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THE ROLE OF PHYSICAL EDUCATION IN THE FIGHT AGAINST CHILDHOOD OBESITY

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ABSTRACT

Childhood obesity is a major health problem in the world, particularly in the United States. States' Childhood obesity rates range from 8.7% to 26.1% according to the National Survey of Children's Health (NSCH) (State of Obesity, 2019). This range of obesity rates suggest that there may be different variables that are making one state to have such different rates of childhood obesity than another. Physical activity has been identified by researchers as a modifiable risk factor for the development of obesity (Pietiläinen et al., 2008). There is a lack of research behind physical education's (PE) role in producing significant results in increasing physical activity and reducing obesity rates amongst pediatric populations. The purpose of this project was to examine the relationship between physical activity and obesity rates with physical education policy in each state. This study examined secondary data physical activity participation, obesity and overweight rates of high school students in each state from the Youth Risk Behavior Survey, as well as state physical education policy in each state from SHAPE. Findings indicated that the differences between the states were for the most part insignificant. There were some significant results that found that states with better quality PE had higher rates of obesity/overweight high school students and higher levels of high school students who reported not attaining adequate levels of physical activity. These findings contradicted the hypothesis. A significant finding that supported the hypothesis was that states with better PE policy has higher reported PE class attendance. Future research should be conducted to further understand physical education role in combating childhood obesity.

TABLE OF CONTENTS

LIST OF TABLES

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Chapter 1 Introduction

Background

Many people would consider that each generation of people, generally, have become healthier due to the continuous development of modern medicine. Diseases have become more treatable, and people presume their kids are living in cleaner and safer environments. Even though medical science has continued to improve, there is one health issue that has become increasingly prevalent in new generations. Obesity is a disease that can cause an array of health problems to be more likely to develop and/or more severe, such as, high blood pressure, type 2 diabetes, coronary heart disease, cancer stroke, and mental health diseases (Budd, 2008). Obesity is defined as a Body Mass Index (BMI) at or above the 95th percentile of the Centers for Disease Control and Prevention's standards (CDC), and although it is affecting all age groups, childhood obesity may be the most alarming component of the health crisis (Budd, 2008). According to the CDC (2015-2016), 13.7 million children between the ages of 2-19 are considered to be obese (CDC, 2018). This is an18.5% of that population (CDC, 2018). This, compounded with the fact that the problem is trending in an increasingly dire direction, calls for immediate action from the medical community. The National Health and Nutrition Examination Society has found that from 1980 to 2008, the prevalence of obesity has increased for all pediatric ages (CDC, 2018). The prevalence of obesity for the 2-5-year-old, 6-11-year-old, and 12-19-year-old populations have gone from 5% to 10%, 6.5% to 19.6%, and 5% to 18% respevtively (CDC, 2018).

These statistics have prompted the Healthy People 2010 report to name obesity the number one health problem facing the human population (CDC, 2018). The cause of the

epidemic is very much linked to an increase in sedentary lifestyles and increased caloric intake. Ecological Systems Theory points out how factors that include parent feeding patterns, nutritional knowledge of the parents, and genetic factors lead to the development of an increase in a sedentary lifestyle and poor dieting in pediatric populations, which can lead to the development of obesity (States of Obesity, 2019). Other more environmental factors that are less related to actions by the parents of the children are school environment characteristics (structured time for activity, dietary quality of school meals, etc.) and other access to recreational facilities (State of Obesity, 2019).

Another aspect to the childhood obesity epidemic is that the severity of the problem varies depending on the part of the country. Childhood obesity rates range from 8.7% to 26.1% in different states around the country, according to the National Survey of Children's Health (NSCH) (State of Obesity, 2019). This raises the question whether there are different factors in different states that are leading to the discrepancies. One area that has the potential to vary in each is the school environment relating to dietary factors and activity levels. States have the potential to have varying policies pertaining things like meal requirements and physical education program requirements.

