall. The rationale for this 24-recall recall was to identify culture-specific food and food categories typically consumed by the target population, which were then added to the Block questionnaire. Examples of changes were the addition of *sopapillas* (a type of fried dough) and breakfast burritos (included in a question regarding egg sandwiches).

The Modified Block Kids 2004 Hispanic Food Frequency Questionnaire asked about foods consumed by the child on each day over the previous week. The questionnaire asked only about foods consumed outside of Head Start. The collected dietary intake results were analyzed with NutritionQuest, and were reported as daily intake of foods, food groups, and individual nutrients.

Section 2: Inclusion and Exclusion Criteria

In my analysis I used data from the baseline parent/primary caretaker survey. A survey was determined to be a "baseline" survey if it had been

17

administered to the parent/primary caretaker before the child had been exposed to any CHILE intervention.

A survey was included if it was from an "Intervention" group and was obtained in Fall 2008, which was when CHILE interventions were first initiated. Additionally, all surveys for a child in the "Delayed" intervention group were included in our analysis, regardless of the time at which the data was collected.

A survey was excluded if it was for a child in the Intervention group and was obtained after Fall 2008. I also excluded surveys for which data was missing for any primary dependent or independent variables (dietary intake, electronic media use, and BMI Percentile).

Section 3: Analysis Techniques

Descriptive statistics on my baseline sample of CHILE data were generated on demographics, anthropometric (BMI Percentile) data, electronic media use, and dietary intake. The independent variable in my analyses was electronic media use (television, DVD/recorded video, and computer/video games) measured in hours per week. The dependent variable in my first analysis was dietary intake (vegetables, fruit/100% juice, whole grains, dairy, and discretionary fats/sugars) measured in servings per day. The dependent variable in my second analysis was BMI Percentile.

In addition to the primary variables, I included other variables that could have had a significant interaction within my model. I identified such variables by reviewing relevant literature to determine which factors previous research has

found to be of significance in the study of childhood obesity and electronic media use. After this literature review, discussions with my consultant biostatistician, and determination of which variables I had access to data for, I identified three variables to control for in all my analyses. These three variables were age, race/ethnicity, and gender.

I initially ran bivariate analysis comparing each variable to all other variables to get an initial idea of potential variable interactions before I began multivariate analysis of three or more variables.

I subsequently ran stepwise linear regression with forward addition for each of my analyses. I did this by performing linear regression analysis using one primary independent variable (i.e. hours per week of television viewing) and one primary dependent variable (i.e. servings per day of vegetables). I then added one of the three secondary variables (age, race/ethnicity, or gender) to the analysis of the primary variables to the analysis to determine if a statistically significant interaction was attributable to the secondary independent variable. I repeated this procedure using two secondary independent variables in addition to the two primary variables. I repeated this procedure again using three secondary independent variables in addition to the two primary variables.

After performing this initial step, I ran linear regression with stepwise backwards elimination. I started with all primary and secondary dependent and . independent variables. I removed the independent variables shown to have the least significant interaction, then ran the regression again. I repeated this

procedure until only one dependent and independent variable remained, each time removing the least significant variable from the analysis. Via this method I was able observe which variables, if any, showed statistical significance in the analyses.

In my analyses I calculated the correlation coefficient (r) and statistical significance (p-value) for each independent and dependent variable. I controlled each analysis for age, race/ethnicity, and gender.

Significance was set at a p-value of less than 0.05.

Data analysis was conducted in 2014. Statistical analyses were done using the Stata IC 12 software program .

Chapter 4

Results

Section 1: Data Analysis of Media Exposure and Dietary Intake

A total of 404 individuals were included in the analysis of electronic media exposure and dietary intake (Table 1). This group included slightly more males (52.2%) than females (47.8%). Furthermore, the racial/ethnic makeup of this sample was primarily Hispanic (48.8%) and American Indian (35.6%). A smaller proportion were White Non-Hispanic (5.9%) and Mixed/Other (9.9%).

The children in this sample ranged in age from 34 to 67 months, with a mean of 47.54 months (Table 2).

The first analysis I performed examined the association between weekly duration of electronic media use and daily dietary intake. The types of electronic media were television, DVD/recorded video, and computer/video games (Table 3). The hours of exposure per week to each form of electronic media ranged from 2 to 16 hours. The mean hours per week of exposure was 5.39, 5.04, and 5.66 for television, DVD/video, and computer/video games, respectively.

