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Association Between the Body Mass Index and School Attendance Among K-3rd Public School Children

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ASSOCIATION BETWEEN THE BODY MASS INDEX AND SCHOOL ATTENDANCE
AMONG K-3RD GRADE PUBLIC SCHOOL CHILDREN

A Thesis

Submitted to the School of Graduate Studies and Research

in Partial Fulfillment of the

Requirements for the Degree

Master of Education

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May 2018

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The purpose of this study was to examine any association between the Body Mass Index (BMI) and school attendance among K-3 public school children. Desensitized data was collected via the Punxsutawney School District regarding K-3 students' BMI, days absent from school during the 2016 school year, medical conditions, and eligibility for free and reduced lunches. The most significant finding after analysis of the data was a significantly weak correlation ($r = .093$, $p = .01$) between students' BMI levels and days absent from school. The results also revealed students eligible for free and reduced lunch missed significantly ($t = 4.8$, $p = .001$) more days from school when compared to students not eligible for free or reduced lunch. Students with a reported medical condition reported an average of 9.31 ($SD = 7.75$) of days missed throughout the school year whereas students without a medical condition missed an average of 8.85 ($SD = 6.3$). When examining absenteeism by specific medical conditions, it was found that students with asthma missed the most days averaging 10.12 ($SD = 7.86$).

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Jason Fallara

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CHAPTER I

INTRODUCTION

Background

It has been established that students who are chronically absent are more likely to drop out of school (Sheldon, 2004). Multiple studies indicate that dropping out can lead to long term consequences, such as lower average incomes, higher risk of unemployment, and a greater likelihood of incarceration (Sum, 2009; Thornberry, 1985). Along with lower overall wages, school dropouts do not make up for their lack of education through additional skill acquisition and training (Campolieti, 2010). Research examining absenteeism found that, chronically absent students are more likely to experience negative academic outcomes (e.g., grade retention, dropping out), to be under- and unemployed, to be incarcerated, and even to die prematurely (Wallace, 2018). Research established that attendance is a lead indicator of successful school outcomes, as well as successful life outcomes. Students who are frequently absent from school are at a much greater risk of poor self-concept, poor school performance, retention, and dropping out (Rencher, 2016). Though the literature on the cause of absenteeism is thorough, it commonly focuses on socioeconomic and demographic factors such as family income, parental status, and environment. Few studies have examined the impact that health status has on attendance in school-aged children.

In adult research, it has been determined that workers who are overweight or obese miss more work when compared to their healthier counterparts (Howard, 2014). Though established in adults, there is little existing literature on the impact that weight status has on school attendance in children. One study that examined the correlation between fitness levels and academic achievement found there was a significant negative relationship between fitness levels

and school absenteeism (Blom, 2010). In other words, students who had lower fitness scores missed more school.

Research Questions

This study focuses on an association between the Body Mass Index (BMI) and school attendance among K-3 Public School Children. Furthermore, this study also examined the association between school attendance with socioeconomic status (indicated by eligibility for free and reduced lunch) and with identified medical conditions (Allergies, Asthma, ADHD). Specifically, this study examined:

1. Is there an association between the Body Mass Index and school attendance among K-3 Public School Children?
2. Is there an association between socioeconomic status and school attendance among K-3 Public School Children?
3. Is there an association between identified medical conditions (Asthma, Allergies, ADHD) with Body Mass Index and absenteeism?

Hypothesis

In order to answer the specific research questions established in this study, it is hypothesized that;

1. Students with a higher BMI will have more recorded missed days from school.
2. Students who are eligible for free and reduced lunches will have higher rates of missed school.
3. Students who are reported as having a medical condition will have higher rates of missed school.

Assumptions

1. School districts track the variables being examined in this study.
2. Parents honestly report their children's eligibility for free and reduced school lunch when registering for school.
3. Body Mass Index (BMI) is recorded accurately (i.e. height and weight) by the school district.

Limitations

1. BMI is not 100% proficient in determining a person's weight status because it does not account for muscle mass.
2. Using only one district will limit the generalizability of the results.
3. Using eligibility for free and reduced lunch for socioeconomic status is a limited indicator to determine SES in families.

