

Exploring Health Behaviors and Health Outcomes of Third
Graders in Appalachia, Ohio: Does School Location Matter?

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Abstract

The number of overweight children in America has continued to increase over the past three decades, and certain subgroups are at even higher risk. This study examines one of these subgroups in particular, children living in rural Appalachia, Ohio. The Appalachian areas report fewer normal or underweight children and more overweight and obese children with some estimates being double the national average. The goal of this study is tri-fold, to compare behavioral, theoretical, and health outcomes of third grade children residing in Appalachia, Ohio by school location. The behavioral outcomes of interest are dietary patterns and daily physical activity. The health outcomes of interest are BMI, systolic blood pressure, and diastolic blood pressure. A secondary goal is to explore children's attitudes and perceived autonomy support and behavioral capacity for physical activity and dietary behaviors. This project is a secondary data analysis of a convenience sample from a study conducted from 2010-2012. The target population was third grade students in low-income counties from the Appalachian region of Ohio. The sample size was 90. Two groups were created: rural and city. Descriptive and inferential statistics were conducted. Difference between the behavioral, theoretical, and health outcomes based on school location was calculated. Independent t-tests were conducted for each variable of interest. Results indicate that mean systolic blood pressure was the only significant finding at the $p=.05$ level. The children residing in the rural area had a higher blood pressure. There was not a difference in BMI or other variables of interest. Although not definitive, broad contextual factors, such as location, may be related to important child health outcomes.

Chapter 1: Statement of the problem

Introduction

Over the past three decades obesity rates have tripled in the United States (Ogden, Carroll, Kit, Flegal, 2014). As scientists understand the phenomenon, widespread obesity represents an interaction of the environment and genetics (Bor, 2010). Throughout history, the ability to gain weight allowed individuals to survive food shortages by tapping energy reserves stored in body fat. Today in America, an overabundance of high-calorie foods allows calorie intakes that can overwhelm the body's weight-regulatory system (Bor, 2010). This has especially become a problem in the youth population.

One third of American children are currently overweight or obese, as defined by having body mass index (BMI) values at or above the 95th percentiles for age and sex (Centers for Disease Control and Prevention, 2012). This undoubtedly increases the risk for a multitude of obesity-related health problems including heart disease, high blood pressure, various cancers, type 2 diabetes, osteoarthritis, and respiratory problems among children and later in life (Koh, 2010; Centers for Disease Control and Prevention). The Data Resource Center for Child & Adolescent Health ranks Ohio #13 out of the 50 states for the amount of overweight or obese children, with 33.3% of all children living in the state classified as overweight or obese (2007).

Background of the Problem

Indications exist that the U.S. obesity epidemic affects some regions more acutely than others. In rural areas, where significant health and economic disparities abound, estimates of obesity often exceed national averages (Montgomery-Reagan, Bianco, Heh,

Huston, 2009). This appears to be the case for the rural Appalachian area of southeastern Ohio. Over a one-year period, investigators conducted a school-based BMI screening of 6-11 year old children living in Appalachia. They obtained 3 sets of height and weight measurements during this time from approximately 2,000 students. The results were consistent with expectations, and exceedingly higher than national averages. The study stated “38% of children living in rural Appalachia had high BMI, with 17% at risk for overweight and 20.9% overweight” (Montgomery-Reagan, Bianco, Heh, Huston, 2009, p.1).

There is also thought to be health differences within Appalachian sub-regions such as “River Bordering” and “Non-River Bordering” counties. Children who live in Ohio’s Appalachian counties that border the Ohio River are disproportionately exposed to adverse environmental conditions existing along the river that may contribute to disparities in health, available access to care and care utilization (Smith and Holloman, 2011). A comparison between the counties showed children residing in river bordering counties had higher rates of obesity (24.4%) and overweight (17%), than children residing in non-river bordering counties (Smith and Holloman, 2011). The majority of the parents reported that their children were in great health, but their BMI profiles indicated otherwise. Holloman and Smith’s findings suggest that the Appalachian counties that border the Ohio River may be particularly vulnerable in the childhood obesity epidemic. A better understanding of the environmental contexts that contribute to the obesity epidemic is needed. Findings further indicate that gender disparities in child health, particularly obesity, exist (Smith and Holloman, 2011).