Dietary intake was measured as servings per day of vegetables, fruit/100% juice, dairy, whole grains, and discretionary fats/sugars (Table 4).

Table 1. Demographic characteristics of children in each sample by gender and race/ethnicity.

Race/Ethnicity	Female	Male	Total (%)
Overall Sample			
American Indian	71	73	144 (35.5)
Hispanic	98	100	198 (48.8)
White Non-Hispanic	6	18	24 (5.9)
Other/Mixed	19	21	40 (9.9)
Total (%)	194 (47.8)	212 (52.2)	406
Dietary Intake Analysis			
American Indian	71	73	144 (35.6)
Hispanic	97	100	197 (48.8)
White Non-Hispanic	6	17	23 (5.7)
Other/Mixed	19	21	40 (9.9)
Total (%)	193 (47.8)	211 (52.2)	404
BMI Percentile Analysis			
American Indian	69	68	137 (36.4)
Hispanic	89	91	180 (47.9)
White Non-Hispanic	6	15	21 (5.6)
Other/Mixed	18	20	38 (10.1)
Total (%)	182	194	376

Table 2. Descriptive Statistics: Age (months) characteristics of samples from Overall Sample, Dietary Intake, and BMI Percentile Analyses. (Reporting mean, standard deviation (SD), Minimum, maximum, total (n))

Sample	Mean*	SD*	Minimum*	Maximum*	Sample Size (n)
Overall Sample	47.59	7.72	34	67	406
Dietary Intake Analysis	47.54	7.71	34	67	404
BMI Percentile Analysis	47.66	7.73	34	67	376
*Results reported as months					

Table 3: Descriptive statistics: Independent variables of type of electronic media use by analysis group. (Reporting mean, standard deviation (SD), Minimum, maximum, total (n))

Variable	Total (n)	Mean*	SD*	Minimum*	Maximum*
Overall Sample					
TV	406	5.39	2.17	2	16
DVD	406	5.034	2.08	2	16
Games	406	5.64	5.36	2	16
Dietary Intake Analysis					
TV	404	5.39	2.18	2	16
DVD	404	5.04	2.08	2	16
Games	404	5.66	5.36	2	16
BMI Percentile Analysis					
TV	376	5.41	2.19	2	16
DVD	376	5.04	2.09	2	16
Games	376	5.63	5.33	2	16
*Results reported as hours per week					

Table 4: Descriptive statistics: Dependent variables of BMI Percentile and

Dietary Intake. (Reporting mean, standard deviation (SD), minimum,

maximum, total (n))

Variable	Total (n)	Mean	SD	Minimum	Maximum
BMI Percentile*	64.39	26.85	0.44	99.99	376
Vegetable[#]	1.65	1.39	0.02	10.09	404
Fruit/100% Juice[#]	2.16	1.14	0.14	6.79	404
Whole Grains[#]	0.71	0.63	0.01	3.99	404
Dairy[#]	2.38	1.16	0.07	6.83	404
Fat/Sugar[#]	3.74	1.59	0.86	9.93	404

*Results reported as BMI Percentile
[#]Results reported as servings per day

There were significant associations found between several forms of electronic

media exposure and dietary intake parameters (Table 5). Significant associations

were seen between hours of television viewing per week and daily servings of

dairy ($r=0.063$; $p<0.01$) and daily servings of discretionary fats/sugars ($r=0.158$;

$p<0.005$). I found that for each additional hour of television exposure per week,

there was an increase in servings of dairy per day. I also found that each

additional hour of television exposure per week correlated with additional daily

servings of discretionary fats/sugars. No significant association was found between duration of television viewing per week and vegetable consumption (r=0.021; p>0.05) although a slight positive trend was seen. A negative trend was seen between hours of weekly television viewing and fruit and 100% juice consumption (r =-0.013; p>0.05) and whole grain consumption (r=-0.013; p>0.05), although neither of these correlations were statistically significant.

There were significant associations between hours of DVD viewing per week and daily servings of dairy (r=0.082; p<0.005) and daily servings of discretionary fats/sugars (r=0.162; p<0.0001). For each additional hour of DVD viewing per week, there was an increase in dairy servings per day. Each additional hour of DVD viewing per week correlated with an increase in daily servings of discretionary fats/sugars. I did not find a significant association between hours of DVD viewing per week and daily vegetable consumption (r=0.006; p>0.05) although a small positive trend was seen. A negative trend was seen between hours of DVD viewing per week and daily fruit and 100% juice consumption (r =-0.002;p > 0.05) and whole grain consumption (r=-0.015; p>0.05), but neither of these correlations were statistically significant.