Definition of Terms

Truancy: The act of staying away from school without an excused reason

Body Mass Index: Height to weight ratio calculated to indicate obesity

Absenteeism: The practice of regularly avoiding school without good reason

Socio Economic Status: A mix of economic and sociological factors to measure an individual's or family's economic and social position in relation to society based on income, education, and occupation.

Asthma: A common inflammatory disease of the airways within the lungs which can cause wheezing, coughing, tightness within the chest, and shortness of breath.

Attention Deficit Hyperactivity Disorder: A genetic brain syndrome which includes difficulty concentrating and controlling impulsive behaviors.

Significance of the Study

It has been established that absenteeism can have a negative effect towards an individual's future (Sheldon 2004). There is little research that has examined health variables as they relate to attendance. This study will help determine if the Body Mass Index, along with socioeconomic status and demographic factors, has any correlation with absenteeism in school. Identifying causations of chronic absenteeism is the first step in reducing this nationwide problem. Furthermore, examining relationships between these variables might also add to the discussion on how to address student health and success as they develop.

CHAPTER II

REVIEW OF RELATED LITERATURE

Research has established connections between dropping out of school and long-term consequences including; lower average incomes, higher risk of unemployment, teen and adult pregnancy, and a greater likelihood of incarceration (Sum, 2009; Thornberry, 1985). Based on related research, absenteeism has been correlated with several factors, ranging from socioeconomic factors (Gottfried, 2017) to poor health habits (Jacobsen, 2016). Absenteeism can be reduced if communities better understand factors that are influencing student attendance.

One factor being compared with absenteeism is Body Mass Index (BMI). BMI has been associated with several factors including academic achievement (Kenny, 2015), sleep patterns (Rangan, 2018), and medical conditions (Nafiu, 2010; Yang, 2017). Because of the association between the BMI and these factors, it is not unlikely that BMI can be associated with absenteeism.

Body Mass Index

Body Mass Index (BMI) is a formula used to calculate an individual's body fat content based on the weight-height ratio. BMI also controls for age and gender as well. A high BMI can be a sign of too much excess body fat, while a low BMI can be a sign of too little body fat. The higher a person's BMI, the greater their chances of developing certain negative health conditions, such as heart disease, high blood pressure, and diabetes. The formula to calculate BMI is simple and requires little equipment to measure, making it popular among doctors, schools, and health clinics. BMI is interpreted differently for people under age 20. While the same formula is used to determine BMI for all age groups, the implications for children and adolescents can vary depending on age and gender. Girls usually acquire a higher amount of

body fat earlier than boys (Hattori, 2004). Furthermore, body fat should decrease as children develop and grow (Hattori, 2004).

For children and teens, the Center for Disease Control and Prevention uses age growth charts to show BMI as a percentile ranking. Each percentile expresses a child's BMI relative to other children of the same age and gender. For example, a child would be considered obese if they had a BMI at or above the 95th percentile. This means that they have more body fat than 95 percent of children in the same age and gender category. Body fat percentages are also ranked accordingly: Individuals with a BMI between 0-5 is categorized as extremely underweight, an index between 6-11 is considered underweight, 12-19 is considered healthy, 20-25 is labeled as overweight, 26-30 is considered obese, and finally individuals with an index over 30 is considered morbidly obese. According to the National Institutes Diabetes and Digestive and Kidney Diseases (NIDDK) 20013-2014 survey, more than two in three adults are considered overweight (e.g. have a BMI between 20-25), and one in three are considered obese (e.g. have a BMI between 26-30). Furthermore, it was also reported that one in six children are reported as being obese based on a BMI between 26-30 (National Institute of Diabetes and Digestive Kidney Disease, 2017).