According to a Shape of the Nation report, the requirements pertaining to physical education vary widely by state (Shape, 2016). There are variations in policy pertaining to funding, minute per week requirements, graduation requirements, substitutions/waivers, curriculum, accountability, and assessment from state to state (Shape, 2016). These differences in policy apply to all levels of education from elementary, through middle, and up to high school (Shape, 2016). The fact that there is no federal law that addresses any physical education standards, or applies any federal directives directed toward PE programs, may have played a role

in the unfolding of such wide range of strategies pertaining to physical education programs across the country (Shape, 2016).

Variation in childhood obesity rates, as well as physical education program standards across the country, raise the question whether there is a connection between the two. Could it be possible that the quality of physical education in each state is having a effect on the development of childhood obesity.

Purpose

The purpose of this project is to analyze both obesity rates and physical education policy in each state, in order to be able to draw comparisons between the two. This will provide insight on if PE policy is having any effects in combating childhood obesity and discrepancies in physical activity.

Hypothesis

It is hypothesized that in states where physical education quality is higher, the childhood obesity rates will be lower and the physical activity levels will be higher.

Chapter 2 Literature Review

Prevalence of Obesity in the United States

According to the most recent data, 18.5% (13.7 million) of children in the United States between the ages of 2 and 19 are classified as obese (CDC, 2018). More specifically, 13.9% of 2-5-year-olds, 18.4% of 6-11-year-olds, and 20.6% of 12-19-year-olds are in this category (CDC, 2018). Hispanics at 25.8%, and non-Hispanics blacks at 22% are more extremely affected (CDC, 2018). Non-Hispanic white children have an obesity rate of 14.1%, while non-Hispanic Asian children are the least impacted by obesity with a rate of 11% (CDC, 2018).

The classification of obesity for children is determined by the Center for Disease Control's sex-specific Body Mass Index (BMI)-for-age growth chart (CDC, 2018. A child is considered obese if he or she falls at or above the 95th percentile (CDC, 2018). The child is considered overweight if falling between the 85th and 95th percentiles (CDC, 2018).

The challenge facing the United States, concerning obesity, have intensified throughout that last quarter century. The National Health and Nutrition Examination Society has found that from 1980 to 2008, the prevalence of obesity has increased for all pediatric ages (CDC, 2018). Among 2-5-year-olds the prevalence has increased from 5% to 10% (CDC, 2018). Among 6-11-year-olds, the obesity prevalence has increased from 6.5% to 19.6% (CDC, 2018). And then finally among 12-19-year-olds, the prevalence of obesity has increased from 5% to 18% (Karnik & Kanekar, 2012). These trends are even more concerning when examining low socioeconomic populations. Obesity rates increase as the head of the household's education decreases (CDC, 2018). The obesity rates by income class have been collected as follows: low-18.9%, middle-19.9%, high-10.9% (CDC, 2018). Data from the WIC programs have shown that obesity rates

are specifically high, and has displayed increases within the last twenty years, for children between the ages of 2 and 4 that come from low income homes (CDC, 2018). From 2000-2010, the obesity rates went from 14% among 2-4-year-olds in the WIC program, to 15.9% (CDC, 2018). More recent data has shown that there have been improvements to this population, with rates decreasing in 45 states during the years of 2010 and 2014 (CDC, 2018).

Adult Obesity

Adult populations are even more impacted by the epidemic of obesity. Seven states have obesity rates at or above 35%, and twenty-nine states have obesity rates at or above 30% (State of Obesity, 2019). The states' adult obesity rates range from 22.6% (Colorado) to 38.1% (West Virginia) (Shape, 2016). Recently most states' obesity rates have remained constant, but four states, Iowa, Massachusetts, Oklahoma, and Rhode Island have experienced increases within the last five years (State of Obesity, 2019).

Effects of Obesity

Obesity is a health issue that can lead to countless deadly health problems. Obesity is associated with chronic health conditions such as, type-2 diabetes, high blood pressure, heart disease, stroke, sleep apnea, metabolic syndrome, fatty liver disease, osteoporosis, gallbladder diseases, cancers, kidney disease, and pregnancy complications, among other serious health conditions (CDC, 2017). By analyzing the regional statistics of these obesity related diseases and adult obesity rates, connections can made between childhood obesity and the development of these chronic adult conditions.