As unsettling as the prevalence of childhood obesity may be, we are able to find comfort in realizing that it is largely preventable. Although genetics do play a role, the Centers for Disease Control and Prevention stress that behavioral factors, such as dietary patterns and physical activity, have the largest effect at the population level (2009). With that being said, education is one of the critical evidence-based strategies in preventing or mitigating childhood overweight and childhood obesity. Children must be presented with healthy breakfast and lunch options at school especially in poor and underserved areas. Children should be empowered to make healthier food choices while at home when possible. In addition, physical activity and exercise or play is important to build into a healthy lifestyle, and it's crucial that schools provide a physical education period for children to get the exercise that they may not be getting at home.

Given limited resources and competing interests such as meeting academic standards, schools may not have the funding or resources to provide these options, especially in rural areas like Appalachia. Concurrently, today's youth spend more time than previous generations did in sedentary pursuits, including watching television and engaging in screen-based games, including during school time. Active behavior has been displaced by these inactive recreational choices and school activities, which has contributed to reductions in activity-related energy expenditure (Baur et al. 2010). Some schools have recognized the importance of the school environment at impacting health and have begun to incorporate more active learning environment into the school day. However, these recent developments remain poorly understood, especially in under-resourced areas such as Appalachia. This brings up an important question, Are different schools impacting the obesity epidemic differently?

Purpose of Study

The purpose of this study is to compare behavioral, theoretical, and health outcomes of third grade children residing in Appalachia, Ohio by school location. The behavioral outcomes of interest are dietary patterns and daily physical activity. The health outcomes of interest are BMI, systolic blood pressure, and diastolic blood pressure. A secondary purpose amongst the children is to explore children's attitudes and perceived autonomy support and behavioral capacity for physical activity and dietary behaviors.

Significance of Study

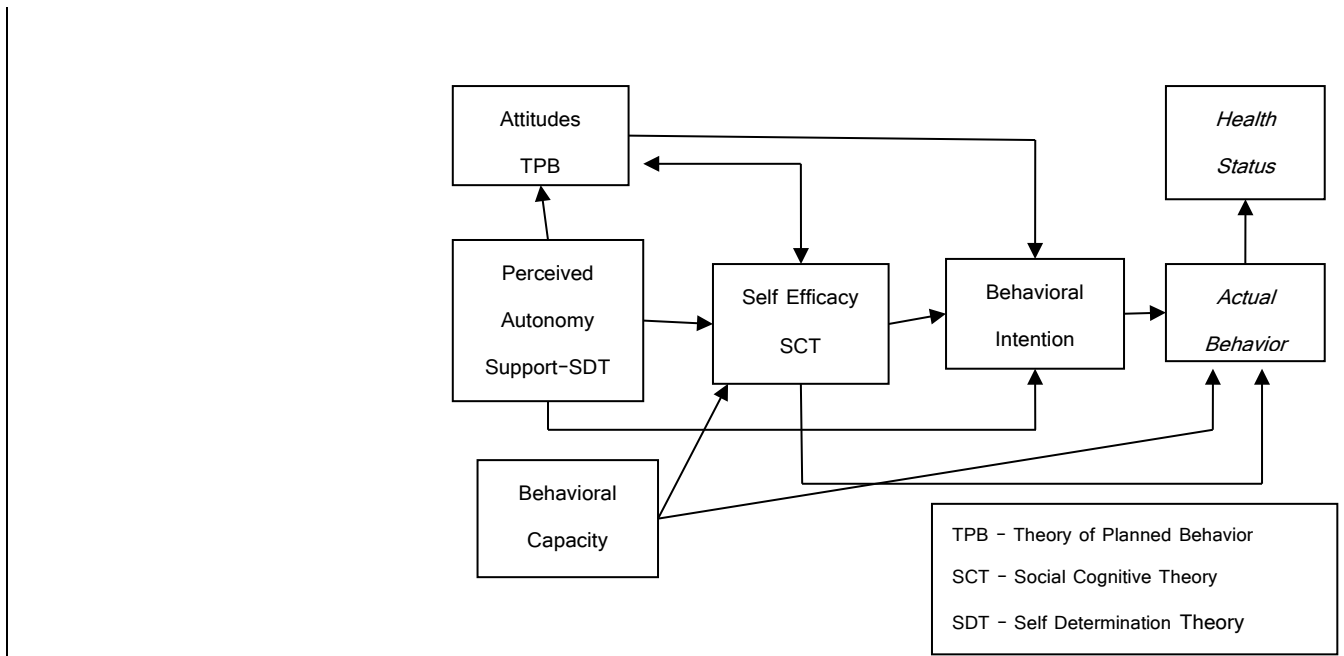
This study is significant because Ohio has found that Appalachia has the highest prevalence rate of childhood obesity and obesity related health conditions in the entire state. Exploring important factors related to childhood obesity within Appalachia's varied communities has not been conducted and remains poorly understood. The information gained through this study will contribute to the scientific literature on childhood obesity in Appalachia, and also to the evidenced based nursing practice. This study addresses a critical public health problem that remains a top priority.