Studying the impact that BMI has on school attendance is a newer concept being examined. The limited research on this association suggests that BMI can impact a student's attendance (Geier et.al, 2007). A study analyzing 1,069 fourth and sixth graders within several schools in Philadelphia discovered students who had a high BMI were more likely to miss school than students with a normal BMI. The study's results concluded that obesity was a substantial interpreter of student absenteeism after adjusting for the student's demographic factors. (Geier et.al, 2007). Furthermore, a national survey which examined 1387 students (age 6-11) and 2185

students (age 12-18) analyzed the association between school absenteeism and BMI. The study reported that overall, the number of days missed within the last 12 months was lower among both adolescents and children with normal-weight compared to overweight and obese peers. Although not as prevalent in adolescents, the study reported that increased body weight is independently associated with severe school absenteeism (more than 2 days missed per month) in children (age 6-11). The study reported that the prevalence of severe absenteeism was over double among overweight children and approximately quadrupled among obese children when compared to their normal weight peers (Li, 2012).

Absenteeism

Attendance is an important factor in school success. Studies show that better school attendance is related to higher academic achievement (Johnke, 2013). For example, as predicted Johnke (2013) found that significant correlations existed between attendance and reading achievements, attendance and mathematics, and attendance and overall GPA. Furthermore, Cassell (2008) looked at student attendance and absenteeism. It was found that students who attended school regularly scored higher on exams than students who were frequently absent (Cassell, 2008). A report in 2006 concluded that nearly one third of all public high school students, and nearly half of all African American, Hispanic, and Native American students fail to graduate with their class (Bridgeland, Dilulio, & Morison, 2006). A 2012 periodical reported that school absenteeism is a pervasive problem that affects approximately 14-15% of American Students (Balfanz & Byrnes 2012).

Chronic truancy (e.g. frequent unexcused absence) is a strong predictor of undesirable outcomes in adolescence, (1) including academic failure, (2) dropping out of school, (3) substance abuse, (4) gang involvement, and (5) criminal activity (Child Trends, 2015). Sum

(2009) reported within 2006 and 2007, 38% of women ages 16-24 who did not obtain a diploma became a mother. The report also indicated dropouts are far more likely to be members of low income families, and in 2006-2007 9.4% of male drop outs were institutionalized on a given day. Lastly, Sum's study concluded that the average high school dropout costs \$292,000 to taxpayers in lost tax revenues, transfer costs, and incarceration costs (Sum 2009). In 1985, Thornberry analyzed the association between dropping out and subsequent criminal behavior and discovered dropping out of high school is positively associated with long-term criminal activity (Thornberry 1985).

Chronic absence is more often being acknowledged as an "early warning sign" that a student may be at risk of academic failure and dropping out (Child Trends 2015). Chronic absenteeism is mutually expressed by researchers as missing ten percent or more days from school. (Sum, 2009). Research has proven there are many contributing factors that relate to student absenteeism ranging from family health and finances, to drug and alcohol use, method of arriving at school, and opposing public outlooks concerning education (Child Trends 2015). Balkis examined 423 high school students' absenteeism records and any relationships found between their absenteeism, self-perceptions, attitudes toward teachers and school, family factors, and academic achievement. It was discovered that absenteeism was negatively related to all of the examined factors. It was reported that student absenteeism was a significant predictor in academic achievement (Balkis 2016).

Medical Conditions and Absenteeism

Research proposes that other health issues influence student attendance as well. For example, weight status, chronic illness, and prolonged discomfort and pain all appear to considerably foresee higher levels of learner truancy (Palermo, 2000) For instance, Taras and

Potts-Datema (2005) studied literature linked to prolonged well-being in children and found that attendance was negatively impacted in students with diabetes, sickle cell anemia, epilepsy, and other chronic diseases. This research, among other studies, suggests that additional chronic conditions have been credited to amplified student absence including migraines, stomach discomfort, musculoskeletal pain, and juvenile rheumatoid arthritis (Chan, Piira, & Betters, 2005). Roth-Isigkeit and colleagues (2005) piloted a large study of kids who reported instances of chronic pain. They determined that out of 749 elementary and secondary students in Ostholstein, Germany, 622 (83%) had experienced pain during the last three months. The children and adolescents in pain reported sleep issues (53%); an inability to participate in hobbies (53%); difficulties eating (51%); school absence (48%); and an inability to meet friends (46%). More than two-thirds of the participants also reported restrictions in daily living, which includes school attendance (Roth-Isigkeit et.al., 2005).