Type-2 diabetes affects 40% of the population in the United States, which encompasses over 100 million people nationwide (State of Obesity, 2019). These statistics include prediabetic patients. West Virginia is the state with the highest rate of type-2 diabetes, with a rate of 15.2% (Shape, 2016). Other states, such as Kentucky, Tennessee, and Arkansas experience diabetic rates that rank 7th (12.9%), 6th (13.1%), and 9th (12.2%), respectively (State of Obesity, 2019). These states also yield some of the most concerning obesity rates among high school students, which could suggest that obesity in childhood may play a role in the development of future obesity related chronic illnesses.

According to the Youth Risk Behavior Surveillance System, it is reported that 14.8% of high school students (grades 9-12) are obese, while 15.6% are overweight (State of Obesity, 2019). The states' obesity rates range from 9.5% (Colorado) to 21.7% (Arkansas) (State of Obesity, 2019). Other states that report the highest number of obese high school aged adolescents are Arkansas (21.7%, highest percentage among the states), Kentucky (20.2%), and Tennessee (20.5%) (State of Obesity, 2019). When considering that high school obesity rates are highest in states that have the most cases of type-2 diabetes, and see higher rates of obesity in adults, addressing the health of high schoolers can be considered as an avenue to relieve health issues that develop later in life, like diabetes.

Diabetes is not the only health issue associated with obesity that yields data that exposes certain regions of the country, as particularly unhealthy. Hypertension, which effects a third of the country's population and is the leading cause of stroke, heart attack, and kidney failure, is most prevalent in many similar states as diabetes is (State of Obesity, 2019). Obesity is responsible for 30% of hypertension diagnoses (State of Obesity, 2019). Obesity is especially attributable for being a leading cause of hypertension in men over 45 (State of Obesity, 2019).

Researchers have found that 60% of this population's hypertension diagnoses is caused by obesity (State of Obesity, 2019). West Virginia, having the 4th highest obesity rate among high schoolers, the highest rate of adult obesity, and the highest rate of diabetes, also has a hypertension health crisis (State of Obesity, 2019). West Virginia ranks first in highest hypertension rate at 43.5% (State of Obesity, 2019). Kentucky, Tennessee, and Arkansas follow West Virginia at 5th (39.4%), 7th (38.7%), and 3rd (41.3%), respectively (State of Obesity, 2019). It is worth noting, that the states with the lowest rates of hypertension is Utah (24.5%) at the top, and Colorado (25.9%) a close runner-up (State of Obesity, 2019). Colorado and Utah are both have one of the top three lowest high school obesity rates in the country (State of Obesity, 2019).

Physical Activity and Obesity

Physical activity is heavily linked to obesity, especially childhood obesity. Researchers have identified physical inactivity as both a cause and effect of obesity (Pietiläinen et al., 2008). Physical activity is referred to as a modifiable risk factor for obesity, along with other obesity associated health conditions (diabetes, hypertension, osteoporosis, cardiovascular disease) (Pietiläinen et al., 2008). The U.S. Department of Health and Human Services establishes guidelines for physical activity (Hootman, 2009). For adults, it is suggested to participate in at least 150 minutes a week of moderate intensity physical activity or 75 minutes of vigorous intensity physical activity (Hootman, 2009). An alternative to this would be to attain an equivalent combination of the two (Hootman, 2009). Muscle-strengthening exercise should be achieved at least two times per week (Hootman, 2009). Only 51.7% of adults reach the aerobic guidelines for physical activity (State of Obesity, 2019).

It is advised that children and adolescents attain 60 minutes of physical activity a day (Hootman, 2009). The majority of the daily physical activity should be moderate or vigorous in intensity, and the vigorous intensity should be incorporated into physical activity on at least three days of each week (Hootman, 2009). For people under 18, muscle-strengthening and bone-strengthening exercise should be incorporated into the 60 minutes at least three days per week (Hootman, 2009). These guidelines were first released in 2008 and then updated in 2018 by the U.S. Department of Health and Human Services (Hootman, 2009). Research has found that physical activity can improve various aspects of health in children and adolescents, including cardiovascular, respiratory, bones, muscles, and help control weight (US Department of HHS, 2008). The improved health of adolescents from adequate amounts of physical activity has then been shown to help reduce risk of developing chronic diseases into adulthood (US Department of HHS, 2008). These chronic health issues include heart disease, some cancers, type-2 diabetes, hypertension, osteoporosis, and obesity (US Department of HHS).