Conceptual Frame of Reference for Parent Study

The parent study on childhood obesity in Appalachia from which this study was completed was framed from the Self Determination Theory (SDT), and the Social Cognitive Theory. The effects of the delivery of the health curriculum are shown in Figure 1 and further described below. Participation in the curriculum was hypothesized to impact the child's attitudes, perceived autonomy support, and behavioral capacity toward eating healthfully and engaging in physical activity. In turn, the child's attitudes,

perceived autonomy support and behavioral capacity was hypothesized to influence self-efficacy for eating healthfully and engaging in physical activity. Attitudes had a reciprocal relationship with self-efficacy. Self-efficacy, behavioral capacity, and attitudes impact behavioral intention, which in turn influences actual behavior. Actual behavior is then directly influenced by behavioral capacity and self-efficacy. Actual behavior will impact health status.

Figure 1. Effects of the Health Curriculum Delivery on the Mediators and Outcomes



Research Questions

The questions that were answered at the completion of this study were:

- a. “What are the differences in behavioral outcomes in third graders based on the school they attend?”
- b. “What are the differences in health outcomes in third graders based on the school they attend?”

Definition of Terms

Body Mass Index [BMI] for Age: Normal weight status was defined as having a BMI percentile for age and gender between the 25th and the 85th percentile for age and gender (Krebs, Himes, Jacobson, Nicklas, Guilday & Styne, 2007). Overweight status was defined as having a BMI percentile for age and gender between the 85th and 95th percentile (Krebs et al, 2007). Obese was defined as having a BMI percentile for age and gender above the 95th percentile (Krebs et al, 2007). BMI for age was measured by obtaining a height and weight for each child and possible teen mentor.

Systolic and Diastolic Blood Pressure: Blood pressure readings were obtained after a 15-minute resting period (United States Department of Health & Human Services, National Institutes of Health, National Heart, Lung, and Blood Institute, 2005). The diastolic blood pressure was obtained through standard protocol. It is the fourth Korotkoff (phase V) sound for children younger than 12 years of age. Participants were seated with feet resting flat on a surface and the right arm resting at heart level. The appropriate cuff was selected from five cuff sizes and placed around the upper arm. Using a standard mercury sphygmomanometer, four blood pressures were obtained by rapidly inflating to the maximum inflation level and deflating at a rate of 2mm HG per second, with 30 to 60 seconds between blood pressure determinations. All study participants had their systolic blood pressure measured twice.

Current Eating Behavior: “Free” and “light” foods were defined then children responded to the prompt: “In the past week I...” (a) ate at least one fruit a day; (b) ate free or light foods at lunch each day; (c) ate only free or light foods at dinner each day; (d) ate only free or light foods 5 or more days a week; and (e) ate breakfast each day.

Current Physical Activity Behavior: Children responded to the prompt: “In the past week, I did an activity on my own time, in addition to what I did in school that...” (a) made my heart beat faster; (b) made me out of breathe; and (c) made me sweat.

Nutrition Awareness and Knowledge: 15-item food choice questionnaire developed for pre and post-test use with the *Just for Kids* program. Respondents were asked to circle the healthier food of two choices, e.g. baked potato or french fries. Correct responses were summed for a total correct score.

Attitude Towards Eating Healthfully: Children responded to the prompt “I think for me, eating healthfully in the next week would be...” with six semantically differential items (“bad/good, “fun/boring”), scored from one to five. Children’s attitudes towards eating have been found to have predictive validity regarding intentions (Conner, Norman, Bell, 2002).

Attitude Towards Being Physically Active: Children responded to the prompt “I think for me, being physically active in the next week would be...” with six semantically differential items (“bad/good, “fun/boring”), scored from 1 to 5. Half of the responses presented the positive descriptor first, and the other half presented the negative descriptor first.