Socioeconomic Influence on Health

A considerable body of evidence has established that individuals from a low socioeconomic background are more likely to (1) suffer from disease, (2) be cognitively and physiologically impaired, (3) experience higher mortality, and (4) be an influential predictor of not graduating from high school. (Adler et al., 1993; Rogers, 1992; Brennan-Olsen, 2017; Qian, 2017; Lazzarino, 2013; Roos, 2017). Alder et.al. (1993) examined socioeconomic status (SES) association with health outcomes in different countries. The research reported that not only does SES status relate to health at all levels of the SES hierarchy, SES is strongly associated with risk of disease and mortality (Alder, 1993). Rogers (1992) examined social and demographic factors associated with mortality rates by race. The results of this study concluded that sociodemographic factors such as age, marital status, family size, and income greatly impacted

mortality rates in both white and black ethnic groups (Rogers, 1992). Brennan-Olsen (2017) examined the prevalence of arthritis in low to middle income countries. The study reported that arthritis was more prevalent among the individuals with the least education, along with a subsequent predisposition to disease such as osteoarthritis (Brennan-Olsen, 2017). Qian (2017) investigated the impact of socioeconomic status on initial clinical presentation to memory disorders clinic. It was reported that not only can low SES status increase the risk of Alzheimer's disease, lower SES was associated with a greater age at initial time of diagnosis (Qian, 2017). Individuals with lower SES came into memory clinics later, when the disease has progressed to dementia, whereas higher SES individuals entered clinics early when the disease is more manageable. Therefore, higher SES is associated with better cognitive functioning and increased use of cognitive enhancers (Qian, 2014). Lazzarino (2013) tested whether lower SES status enhances the effect of psychological distress on mortality from stroke or coronary heart disease. The study reported psychological distress and low SES status were associated with an increase in mortality for both categories (stroke death, and coronary heart disease death). People within low SES circumstances were also more vulnerable to the effect of psychological distress when compared to individuals of higher SES status (Lazzarino, 2013). The influence of socioeconomic status on health is assumed to begin in the prenatal environment and continue throughout life. A study examining the effects of parental socioeconomic status on their children's health determined that parents' SES status does affect childhood health-related quality of life (Kim, 2017). The health effects of low SES status has been proven to significantly influence long-term BMI and self-rated health in a study that focused on the role of SES factors in Caucasian and African American inequities across their life course (Boen, 2016).

CHAPTER III

METHODOLOGY

This study used existing data sets collected by the Punxsutawney Area School District as part of their yearly reporting on student records. The student information was de-identified by the school district's head nurse and recorded in a manner that replaced student names with a unique identification number. The data being compared in this study included eligibility for free and reduced lunches, gender, race, medical conditions (e.g. allergies, ADHD, and asthma) school attendance records, and the Body Mass Index (BMI). Participants were students within grades K-3 attending Punxsutawney Area School District. Absenteeism will be recorded in the school records including, excused, unexcused, and excused-educational leave. Only the excused and unexcused days will be included in the analysis; educational leaves were not included in the analysis. Approximately 632 students were included in this analysis.

Procedures

Once the school district administration de-identifies the information, the data were placed within an excel spreadsheet. Students were represented by a number, along with their statistics in adjacent columns; including BMI, grade, gender, sick days absent, and eligibility (e.g. Yes or NO) for free and reduced lunch. After the data were organized, statistical tests were computed. Descriptive statistics were collected on the 632 participants. A Pearson correlational test was utilized to examine the relationship between BMI, socioeconomic status, and absenteeism for the participants. Correlations were also run on Absenteeism + Body Mass Index, Absenteeism + Socioeconomic Status, and Body Mass Index + Socioeconomic Status. A paired sample T-Test was used to determine any significant difference between gender and the study variables. Lastly,

the study also utilized a two-tailed t-test to determine absenteeism between students with medical conditions and students without.

Participants

The study included six elementary schools within the Punxsutawney Area School District. As displayed in Table 1, the number of students included 164 Kindergarteners, 162 1st graders, 148 2nd graders, and 158 3rd graders, giving the study a total of 632 participants. Of these participants, 327 were male and 305 were female. 607 of the students were Caucasian, 4 were African American, and 21 were considered Multicultural. 365 students were eligible for free and reduced lunch. A total of 175 students were diagnosed with allergies, 67 were diagnosed with asthma, and 41 were diagnosed with ADHD.