The recommendations for physical activity is clear and the research is strong in the case of physical activity being a form of medicine that can ward off many chronic diseases, but there are still significant disparities in physical activity, especially among adolescents and children. The majority of children ages 6-19-years-old do not attain the recommended levels of physical activity (National Physical Activity Plan Alliance, 2016). In 2016, 21.6% of this population attained the Department of Health's suggested amount of 'play' (National Physical Activity Plan Alliance, 2016). Large proportions of high school students in the U.S. do not participate in adequate amounts of physical activity or muscle-strengthening activities (Laura et al., 2015). Physical activity generally decreases with age, especially during the transition from adolescence to adulthood (Gordon-Larson, 2010) (Corder et al., 2017). It is also the case that less physical

activity during childhood leads to less physical activity as an adult (Corder, et al., 2017). The low levels of childhood physical activity could partially account for the high levels of physical inactivity occurring all across the United States. Physical inactivity refers not attaining any physical activity other than reason relating to work (State of Obesity, 2019). Physical inactivity levels in states range from 34.4% in Kentucky to 19.5% in Colorado (State of Obesity, 2019). Other states that have some of the highest levels of physical inactivity are West Virginia 31.6%, Tennessee 30.6%, and Arkansas 32.5% (State of Obesity, 2019).

Not only does physical activity, during childhood and adulthood, help in improving people's general health and decreasing risk of chronic illnesses, it also can decrease healthcare costs (Carlson, Fulton, Pratt, Yang, & Adams, 2015). Healthcare is a major aspect of the United States economy, with the 17.9% of the GDP being committed to healthcare (CMMS, 2018). Yearly, $3.5 trillion dollars are spent on healthcare in the United States, and that would mean on average every person spends $10,736 on healthcare (CMMS, 2018). Deficiencies in reaching the recommended levels of physical activity plays a large part in the high healthcare expenditures in this country (Carlson et al., 2015). It is estimated that 11.1% of all healthcare expenditures are due to physical inactivity in adults (Carlson et al., 2015). It has also been found that individuals who are active on average spend 26.6% less on healthcare costs than non-active people do (Carlson et al., 2015).

Increasing Physical Activity

Despite the overwhelming evidence of the benefits of physical activity on an individual's health and well-being, there is still a concerning lack of physical activity being accomplished by the majority of the people in this country. Some reasons people sight for not attaining adequate

levels of physical activity are that exercising is not convenient, that exercise is not enjoyable, and that they do not feel supported by their family/friend's community (Thiel, 2018). Some reasons for these poor attitudes toward physical education are due to changes in lifestyles and community/institutional barriers (Thiel, 2018). Fitness centers, parks, or other resources are not within convenient proximities to the majorities of families (Healthy People 2020, 2018). Four out of five homes do not have a park or fitness/recreation center within a half-mile radius (Healthy People 2020, 2018). There is also an increase in childhood sedentary behavior due to an increase in screen time (Thiel, 2018). Over seven and a half hours per day are spent watching TV, the computer, etc., for the average child (Rideout, Foehr, & Roberts, 2010). Instead of being physically active outside, a third of high school students spend three or more hours on a school day playing video/computer games (CDC, 2011).

The next step in addressing this discrepancy in physical activity is to find ways that would motivate people, especially children to move. Interventions intended to increase physical activity in populations can come in the form of policy, better access to recreational facilities, better education on the benefits of physical activity, point-of-decision prompts, infrastructure that promotes physical activity (sidewalks, centralized and appealing stairwells, etc.), and improved physical education programs in schools (Thiel, 2018).

One of the most obvious interventions that would have a direct impact on young populations is physical education programs. This intervention is intertwined with policy on a national, state, and local level. It can be theorized that physical education can possibly be an effective tool for improving childhood health because of access it has to nearly the entire pediatric population. Studies have found that physical education does increase moderate-vigorous levels of physical activity (Community Prevention Services Task Force, 2017). Not

only can physical education increase physical activity in children, it can have a mutualistic relationship with the academic goals of schools. Physical activity has been found improve cognitive brain development and improve concentration (Shape, 2016). Physically active student has been found to perform better academically than less physically active peers (Shape, 2016). Studies regarding recess have shown that physical activity has helped students improve their behavior and concentration in class (Shape, 2016).