There were also significant associations between hours of computer and video game use per week and daily servings of fruits and 100% fruit juice (r=-0.03; p<0.005) and daily servings of discretionary fats/sugars (r=-0.035; p<0.01). For each additional hour of computer and video game use per week, the correlation coefficient indicated an decrease of servings of fruit and 100% fruit juice per day. Each additional hour of computer and video game use viewing per

week correlated with a decrease of servings of discretionary fats/sugars per day. No significant correlation was found between hours of computer and video game use per week and vegetable consumption ($r=-0.006$; $p>0.05$) although a small negative trend was seen. A negative trend was also seen in daily whole grain intake ($r=-0.002$; $p>0.05$), but this was also not statistically significant. Daily dairy intake trended in a positive direction with each hour increase in computer and video game use per week, but was not a statistically significant correlation ($r=0.004$; $p>0.05$).

Section 2: Data Analysis of Media Exposure and BMI Percentile

The second analysis examined the association between weekly duration of electronic media use and BMI Percentile. A total of 376 individuals were included in the analysis of electronic media exposure and BMI Percentile (Table 1). I excluded 28 surveys that had been included in the analysis of media exposure and dietary intake, because these surveys did not report anthropometric data.

This analysis included approximately half male (51.6%) and half female (48.4%). The racial/ethnic makeup of this was primarily Hispanic (47.9%) and American Indian (36.4%). The remainder were White Non-Hispanic (5.6%) Mixed/Other (10.1%) (Table 1).

The children in BMI Percentile analysis sample ranged in age from 34 to 67 months, with a mean of 47.66 months (Table 2). The BMI Percentiles for this group ranged from 0.44 to 99.99, with a mean of 64.39 (Table 4).

There were no significant associations between any type of electronic media exposure and BMI Percentile, although all trended upward (Table 5). My results showed that the associations between hours of television viewing per week and BMI Percentile (r=0.838; p>0.05), hours of DVD viewing per week and BMI Percentile (r=0.247; p>0.05), and hours of computer and video game use and BMI Percentile (r=0.007; p>0.05) were not statistically significant.

Table 5. Adjusted multivariate analysis of media exposure and dietary intake and BMI Percentile.

		DEPENDENT VARIABLES (servings per day; correlation coefficient (p-value))					
		Vegetable	Fruit & 100% Juice	Whole Grains	Dairy	Fat & Sugar	BMI Percentile
INDEPENDENT VARIABLES (hours per week)	TV	0.021 (0.531)	-0.013 (0.633)	-0.017 (0.229)	0.063 (0.018)	0.158 (0.000)	0.838 (0.184)
	DVD	0.006 (0.855)	-0.002 (0.941)	-0.015 (0.32)	0.082 (0.003)	0.162 (0.000)	0.247 (0.711)
	Computer /Games	-0.006 (0.656)	-0.03 (0.005)	-0.002 (0.768)	0.004 (0.737)	-0.035 (0.018)	0.007 (0.979)
	All values controlled for Age, Race/Ethnicity and Gender						

A total of 406 baseline surveys were identified in our data set. I further excluded several surveys because they were missing data.

For the analysis of the association between electronic media exposure and dietary intake, I used 404 baseline surveys. I excluded 2 surveys from the total of 406 baseline surveys for this analysis because the food survey questionnaire had not been completed by the respondents.

For the analysis of the association between electronic media exposure and BMI Percentile, I used 376 baseline surveys. I excluded 30 surveys from the total of 406 baseline surveys from this analysis because a height and weight data was missing, and therefore BMI Percentile could not be calculated.

All p-value and correlation coefficient (r) data reported in the results section reflects an analysis which controlled for age, race, and race/ethnicity.

Chapter 5

Discussion

Section 1: Summary

The purpose of this study was to determine if an association exists between electronic media use and 1) BMI Percentile, and 2) dietary intake in American Indian and Hispanic children in rural New Mexico.