CHAPTER IV

RESULTS

With the use of SPSS software, the research questions were answered by the researchers. Demographic and socioeconomic indicators were factored into the results as controlling variables. These variables include: grade, gender, ethnicity, socioeconomic status, and medical conditions including Asthma, ADHD, and allergies.

Population

The school provided information on a total of 632 students. Of the 632 participants, 5 were removed from the data due to the school not providing the required information (i.e. days missed from school) to be considered for the study. Table 1 displays the grade of each student. Of the 632 students, there are 162 (25.6%) first graders, 148 (23.4%) second graders, 158 (25%) 3rd graders, and 164 (25.9%) kindergarteners. The table also displays the number of students divided by gender. Within the 632 participants, 324 (51.7%) are male and 305 (48.3%) are female.

Within the table, students were also divided by ethnicity which helps determine demographic factors that apply to the study. Of the 632 students, 607 (96%) are Caucasian, 4 (.6%) are African American, and 19 (3%) are considered Multicultural by the school district. Another variable considered was medical conditions. For the purpose of this study, three medical conditions were analyzed including ADHD, asthma, and allergies. A total of 175 (27.7%) students were diagnosed with allergies, 67 (10.6%) were diagnosed with asthma, and 41 (6.5%) were diagnosed with ADHD. Lastly, Table 1 displays the eligibility of students for free and reduced lunches; which is the measuring factor used to determine the socioeconomic status of the

participants. It was concluded that of the 632 students, 365 or 57.8% were eligible for free or reduced lunches. There were only 267 or 42.2% of students not eligible.

Table 1

Demographic Characteristics of Participants

		Frequency	Percentage
Gender	Male	327	51.7%
	Female	305	48.3%
Grade Level	K	164	25.9%
	1	162	25.6%
	2	148	23.4%
	3	158	25.0%
Ethnicity	White	607	96.0%
	African American	4	.6%
	Multicultural	21	3.3%
Medical Condition	ADHD	41	6.5%
	Asthma	67	10.6%
	Allergies	175	27.7%
Free or Reduced Lunch	Yes	365	57.8%
	No	267	42.2%

Socioeconomic Status and Test Variables

This study compared students' eligibility for free or reduced lunch with their BMI and their absentee records. Table 2 illustrates the association between free and reduced lunches on BMI levels. The students eligible for free and reduced lunch did have a slightly higher (17.98) BMI, when compared to students not eligible for free or reduced lunch (17.78). However, the difference between the group was not significant.

Table 2

Comparison Between Eligibility for Free/Reduced Lunches With BMI

Free/Reduced Lunch		N	Mean (SD)	T-Test (P Value)
BMI	Yes	365	17.98 (3.58)	1.051 (.294)
	No	267	17.68 (3.43)	

When comparing students' eligibility for free or reduced lunch with their absentee records, interesting results were found. Students eligible for free and reduced lunch missed significantly ($t = 4.8, p = .001$) more days from school when compared to students not eligible for free or reduced lunch. As displayed in Table 3, students eligible for free or reduced lunch missed on average 2.62 more days of school than those students not eligible during the school year.

Table 3

Comparison Between Eligibility for Free/Reduced Lunches with Absenteeism

Free/Reduced Lunch		N	Mean (SD)	T-Test (P Value)
Absenteeism	Yes	362	10.12 (7.64)	4.8 (.001)
	No	265	7.50 (5.19)	

Body Mass Index

Body Mass Index was used as the health status variable when comparing participant's absentee records. This study compared BMI levels with missed days from school, prevalence of medical conditions, ethnic groups, gender, and grade level.

Body Mass Index and Demographic Variables

This study examined how free and reduced lunch eligibility associated with absenteeism and BMI levels. The minimum BMI recorded in the data is 12.29, and the maximum BMI recorded was 37.77. The average BMI reported of the 632 students is 17.85 (SD = 3.52) (see Table 4). Caucasian students recorded an average BMI of 17.82 (SD = 3.52). African American students recorded an average BMI of 19.47 (SD = 3.11), and the average BMI for Multicultural students is recorded as 18.36 (SD = 3.34). Males had an average BMI of 17.96 (SD = 3.53), and females had an average BMI of 17.74 (SD = 3.51).