Physical Education

Physical education is a relatively common characteristic of any child's education, and it has been a part of school's curriculum for many decades. Physical education programs not only needs to be present in school, they need to effective in actually providing opportunity to engage in meaningful exercise and instill these healthy habits of physical activity into students, so they carry over into extracurricular time and beyond (Shape, 2016). Organizers have developed the Comprehensive School Physical Activity that highlights areas of focus that can best ensure children's school experience instills practices and values of physical activity into students' lives (CDC, 2014). The model (CSPAP) includes physical education, physical activity before and after school, physical activity during school, family and community engagement, and staff involvement (CDC, 2014). A quality physical education includes components that address all the aspects of the CSPAP model. Children involved in quality physical education increase their physical activity levels outside of school, and continue the habit of exercise into adulthood (Le Masurier & Corbin, 2006). In order to have a significant and lasting impact on the health of children, physical activity programs need to be supported fiscally and institutionally (Shape, 2016).

Policy, environment, curriculum, instruction, and accountability all are components that go into fostering a successful PE program (Shape, 2016). Obviously, an adequate amount of a child's time should be spending in PE class. It is suggested that 150 min/week and 225 mins/week should be set aside for PE class for elementary and middle/high school students respectively (Shape, 2016). The teachers should aim to keep their students achieving moderate vigorous activity for at least 50% of class time (Shape, 2016). School should require all students to partake in physical education class, and they should not allow waivers or substitutions (Shape, 2016). In order to ensure an effective environment, school districts are encouraged avoid allowing PE class to become oversized, and to make sure the classes taught by qualified educators that are certified/licensed at the state level (Shape, 2016).

Stakeholders encourages that curriculum should be standardized at the state or even national levels (Shape, 2016). Currently, there is no federal law in the United States that pertains to any physical education requirements (State of Obesity, 2019). The responsibility therefore falls on the state legislatures to provide curriculum that not involves proper physical activity components, but also a written component (Shape, 2016). Shape organizers believe there should be some sort of standard for review and redesign of the PE programs across a given state or the country (Shape, 2016). Students should be assessed and graded based on written assessments, and students' fitness should also be assessed and discussed/monitored in conjunction with the student and his or her parent/guardian (Shape, 2016). PE teachers should be involved in evaluating student learning and activity. These evaluations should be included in the assessment of the educator (Shape, 2016).

As previously stated, there are no federal laws pertaining to physical education standards (State of Obesity, 2019). This means that there is a wide array of physical education standards

state by state. The largest majority of states require some sort of physical education program (Shape, 2016). Eighty-six percent of states require physical education in elementary school, where 80.4% and 90.2% of states require PE in middle schools and high school, respectively (Shape, 2016). As for time requirements, only 37.3% of states have time requirements for elementary school. Even fewer elementary states require the recommended 150 minutes per week (Shape, 2016). As for middle and high school, 29.4% and 12% of states have time requirements respectively (Shape, 2016). No state meets the standard for physical activity per week for high school PE (Shape, 2016). State legislature for high school PE across the country sees that 76.5% of states require students to attain physical education for credit before they graduate (Shape, 2016). Amount of credit needed to graduate ranges from 0.5 credits to 2 credits in all states (Shape, 2016).

As for state funding allocated for physical education, 58.3% of states receive general funding, 29.2% of states receive school district appropriation, Colorado is the only state to receive a 'special' appropriation funding, 10.4% of states receive 'other' types of funding for PE (Shape, 2016). The mean PE budget per school, per year is $764 (Shape, 2016).