I found that increased weekly amount of television exposure was associated with an increase in daily servings of dairy and discretionary fats/sugars. Increased weekly amounts of DVD and recorded video viewing was also associated with an increase in daily servings of dairy and discretionary fats/sugars. Increased hours per week of computer and video game use was significantly associated with a decrease in the number of daily servings of fruit/100% fruit juice, as well as a decrease in the daily number of servings of discretionary fats/sugars.

There was no statistically significant association found between hours per week spent using any form of electronic media and BMI Percentile.

Section 2: Discussion of the Results

Some of the significant associations between electronic media use and dietary intake seen in this study may be due to the type of electronic media use the child engaged in. There are several reasons the type of electronic media

could be associated with differences in dietary intake. Television and recorded video viewing is an inherently passive activity, whereas video games and computer use are activities that require a higher level of physical and mental engagement. The difference we see in the eating patterns of video game and computer users may be partly explained by this requirement of engagement. Playing video games or using the computer require the use of hands, which makes them unavailable to be used for eating. Video games and computers also require the user to make decisions, such as which move to make next in a game or what to type or read next. Being engaged may not only make the user think less about food, but also requires their attention to the extent that they can not easily leave the activity to do other things, such as prepare a meal or snack.

Previous studies have found that children who watch more television tend to be heavier, eat more fat, eat fewer fruits and vegetables, and drink more sugar-sweetened soft drinks (Education, 2001). Several reasons for this have been proposed. It is possible that these sedentary activities replace physical activities in children, resulting in decreased calorie expenditure. It has also been argued that television viewing may decrease innate satiety signals, leading to decreased time between eating sessions, and more servings consumed during an eating session in front of the television. Additionally, exposure to electronic media has been found to lead to consumption of greater amounts of energy dense foods containing added fats and sugars. This may be due to the fact that foods in this category are those which are most heavily advertised. Food advertisements are a well-established influence upon food selection and eating

behavior (Brand, 2007; Committee on Communications & Strasburger, 2006; Hastings, McDermott, Angus, Stead, & Thomson; Hingle & Kunkel, 2012; Swinburn & Shelly, 2008). However, as this effect has also been seen with forms of electronic media which do not contain advertisements, such as pre-recorded videos, it has been suggested that electronic media viewing causes an excitement response in viewers which may lead to a greater frequency of selection of energy dense food items (Blass et al., 2006).

Several recent studies have examined the relationship between different forms of screen media use and BMI. One prospective study compared the effects of television, DVD/recorded videos, and computer/video games on change in adolescent adiposity as measured by BMI. This study found that higher daily television viewing was associated with a higher BMI in both boys and girls. Among girls, greater baseline exposure to television and computer/video games was associated with higher BMI. This study also found that increasing exposure to television was associated with longitudinal gains in BMI for boys and girls, but increasing exposure to DVD/recorded videos was associated with long-term gains in BMI for girls only. No relationship was found for boys between baseline screen time and gains in BMI (Falbe et al., 2013).

Another study used diaries to examine the relationship between time spent with screen media, level of attention to media, and BMI in adolescents. Participants in this study recorded their time spent with, and level of attention to, television, computers, and video games at several times per day over the course of one week. Increased attention to, but not time spent with, television was

associated with a higher BMI. No relationship was found between time spent with, nor attention paid to, computers and video games and BMI (Bickham et al., 2013).

There do appear to be differences in use of different forms of screen media and obesity. These differences may provide insight into how to utilize each to promote healthy behaviors. Research in this area is determining whether the type of electronic media, ways they are used, characteristics of the user, or other factors may account for these differences.

Section 3: Limitations of the Study

I identified several limitations with my research. The first potential problem is that participation in the CHILE study was on a voluntary basis. This could bias the data through selection bias. I do not expect this to bias my results because I have a large enough sample size. Additionally, because the parent/primary caretaker survey results were based upon recall of observed behavior, voluntary participation in the study could be a proxy indicator of parental involvement with a child. As such, it is possible that more involved parents have better recall of their child's behavior and provide more reliable data.

A second potential problem is that there was no blinding of the researcher or study participants. This could influence behavior and survey responses of the participants. I do not expect this to have occurred, because I used a cross-sectional study design to examine baseline data obtained prior to exposure to any intervention.

A third potential problem is that variables other than frequency of exposure to advertisements in media, such as influence from family and friends or socioeconomic status, may be the cause of dietary patterns. I adjusted for this by using controls and analyzing survey data on other behaviors to make sure the effect of media on dietary intake is independent of other factors. Factors I controlled for in my analysis were age, race/ethnicity, and gender.