Perceived Autonomy Support for Eating Healthfully: Six items, two sets of three items taken from the scale used by Chatzisarantis, et al. for the global behavior of eating healthfully, rather than the 4 target behaviors individually. One set of three items asked children to rate autonomy support elements from “People important to me,” which was administered to all children. Children with teen mentors also rated autonomy support from their mentor.

Perceived Autonomy Support for Being Physically Active: Six items, two sets of three items taken from the scale used by Chatzisarantis, et al. for the behavior of being physically active, as defined previously. One set of three items asked children to rate autonomy support elements from “People important to me,” which was administered to all children. Children with teen mentors also rated autonomy support from their mentor (“_____ listens to how I would like to be physically active.”). Predictive and discriminant validity of the concept in exercise over 4 weeks has been found in previous studies (Thogersen-Ntolmani, Ntouomanis 2006) (Vlachopoulos, Michailidou, 2006).

Self-Efficacy for Eating Healthfully: Eight items, two for each of the four targeted eating behaviors (“I feel I will be good at...”) These items were designed to specifically assess internal evaluations of competence rather than control over environmental obstacles or ability to perform the behavior despite barriers (the definition of PBC). A growing body of research (Portwood, Ayers, Kinnison, Waris, Wise, 2005) suggests that self-efficacy, thus defined, has a stronger relationship than does PBC with intentions. Behavioral specific self-efficacy has been found to predict intention to eat healthy and actual eating behaviors (Bebestos, Chroni, Theodorakis, 2002) (Brugg, deVet, deNooijer, Verplanken, 2006).

Self-Efficacy for Being Physically Active: Two items for the target behavior of being physically active, as defined earlier (“I feel I will be good at...” and “I’m sure I am able to...”). Predictive validity has been found for behavioral self-efficacy and intention to be physically activity as well as actual activity levels (Dzewaltowski, Noble, Shaw, 1990).

Intention to Eat Healthfully: 12 items (“I plan to...), three for each of the four target diet behaviors of (a) eating at least one fruit daily, (b) eating healthy foods at lunch,

(c) eating healthy foods at dinner, and (d) eating breakfast. The term “free or light foods” was used in place of the term “healthy foods.” A brief definition of “free, light, and heavy” foods was provided at the top of the measurement tool. In studies with children, intention to eat healthy has been found to be predictive of eating behavior (Blue, 1995).

Intention to Be Physically Active: Three items (e.g. “I plan to...”) for the target behavior of being physically active, defined as doing something on your own time, outside of what you have to do in school, that makes your heart beat faster or makes you out of breath, for at least 20 minutes each day (National Institute of Child Health and Human Development, 2003). Predictive validity has been found regarding intention of children to engage in physical activity and engagement in healthy activity (Armitage, 2005) (Lien, Lytle, Komro, 2002) (Hagger, Chatzisarantis, Biddle, 2002) (Downs et al., 2006).

Chapter II

Literature Review

A literature review was conducted by searching the PubMed and CINAHL databases. The search parameters were very specific to ensure accurate results. Search terms used were “childhood obesity”, “Appalachia, Ohio”, “overweight”, and “children”. The years included in the search were 2006-2014. Thirty-one articles were initially identified, and then narrowed down based on the relevance to my sample for this study.

After review of 20 research articles related to childhood obesity, many common themes arose. A school-based BMI screening was conducted on approximately 2,000 elementary students in rural southeastern Ohio, and 38% of these children had high BMI (Montgomery-Reagan, Bianco, et al., 2009). This is significantly higher than the national average. The Centers for Disease Control and Prevention determined that 18% of children aged 6-11 years in America had a BMI that classified them as obese (2012).

Blood Pressure

According to national survey data, there is a trend towards an increase in average blood pressure values in children in the US, which is attributed to the increasing prevalence of overweight youth (Torrance, McGuire, et al., 2007). The criteria for high blood pressure is not as clear-cut in children as it is in adults, and it is affected by multiple variables such as age, gender, and height. In a study of 5,100 school-age children, it was reported that the prevalence of high blood pressure was greater in children within the upper quintiles of BMI and that 38% of overweight children (BMI >95th percentile) displayed high-normal blood pressure for their height when screened (Sorof et al, 2004).