The importance of physical activity on the health of children and adults are well documented. Physical activity in adolescence can also be a preventative measure for reducing the risk of the development of chronic adult diseases such as, heart disease, hypertension, and type 2 diabetes (Committee on Physical Activity and Physical Education in the School Environment, 2013). The correlation between the direct effects of physical education on the health outcomes of children is less defined (Pate, Mitchell, Byun, & Dowda, 2011). Physical education is a unique being that it has the potential to provide opportunity for all children to participate in physical activity. Since physical activity is identified a practical way to reach such a large population of

youth in order to initiate physical activity, it has the potential to be a driving force in improving obesity rates and decreasing the risk of associated diseases (Committee on Physical Activity and Physical Education in the School Environment, 2013).

Some studies have suggested that there are direct effects from physical education on the health of the school-aged population (Committee on Physical Activity and Physical Education in the School Environment, 2013). Researchers have found that students tend to be more physically active on days when they are involved in physical education class (Morgan, Beighle, & Pangrazi, 2007). Physical education may not only be having a compulsory effect on the initiation of physical activity, it may be motivating children to institute more physical activity into their daily routines. As previously stated, quality physical education has the potential to instill value in physical activity in school-aged children, so that they can lead more physically fit lives outside of school (CDC, 2014). The kind of quality education that is most likely to be successful in leading to these outcomes is summarized in the Comprehensive School Physical Activity model (CDC, 2014). Most importantly, physical education has been found to have the greatest effects of obese/overweight children or children who have homes where physical activity is most inconvenient (NASPE, 2012).

Despite there being no laws in place at the national level providing standards for physical education programs in schools, Michelle Obama' Let's Move initiative helped schools develop quality physical education programs (Committee on Physical Activity and Physical Education in the School Environment, 2013). The goal of the initiative is to have schools at all levels model their physical education programs off the Comprehensive School Physical Activity Program (Committee on Physical Activity and Physical Education in the School Environment, 2013). This model has been discussed previously multiple time, and has been showed to lead to some of the

most promising fitness outcomes for pediatric population, relating to physical education (CDC, 2014). The focus of this program model is to "provide a variety of school-based physical activity opportunities that enable all students to participate in at least 60 minutes of moderate-to-vigorous physical activity each day" and to "provide coordination among the CSPAP components to maximize understanding, application, and practice of the knowledge and skills learned in physical education so that all students will be fully physically educated and well-equipped for a lifetime of physical activity" (AAHPERD, 2012).

With this initiative being introduced in 2010, it is essential to analyze the effects that it has had on the health of school populations. Since it is not a mandatory initiative, determining if states whose physical education programs most closely resemble this model has observed the better health than states that have not instituted these practices is worthwhile. The lack of there being a national standard for physical education programs, and the wide degree of variability in obesity levels and other related health conditions in each state, it would be valuable to see if there is a connection between quality physical education and obesity/overweight/ levels and physical activity levels. Further investigation is warranted to analyze if states with quality education being reflected in legislature are yielding quality physical education in practice. This study will attempt to shine light on the effects quality physical education may or may not have on childhood health outcomes relating to obesity and physical activity.

Chapter 3 Methods

Design:

This study collected data on physical activity participation, obesity and overweight rates of high school students in each state, as well as state physical education policy in each state. This data was collected from secondary sources.

Measures:

Behavioral and Health Outcomes:

Data on students' physical activity levels and physical education class attendance were also collected. The student obesity and overweight data, as well as the students' physical activity levels and PE class attendance was obtained through the Youth Risk Behavior Surveillance System (YRBSS). The YRBSS is a database through the U.S. Department of Health and Human Services' Centers for Disease Control and Prevention. Youth Risk Behavior Surveillance System: Ongoing surveys, which are conducted biannually, were sent out nationally to representative samples of highs school students. Representative samples were attained by using a three-stage cluster sample design. The first stage included 1,257 primary sampling units (PSUs). Out of these PSUs, "54 were sampled with probability proportional to overall school enrollment size for the PSU." The second stage consisted of secondary sampling units (SSUs). These were characterized as being a school containing grades 9-12 or a created school via combining local schools to include grades 9-12. The 54 PSUs were used to sample 162 SSUs. These SSUs sampled according to probability proportional to school enrollment size. The 162 SSUs represented 192 actual schools. The third stage used random sampling of for grades 9-12. Students in one or two required subject area classes (ex: English) or students in a required class

(ex: homeroom) were sampled. The following data was collected for each state through the YRBSS database:

1. Percentage of High School Students Overweight
2. Percentage of High School Students Obese
3. Percentage of High School students who were not physically active at least 60 min/day on 5 or more days/week
4. Percentage of High School students who did not go to PE 1 or more days/week

- Variables one and two were added together to form one variable for the study.