Table 4

Comparison Between BMI and Demographic Variables

	Demographic Variable	Mean (SD)
BMI	All Participants	17.85 (3.52)
Ethnicity	White	17.82 (3.53)
	African American	19.47 (3.11)
	Multicultural	18.36 (3.34)
Gender	Male	17.96 (3.53)
	Female	17.74 (3.51)

Body Mass Index and Absenteeism

This study analyzed the correlation between Body Mass Index and days absent from school. After running a Pearson correlation, a significantly weak correlation ($r = .093$, $p = .01$) between BMI levels and days absent from school was found. This result shows that students with a recorded higher BMI were more likely to miss school.

Absenteeism

Of the 632 participants, 627 had eligible absenteeism records. Of these eligible 627 students, the minimum amount of days missed from school was 0, and the maximum amount of days missed from school was 56. Table 5 displays the average amount of days missed from school was 9 (SD = 6.83). This table also presents days absent from school by gender. It was recorded that the average amount of days that the 324 male students missed was 8.93 (SD = 7.39), meanwhile the average amount of days the 303 female students miss was 9.02 (SD = 6.19).

Table 5

Absenteeism by Gender and Ethnicity

		N	Mean (SD)
Participants		627	9.00 (6.83)
Gender	Male	324	8.93 (7.39)
	Female	303	9.02 (6.19)
Ethnicity	White	607	8.98 (6.73)
	African American	4	9.58 (6.22)
	Multicultural	19	9.74 (10.13)

Medical Conditions

This study also focused on medical condition as a variable when examining BMI and absenteeism. This study focused on Allergies, Asthma, and ADHD because these were the most prevalent conditions reported overall. A total of 175 (27.7%) students were diagnosed with allergies, 67 (10.6%) students were diagnosed with Asthma, and lastly 41 (6.5%) students were diagnosed with ADHD. Furthermore, this study examined the BMI levels of students diagnosed with any of these three medical conditions, as well as, with days absent of those students.

Comparing Body Mass Index between Students with and without Medical Conditions

This study took an interest in the difference of BMI in students with medical conditions versus students without medical conditions. Table 7 displays the comparison of BMI between the two groups. It was concluded that students with medical conditions reported a significantly

higher (t score = 2.142, p = .003) average BMI of 18.26 (SD = 3.77). Students without medical conditions reported an average BMI of 17.63 (SD = 3.36).

Table 6

Medical Conditions and Body Mass Index

	N	Mean (SD)	T-Test (p-value)
Students without Medical Conditions	411	17.63 (3.36)	2.142 (.003)
Students with Medical Conditions	220	18.26 (3.77)	

Body Mass Index by Specific Medical Condition

This study also compared BMI of students with specific medical conditions, including allergies, Asthma, and ADHD.

When comparing the three groups, students with Asthma had the highest recorded average BMI of 19.05 (SD = 4.05); followed by students with allergies having an average BMI of 18.42 (SD = 3.78). Students with ADHD had the lowest average BMI of 17.31 (SD 3.68).

Table 7

Body Mass Index and Medical Conditions

	No Medical Condition Mean (SD)	Allergy Mean (SD)	Asthma Mean (SD)	ADHD Mean (SD)
Participant BMI	17.63 (3.36)	18.42 (3.78)	19.05 (4.05)	17.31 (3.68)

Comparing Absenteeism between Students with and without Medical Conditions

This study also examined days absent in students with specific medical conditions. It was reported that students with medical conditions missed more days of school than students without medical conditions, however the difference is not significant. Students with medical conditions recorded an average of 9.31 (SD = 7.75) of days missed throughout the school year. When examining absenteeism by specific medical conditions, it was found that students with asthma missed the most days averaging 10.12 (SD = 7.86). Students with ADHD missed on average 9.37 (SD = 10.9) days from school, and students with allergies missed an average 8.88 (SD = 7) days from school. Students without a medical condition missed an average of 8.85 (SD = 6.3). When checking for significances between the groups, none was found. This suggests that there was no significant difference between students with and without medical conditions when comparing absentee records.