Dietary Patterns

Another contributor to the obesity epidemic in this area is that energy-dense foods are replacing healthy foods in the diets of children living in rural Appalachia (Duffrin, Hovland, et al., 2009). This creates a problem because many high-calorie, high-sugar foods are less expensive and more accessible than healthier alternatives with more nutritional value. Overeating and increased portion size are also to blame in today's society. Especially in school-age children, learned behaviors are fostered through role modeling by parents. Therefore, if parents overeat, then children are likely to do so.

Furthermore, children with one or two obese parents are respectively either 40% or 80% more likely to develop obesity (Broedsgaard, 2006). Another common theme throughout the articles was the mention of an increased portion size throughout the years. Research collected by Young & Nestle (2002) found that many fast food chains in America now overly exceed the recommended portion sizes. They also found that the more people are offered to eat, the more likely they are to eat. Evidence has suggested that expecting a larger portion size and completely consuming it is a learned behavior.

Physical Activity

Despite the knowledge that physical activity is necessary for normal growth and development of children and also prevents obesity and its related health problems, far too many children are physically inactive. The current physical activity guidelines for children recommend that each child performs at least 60 min/day of moderate-to-vigorous physical activity (MVPA) (CDC, 2014). There are many factors that influence the extent to which children and adolescents are active, and research continues to expand in this area. The existing literature suggests that "the concept of self-efficacy (i.e. the

child's confidence in his ability to perform a physical activity) is particularly suited to children, as it has been consistently reported as being positively related to high levels of physical activity" (Guinhouya, 2012, p. 439). Aside from self-efficacy and the child's own perceptions about being physically active, external factors exist as well.

Geography

The geographical location of Appalachia, Ohio plays a major role in regards to diet patterns and physical activity in the participants of this study. Convenience stores and fast food restaurants vastly outnumber supermarkets and any other source of healthier food options in the area. This phenomenon is known as a "food desert". The U.S. Department of Agriculture defines this as urban neighborhoods and rural towns without ready access to fresh, healthy, and affordable food (2014). The lack of access results in poor diets, in turn leading to obesity and other co-morbidities throughout adulthood. The physical environment also has a strong impact on physical activity. According to a study done by Dr. Benjamin Guinhouya on the prevention of childhood obesity, it was found that time spent out of the home, opportunities for physical activity, convenience of playgrounds and availability of equipment, as well as the facilities within the home have all been identified as contributing factors to the level of daily physical activity (2012).

Family Context

Perhaps one of the most prevalent themes in the articles that is closely tied in to socioeconomic status is the knowledge and behavior of parents of obese children. A lack of parental knowledge concerning the nutritional value of various products or the inability to correctly decipher packaging label contents may contribute to inappropriate food choices (Lindsay et al. 2006). Many parents believed that juice was an appropriate

fluid to offer children rather than soft drinks, but the study found that children who drank more than 12 ounces of juice daily were found to be at a higher risk to become overweight and obese, compared to their peers who did not consume juice (2006). Thus, we can conclude that children who are overly exposed to drinking juice may encourage them to develop a preference for sweetened drinks and may become a lifetime habit.

Attitudes

Attitudes and intentions towards eating healthfully and being physically active is also important when examining childhood obesity. 1,272 children aged 8-9 years old participated in a study aimed at identifying predictors of healthy eating intention. The results indicated that attitude, parental norms, friend's norms, knowledge, motivation to conform to friends' and parental norms and perceived behavioral control accounted for 35% of the variance of intention to eat healthily (Bazillier et al, 2011). Results also identified that the more positive attitudes towards nutrition, the more children intend to eat healthily. Intervention directed at changing attitudes towards nutrition (i.e., information about healthy eating, attitudes changes workshop, cooking workshops) could be effective according to that result (2011). In another study conducted to examine the attitudes and intentions of children to exercise, results were very similar. The study included 698 participants, and aimed to examine the social norm of exercise behavior to which the children perceive they are exposed by parents, teachers, and friends, along with their wish to comply with that norm (Godin, Shephard, 1984). The results concluded that involvement in physical activity is a social process, and "appropriate" leisure behavior is determined by age. Godin and Shephard concluded that the younger students perceived a personal control of their behavior, and they believed themselves free of pressure from

their parents, teachers, and even their close friends (1984). Those who were active viewed parents and friends as having more positive beliefs about physical activity than the children who were sedentary.