A fourth potential problem is missing data. I dealt with this by removing data for a participant whenever a value for relevant primary dependent or independent variable was missing. Even after removing data that did not meet the study criteria, the sample size remained large enough (n=337) to expect reliable results.

Section 4. Clinical Significance of Results

The results found in my analyses can have clinical significance. As an example, we can look at the results which found a statistically significant association between hours of television per week and servings of discretionary fat per day. My study found that every hourly increase in television viewing per week was associated with an increase of discretionary fat of 0.158 servings per day. If we assume, as my descriptive statistics show, that children in my study watched an average of 5 hours of television per week, this is associated with an increase of 0.79 servings of discretionary fat per day, or 5.53 servings per week. Over one year, this would equal 288.35 servings per year. If 1 serving of fat contains 120 calories, this is equal to an increase of 34,602 calories per year.

One pound of body weight is equal to approximately 3,500 calories. Therefore, over one year, 5 hours of television per week would be associated with an increase of 10 pounds body weight per year.

These calculations assume that this increase in calories is not being offset by an increase in calorie expenditure through physical activity, or a decrease in consumption of other food categories. However, this does demonstrate that over time, small increases in daily food consumption have the potential to significantly affect body weight.

Section 5: Implications for Future Research

Research has suggested that lifelong habits are formed early in life. Habits formed in pre-school are likely to follow a child into adulthood. Additionally, body weight in early childhood has been found to be a predictor of body weight in adulthood. This association becomes less strong as a child's age increases toward 18 years (Guo et al., 2002). The earlier in life interventions are made, the more potential they have to create lifelong healthy habits.

Electronic media use and screen time is increasing, and new forms of electronic media, apart from television, are readily becoming adopted by adults and children. The characteristics of these various forms of media differ from one another, and may have different potentials for discouraging or potentiating healthy behaviors. My study shows that different forms of media may affect the user's dietary intake in different ways. Computer and video games, in particular, appear to have a different effect upon the user's eating habits than does

television and DVD/recorded video viewing. The interactive nature of computer and video game use may partially account for these differences.

Several studies have examined how video games and computers may be used to encourage healthy eating behavior and increase physical activity. The ability of video games and computers to promote healthy eating behavior has met with some success, although electronic media's ability to increase physical activity so far appears limited (Baranowski et al., 2011; Barnett et al., 2011; Beasley et al., 2012). Promotion of healthy eating behavior through educational, interactive computer and video games holds promise as an effective intervention for combatting childhood obesity. It is an area worthy of future study.

In addition to the type of intervention made, age and environment remain an important factor in determining when and where to begin promoting healthy behaviors. Preschool is a time when interventions to encourage a healthy lifestyle could be most effective, and schools are an important intervention point for tackling the obesity epidemic (Caballero et al., 2003; Gittelsohn & Rowan, 2011).

In addition to changing habits regarding use of television and other media, public health interventions can be implemented in any environment. Schools are an ideal place to implement lifestyle interventions, as they are places where children are required to be and where they spend most of their time. Schools are also already established as places for learning, and because of this lessons about healthy lifestyle can be incorporated into classrooms as well as the overall

school culture and environment. This is what CHILE attempted to do. CHILE was designed so that healthy lifestyle was incorporated into classroom lessons, and this was supported by changes to what foods were served at mealtimes and how the food was prepared. These efforts were furthered by enlisting the families of students, as well as local grocery stores, in promoting healthy eating and physical activity.

Additional steps, beyond what CHILE accomplished, would be to garner the support of government on both the local and federal levels. Governmental participation in healthy lifestyle promotion could be a powerful tool in creating a healthy environment for students. Governmental interventions to create a healthy school environment have already been implemented in many states, Some examples of this are passing laws or regulations prohibiting school vending machines from selling candy or sugar-sweetened soft drinks; requiring that snacks sold by vending machines and between meals to meet national nutrition guidelines; allowing at least 30 minutes of physical activity per school day in gym class or recess; and prohibiting corporate advertisements on school property.

Some of these regulations have been ordered by the federal government, - such as a revamping of school lunch standards, the Healthy Hunger Free Kids Act of 2010, and the *Let's Move!* Initiative - and will be implemented nationally over several years. Additionally, several states have already made such changes on their own. Their successes should be emphasized. We know that food choices are greatly influenced by environment and advertising, and that obesity is a growing but preventable condition (Ng et al., 2014).