Table 8

Absenteeism and Medical Conditions

	No Medical Condition	Allergy	Asthma	ADHD
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Absenteeism	8.85 (6.30)	8.88 7	10.12 7.86	9.37 10.9

The results of this study have found significant associations between student absenteeism, BMI, and medical conditions. It was discovered that all three factors are potentially associated with one another. The most significant findings of this study included; (1) A higher BMI for students with medical conditions, (2) a significantly weak correlation between BMI and Absenteeism, and (3) student's eligible for free and reduced lunch missed significantly more school when compared to students not eligible.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMENDATIONS

Summary

This study was conducted to answer three specific research questions regarding the association between K-3 public school children's BMI and absenteeism. When conducting this study, the questions that were specifically examined included;

1. Is there an association between the Body Mass Index and school attendance among K-3 Public School Children?
2. Is there an association between socioeconomic status and school attendance among K-3 Public School Children?
3. Is there an association between identified medical conditions (Asthma, Allergies, ADHD) with Body Mass Index and absenteeism?

De-identified data was collected from a school district regarding students' information (e.g. BMI, grade, gender, ethnicity, absenteeism, eligibility for free and reduced lunch, and medical conditions such as asthma, allergies, and ADHD) in hopes of determining any associations between students' absenteeism from school, BMI, and medical conditions.

Chapter 1 provides extensive framework regarding the purpose of the study. Chapter 2 outlines the review of literature related to the examined topic. This overview comprises of factors influencing and the effects of: Absenteeism, medical conditions, low socioeconomic status, and BMI. Chapter 3 contains a framework for the procedure of the study. Included in this chapter are the purpose and setting of the study, data collection, instruments used, and data analysis. Chapter 4 outlines the data and analysis of this study, including discussion of significant findings of the study. Chapter 5 provides further elaboration on the significant

findings of this study as well as a summarization of the results provided in Chapter 4. Chapter 5 will also contain recommendations for further research performed on student absenteeism, BMI, and medical conditions.

Conclusions

This research concentrates on three research questions that relate to student absenteeism, BMI, and medical conditions. Within the de-identified data provided by the participating school district was student information which allowed the researchers to examine any associations with student absenteeism. The association between BMI and absenteeism was the main focus of this study and is further explained below.

Research Question 1

The first research question examines the association between student BMI and absenteeism, or days missed from school. When comparing these two variables, it was found that there was a significantly weak correlation ($r = .093$, $p = .01$) between students' BMI levels and days absent from school.

Although there is little research comparing student BMI and absenteeism, two similar studies were found. These studies also found significant finding among student BMI levels and days absent from school (Geier et.al., 2007; Li, 2012). For example, Geier and colleagues (2007) examined over 1,000 students within elementary schools and discovered that students with a high BMI level were more likely to miss school when compared to students who reported normal BMI levels. Furthermore, a national survey which examined the association between school absenteeism and BMI in 1387 students reported that overall, the number of days missed was lower among students with normal-weight compared to overweight and obese peers. The study concluded that increased body weight is independently associated with severe school

absenteeism and that the prevalence of severe absenteeism was doubled in overweight children and quadrupled among obese children when compared to their normal weight peers (Li, 2012). Lastly, there was a study that compared student fitness levels and their absentee levels (Blom, 2010). Though not directly measuring BMI, fitness levels also help establish health status in people. The study revealed a statistically substantial positive correlation among health and test scores within Math and Language Arts and a statistically substantial negative association with school nonattendances. The associations persisted significant while controlling for all demographic factors. In other words, students who achieved better health achieved better test scores and fewer absences (Blom, 2010).

Also examined in this current study was BMI levels compared to ethnic groups. Caucasian students recorded the lowest average BMI of 17.82 (SD = 3.52). African American students recorded the highest average BMI of 19.47 (SD = 3.11), and the average BMI for Multicultural students was recorded as 18.36 (SD = 3.34). According to the National Institutes of Diabetes and Digestive and Kidney Diseases (NIDDK) 20013-2014 survey, among 48.6% of African American adults were considered to be obese whereas only 36.4% of Caucasian adults were recorded as obese.