Self-Efficacy

Self-Efficacy for eating healthfully and being physically active also need to be taken into consideration when looking at the behavioral patterns of overweight and obese children. It appears that those who feel efficacious in adopting and following a healthy diet tend to have a strong intention towards it, while those who have a strong intention to follow a healthy diet also have high self-efficacy. The strength of one's attitude towards healthy eating was significantly related to the development of participants' self-efficacy (Bebestos et al, 2002, p.493). According to social cognitive theory, one's belief of self-efficacy is central to the decision to participate in physical activity. Predictive validity has been found for behavioral self-efficacy and intention to be physically active, as well as actual activity levels (Dzewaltowski et al, 1990).

The existing literature shows the disadvantages that these children are facing, which puts them at an exponentially high risk of developing obesity compared to the national average. Barriers exist in diet patterns, physical activity, attitudes, intentions, and the geographical location as a whole.

Chapter III Methods

Research Design

This correlational study is a secondary analysis of a convenience sample from a study conducted from 2010-2012. The parent study was a randomized controlled trial that compared the effects of two curriculum delivery methods on dietary and physical activity outcomes. This project utilized data collected at baseline from child participants.

Population and Sample Design

The parent study consisted of third and fourth graders from 3 different elementary schools in Appalachia, Ohio. For this study, data were analyzed from only the third grade participants. The sample size of third grade participants was 90. This entire sample was utilized for this study. Child assent and parent consent were obtained during data collection for the parent study.

Data Collection Procedures

This study is a secondary data analysis. No new data were collected for the purpose of this study. The database is stored on a password protected and encrypted computer. No other copies of the data were made.

Data Analysis

Descriptive and inferential analyses were conducted. Descriptive analysis included measures of central tendency including means, range, and standard deviations, as well as percentages. Schools were classified as either rural or not rural and comparisons were made by group. Independent t-tests were completed using a $p < .05$ as significant. Initial plans were to maintain each school independently and complete ANOVA analyses. This resulted in unequal group size between the small rural schools

and a larger non-rural school. It was decided to combine the two smaller schools into one group for analysis purposes.

Results

The sample utilized for this study was 56.7% female and 43.3% male. The majority of the children were Caucasian/White, accounting for 92.2%. Over half of the sample attended the non-rural school, School A. The small rural schools included School B with 28.9% of the children attending, and School C making up 13.3%. See Table 1 for additional demographic description.

Limitations

The study has four major limitations. The first is that it is a secondary data analysis. This limited the ability to collect pertinent information, since I was unable to directly ask all questions that might be important for this study. If this study involved primary data collection, participants could have been interviewed to pick up on trends in responses or to obtain further details about the responses received.

Secondly, it includes a small sample size, as only three schools were explored. The sample size was limited to 90 third-grade students. All students in the schools could not be included in this study. Therefore, the results obtained cannot be generalized to include all elementary aged children, only children in third grade.

The third limitation is that this was a cross-sectional study, and the third graders were not followed over time. This study contains only data from the parent study, which was conducted from 2010-2012.

Lastly, the physical activity was self-reported during the data collection process. This presents to be a major limitation because actual activity or sedentary behavior was not measured. The behavior of the children in school was not observed first-hand.

Three schools within the Appalachian area were examined for the purpose of this study. One school is located in a rural Appalachian county and the other two are located in a non-rural Appalachian county. In all schools, nearly all (71-95%) qualified for free or reduced-lunch programs (OH Department of Education, 2013). The state-wide average for the school lunch program is 47% (OH Dept. of Education). The school populations ranged from 385 total students to 600 total students.

Summary of Findings

Research Question 1: What are the differences in behavioral outcomes in third graders based on the school they attend?

The behavioral outcomes of interest were dietary patterns and daily physical activity. Dietary patterns were not significant with a t-test value of $-.743$ and a p-value of 0.59 . Physical activity however did appear to be higher in the non-rural school (Mt. Logan), with $p=0.04$.

Research Question 2: What are the differences in health outcomes in third graders based on the school they attend?

The health outcomes of interest were BMI, systolic blood pressure, and diastolic blood pressure. The only variable that proved to be significant was systolic blood pressure in the non-rural school, with a p-value of 0.004 and a t-test value of $-.284$. Diastolic blood pressure resulted in a t-test value of $.306$ and a p-value of $.273$, making it not significant.