<u>Section 6: Conclusions</u>

My study found that there are differences between various forms of electronic media use and their influence upon dietary intake of specific food groups. To my knowledge, this is the first such study that has examined the relationship between different forms of screen media use, dietary intake, and BMI Percentile for Hispanic and American Indian children of pre-school age. Further research is needed to determine the different effects of various forms of screen media, and what implications this holds for childhood obesity research, prevention, and treatment.

LIST OF APPENDICES

Appendices

Appendix A: Glossary

Body Mass Index (BMI) – Weight (kilograms) divided by Height (meters)

squared. Used primarily for adults age 20 years and greater.

Calculation: BMI = mass (kg)/(height (m))^2

- Below 18.5 = Underweight

- 18.5 – 24.9 = Healthy Weight

- 25 – 29.9 = Overweight

- 30 and greater = Obese

Body Mass Index Percentile (BMI Percentile) – The percentile of a child's BMI

when compared to a population of other children of the same age and sex. Used

for children age 2 to 20 years of age.

- Below 5th Percentile = Underweight

- 5th to 84.9th Percentile = Healthy Weight

- 85th to 94.9th Percentile = Overweight

- 95th Percentile and greater = Obese

Dietary Intake – Diet measured by frequency eating vegetables/fruits, whole

grains, sugared soft drinks/juices, and prepackaged commercial snack foods.

Discretionary Fat/Sugar – Fat and sugar not naturally found in a whole, unprocessed food item. Includes fat in a food that would not be found in lean, low-fat, or fat-free form of the food.

Race/Ethnicity –

- American Indian = Self-identified as "American Indian" only.

- Hispanic = Self-identified as "White and Hispanic" or "Hispanic" only.

- White = Self-identified as "White" only.

- Mixed/Other = Self-identified as "Black/African-American", "Asian", or as more than one race/ethnicity (except for "White and Hispanic").

Rural – The United States Census Bureau uses "Rural" to classify all inhabited settlements that are not considered "Urban" (population over 50,000) or part of an "Urban Cluster" (population 10,000-50,000). For the purposes of CHILE, both the terms "rural" and "non-metropolitan" were used to identify areas with less than 50,000 inhabitants.

Sedentary Behavior – Behaviors measured by frequency of television viewing, video game playing, and pre-recorded video watching.

FIGURES

Figure 1. CDC BMI Percentile Chart for Boys (English)

2 to 20 years: Boys
Body mass index-for-age percentiles

NAME

RECORD #

*To Calculate BMI: Weight (kg) ÷ Stature (cm) ÷ Stature (cm) x 10,000
or Weight (lb) ÷ Stature (in) ÷ Stature (in) x 703

AGE (YEARS)

Published May 30, 2000 (modified 10/16/00).
SOURCE: Developed by the National Center for Health Statistics in collaboration with
the National Center for Chronic Disease Prevention and Health Promotion (2000).
http://www.cdc.gov/growthcharts
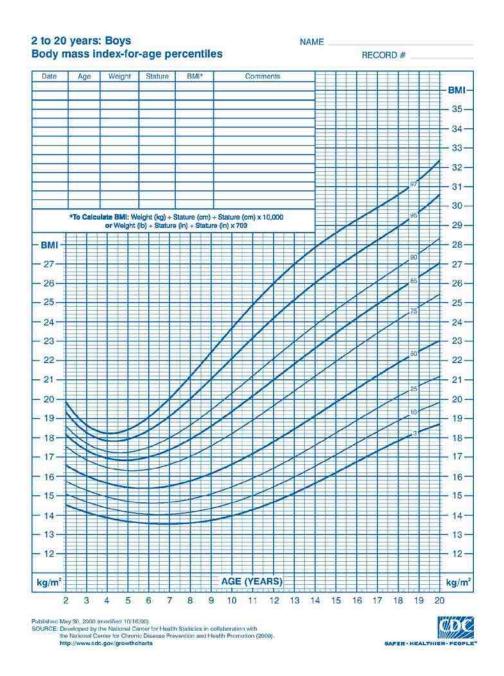
SAFER · HEALTHIER · PEOPLE™