Research Question 2

The second research question examined an association between socioeconomic status (SES) and school attendance among K-3 Public School Children. This study determined SES by those students eligible for free or reduced lunch. It was found that student's eligible for free and reduced lunch missed on average 10.12 (SD = 7.64) days of school. Students not eligible reported missing on average 7.12 (SD = 5.19) days of school. Students eligible for free or reduced lunch missed on average 2.62 more days of school during the year than those students

not eligible. These results revealed students eligible for free and reduced lunch missed significantly ($t = 4.8, p = .001$) more days from school when compared to students not eligible for free or reduced lunch.

Multiple studies examining determinants of chronic absenteeism revealed several factors that associate with student absenteeism. One study found that children from larger families and of lower socioeconomic status faced increased odds of chronic absenteeism (Gottfried & Gee, 2017). Another study focusing on family risk factors (e.g. teenage mothers, mothers on welfare, and unemployed mothers) and chronic absenteeism revealed that children in families experiencing multiple risk factors sustain higher rates of absenteeism during their early school years than children without family risk factors (Jacobson, 2008).

Research Question 3

The third research question asks if there is an association between identified medical conditions (e.g. Asthma, Allergies, ADHD) with absenteeism and Body Mass Index. It was reported that students with medical conditions missed more days of school than students without medical conditions, however the difference was not significant. Students with a reported medical condition reported an average of 9.31 (SD = 7.75) of days missed throughout the school year whereas students without a medical condition missed an average of 8.85 (SD = 6.3). When examining absenteeism by specific medical conditions, it was found that students with asthma missed the most days averaging 10.12 (SD = 7.86). Students with ADHD missed on average 9.37 (SD = 10.9) days from school, and students with allergies missed an average 8.88 (SD = 7) days from school. When checking for significances between the groups, none was found. This suggests that there was no significant difference between students with and without medical conditions when comparing absentee records.

Other studies examining associations between absenteeism and medical conditions revealed similar results. For example, Palermo (2000) revealed that obesity, chronic illness, and chronic pain all appear to significantly predict higher levels of student absenteeism (Palermo, 2000). Taras and Potts-Datema (2005) reviewed literature related to chronic health conditions in children and found that attendance was negatively impacted in students with diabetes, sickle cell anemia, epilepsy, and other chronic illnesses. Roth-Isigkeit and colleagues (2005) conducted a large-scale study of children who experienced chronic pain. They determined that out of 749 elementary and secondary students in Ostholstein, Germany, 48% of participants in pain reported an increase in school absence. More than two-thirds of the participants also reported restrictions in daily living, which includes school attendance (Roth-Isigkeit et.al., 2005).

In regard to medical conditions and BMI, the study revealed students with medical conditions had significantly (t -score = 2.142, p = .033) higher BMI than students without medical conditions. Specifically, students without a recorded medical condition had an average BMI of 17.63 (SD = 3.36). Students with Asthma had the highest recorded average BMI of 19.05 (SD = 4.05); followed by students with allergies having an average BMI of 18.42 (SD = 3.78). Students with ADHD had the lowest average BMI of 17.31 (SD = 3.68).

Related research has reveal similar results. When examining BMI among children with asthma, it was revealed that females BMI development differed between children with and without asthma (Ekstrom, 2017). Females diagnosed with asthma had 2.33 times' (95% confidence interval: 1.21, 4.49) greater odds of having a BMI above the 85th percentile at age 15 or above than females without asthma (Ekstrom, 2017). The study reported, no clear associations between asthma and BMI were observed within males. The study concluded that asthma was associated with high BMI throughout childhood among females, however no association was

found within males (Ekstrom, 2017). Another study revealed that a high BMI in children age 7 is associated with an increased risk of asthma and sensitization to inhalant allergens (Magnusson, 2012).

One study examined ADHD as a risk factor for overweight and obesity in Dutch children determined that boys with ADHD between the ages of 10 - 17 years and girls between the ages of 10 - 12 years were more likely to be more overweight than children in the general population. Younger girls and female teenagers, however, reported to be at lower risk for being overweight than boys (Fliers, 2013). These findings were different than the current study, finding that students with ADHD had the lowest recorded BMI.

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