Lastly, the results concluded that BMI did not differ by school location. The t-test value was -.920 and the p-value was .594.

Implications of Study

Although there were not many significant values in the results of this study, the findings were still significant in regards to the health outcomes of the third-grade children of Appalachia. Lack of variation in dietary patterns may be due to schools being in the same county; children are served two meals a day at school. Increased physical activity in the non-rural school could be related to more opportunities for exercise, and some of these children are able to walk to school instead of riding a bus. Higher systolic blood pressure in the non-rural school could also be explained by the increased physical activity. These are all very important findings as they demonstrate how the different lifestyles of these children impact their health differently.

Recommendations

Based on the study results, I recommend that more research be conducted on the behavioral and health outcomes of children in Appalachia, Ohio. This study provides an insight into the health disparities that occur in this geographical location, however the sample size is too limited to make general conclusions. With blood pressure showing to be increased in this particular population, a beneficial intervention would be to begin screening for blood pressure in all schools, and working with kids at earlier ages to make healthy lifestyle choices to keep these numbers low. For children living in under-resourced areas such as Appalachia, I would recommend for schools to provide information and education sessions for parents regarding their child's health status and

health behaviors. They would become more aware of the importance of healthy eating and physical activity, thus reducing BMI and blood pressure promoting better outcomes.

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Table 1 : Sample Demographics

School Attending:	Valid Percent (n=90)
School A (non rural)	57.8%
School B (rural)	13.3%
School C (rural)	28.9%
Race or Ethnicity:	
Caucasian/White	92.2%
Black/African American	2.2%
Asian American	1.1%
Other	3.3%
Missing	1.1%
Is Child Hispanic or Latino:	
Yes	2.2%
No	97.8%
Gender:	
Male	43.3%
Female	56.7%

Appendix I

Appalachian Counties in Ohio

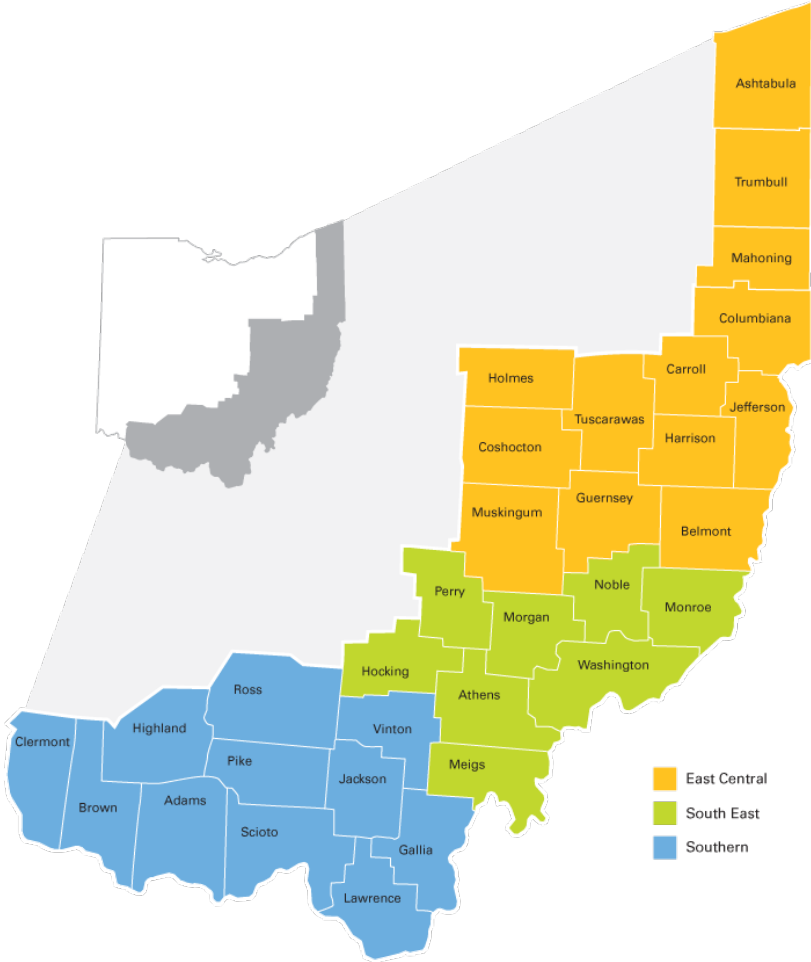


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