42

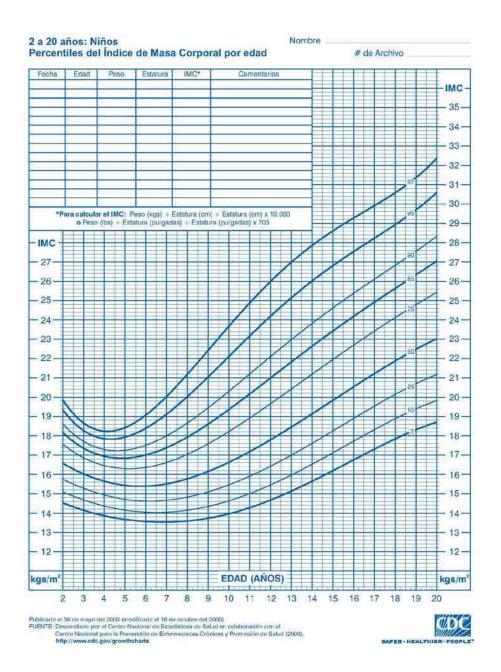Figure 2. CDC BMI Percentile Chart for Boys (Spanish)
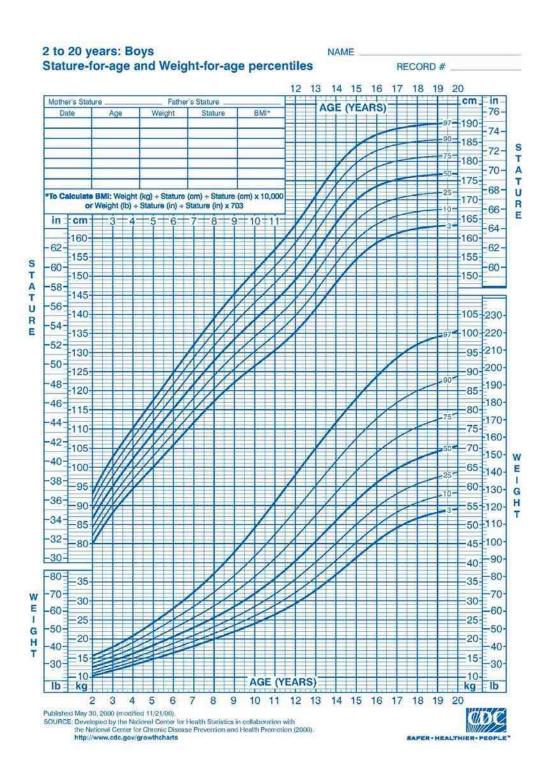
Figure 3. CDC Growth Chart for Boys (English)

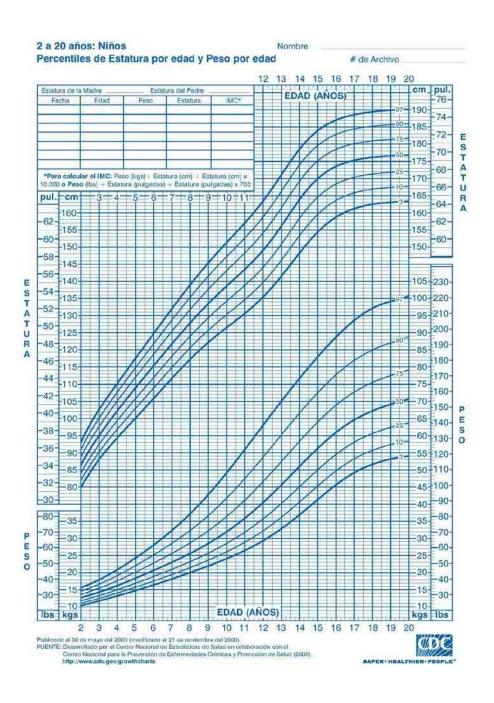Figure 4. CDC Growth Chart for Boys (Spanish)

Figure 5. CDC BMI Percentile Chart for Girls (English)

Figure 6. CDC BMI Percentile Chart for Girls (Spanish)

47

Figure 7. CDC Growth Chart for Girls (English)

Figure 8. CDC Growth Chart for Girls (Spanish)

Table 1. Demographic characteristics of children in each sample by gender and race/ethnicity.

Race/Ethnicity	Female	Male	Total (%)
Overall Sample			
American Indian	71	73	144 (35.5)
Hispanic	98	100	198 (48.8)
White Non-Hispanic	6	18	24 (5.9)
Other/Mixed	19	21	40 (9.9)
Total (%)	194 (47.8)	212 (52.2)	406
Dietary Intake Analysis			
American Indian	71	73	144 (35.6)
Hispanic	97	100	197 (48.8)
White Non-Hispanic	6	17	23 (5.7)
Other/Mixed	19	21	40 (9.9)
Total (%)	193 (47.8)	211 (52.2)	404
BMI Percentile Analysis			
American Indian	69	68	137 (36.4)
Hispanic	89	91	180 (47.9)
White Non-Hispanic	6	15	21 (5.6)
Other/Mixed	18	20	38 (10.1)
Total (%)	182	194	376

Table 2. Descriptive Statistics: Age (months) characteristics of samples from Overall Sample, Dietary Intake, and BMI Percentile Analyses. (Reporting mean, standard deviation (SD), Minimum, maximum, total (n))

Sample	Mean*	SD*	Minimum*	Maximum*	Sample Size (n)
Overall Sample	47.59	7.72	34	67	406
Dietary Intake Analysis	47.54	7.71	34	67	404
BMI Percentile Analysis	47.66	7.73	34	67	376
*Results reported as months					

Table 3: Descriptive statistics: Independent variables of type of electronic media use by analysis group. (Reporting mean, standard deviation (SD), Minimum, maximum, total (n))

Variable	Total (n)	Mean*	SD*	Minimum*	Maximum*
Overall Sample					
TV	406	5.39	2.17	2	16
DVD	406	5.034	2.08	2	16
Games	406	5.64	5.36	2	16
Dietary Intake Analysis					
TV	404	5.39	2.18	2	16
DVD	404	5.04	2.08	2	16
Games	404	5.66	5.36	2	16
BMI Percentile Analysis					
TV	376	5.41	2.19	2	16
DVD	376	5.04	2.09	2	16
Games	376	5.63	5.33	2	16
*Results reported as hours per week					

Table 4: Descriptive statistics: Dependent variables of BMI Percentile and

Dietary Intake. (Reporting mean, standard deviation (SD), minimum,

maximum, total (n))

Variable	Total (n)	Mean	SD	Minimum	Maximum
BMI Percentile*	64.39	26.85	0.44	99.99	376
Vegetable[#]	1.65	1.39	0.02	10.09	404
Fruit/100% Juice[#]	2.16	1.14	0.14	6.79	404
Whole Grains[#]	0.71	0.63	0.01	3.99	404
Dairy[#]	2.38	1.16	0.07	6.83	404
Fat/Sugar[#]	3.74	1.59	0.86	9.93	404

*Results reported as BMI Percentile
[#]Results reported as servings per day

Table 5. Adjusted multivariate analysis of media exposure and dietary intake and BMI Percentile.

		DEPENDENT VARIABLES (servings per day; correlation coefficient (p-value))					
		Vegetable	Fruit & 100% Juice	Whole Grains	Dairy	Fat & Sugar	BMI Percentile
INDEPENDENT VARIABLES (hours per week)	**TV**	0.021 (0.531)	-0.013 (0.633)	-0.017 (0.229)	0.063 (0.018)	0.158 (0.000)	0.838 (0.184)
	DVD	0.006 (0.855)	-0.002 (0.941)	-0.015 (0.32)	0.082 (0.003)	0.162 (0.000)	0.247 (0.711)
	Computer /Games	-0.006 (0.656)	-0.03 (0.005)	-0.002 (0.768)	0.004 (0.737)	-0.035 (0.018)	0.007 (0.979)
	All values controlled for Age, Race/Ethnicity and Gender						

Table 6. Unadjusted bivariate analysis of media exposure and dietary intake and BMI Percentile.

		DEPENDENT VARIABLES (servings per day; correlation coefficient (p-value))					
		Vegetable	Fruit & 100% Juice	Whole Grains	Dairy	Fat & Sugar	BMI Percentile
INDEPENDENT VARIABLES (hours per week)	**TV**	0.02 (0.50)	-0.01 (0.58)	-0.01 (0.31)	0.06 (0.03)	0.16 (0.00)	0.73 (0.25)
	DVD	0.01 (0.78)	-0.00 (0.89)	-0.01 (0.42)	0.08 (0.01)	0.16 (0.00)	0.44 (0.51)
	Computer /Games	-0.01 (0.54)	-0.03 (0.00)	-0.00 (0.84)	0.01 (0.63)	-0.04 (0.01)	0.04 (0.88)

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