Physical Education Policies:

The state physical education policy was collected through Shape of America's 2016 Shape of the Nation study. Physical education supervisors of the Department of Education were surveyed from each state (including the district of Colombia). They were surveyed about their states' requirements for physical education in grades K-12. The report also conducted a legal analysis using the Public Health Law Center and the State School Health Policy Matrix 2.0. The state physical education policy data determined the quality of physical education that was being taught in each state. Each state was given a quality rating based on physical education policy data collected from the Shape the Nation Study. These results from the secondary source (Shape the Nation) were then used to create two indexes that were used for the study. These indexes established a score for each state for each of the following categories. The rating was calculated by adding up the number of 'yeses' to each of the PE policies (See Table I). Each equaled one point. The score was a summation of each point. The higher the score for each rating indicated the higher quality physical education credited to that state.

Index 1: Categorized Index:

Table I. Policies by category

Basic PE Requirement Rating (range 0-3)	PE Time Requirement Rating (range 0-3)	Bad PE Rating (range 0-4)	PE Quality Rating (range 0-6)
○ Does the state require elementary students to take physical education? ○ Does the state require middle school/junior high school students to take physical education? ○ Does the state require high school students to take physical education and/or to earn physical education credit for graduation?	○ Does the state have a requirement for minutes/ week that elementary students must participate in physical education? ○ Does the state have a requirement for minutes/week that middle school/junior high students must participate in physical education? ○ Does the state have a requirement for minutes/ week that high school students must participate in physical education?	○ Does the state not permit schools/districts to apply for a waiver from the state physical education requirements and does not allow students to apply for an exemption from required physical education participation or credit? ○ Does the state not permit school districts or schools to allow students to substitute other activities for required physical education credit? ○ Does the state prohibit schools/districts from withholding physical activity as a punishment for students? ○ Does the state prohibit schools/districts from using physical activity as a form of punishment for students?	○ Does the state have additional funding available (beyond general education funding, special appropriation, or school district appropriations) for physical education programs? ○ Does the state have adopted standards for physical education? ○ Does the state require student assessment in physical education or student physical fitness assessment? ○ Does the state require physical education teachers to be state certified/licensed and endorsed to teach physical education at the elementary level? ○ Does the state require physical education teachers to be state certified/licensed and endorsed to teach physical education at the middle school/junior high level? ○ Does the state require physical education teachers to be state certified/licensed and endorsed to teach physical education at the high school level?

Index 2: Summary Index:

This index score was a summation of the scores from the Categorized Index that was divided into quality scores of Basic PE, PE Time, Bad PE, and PE quality (range 0-16). One score was assigned to each state. The scores were dichotomized in two different ways: 1) the states in the top 50% in physical education quality scores were compared to states in the bottom 50% in physical education quality scores and 2) the states in the top 25% were then compared to the states in the bottom 25%.

Analyses:

Each states' Behavioral and Health Outcomes were then compared to their respective PE Policy score. The groupings of states (top 50/bottom 50; top 25/bottom 25) were compared in terms of high school student obesity/overweight rates, percentages of high school students who were not physically active > 60 min/day on ≥ 5 days/week, and percentages of high school students who did not go to PE ≥ 1 days/week. The groups were compared using Statistical Package for Social Sciences (SPSS) version 23.0 software.

Chapter 4 Results

The findings in this results section were from data attained from two sources. The data on obesity/overweight rates, physical activity, and physical education attendance were taken from the YRBSS. Data on PE policy were attained from a report the Society of Health and Physical Educators' 2016 report Shape of the Nation.

YRBSS provided data from 47 states plus the District of Colombia for obesity/overweight and physical activity rates. There was no data from Minnesota, Oregon, or Washington, so data from these states is not reflected in the results for data on obesity/overweight and physical activity. The data from the 47 states plus the District of Colombia includes the most recent data collected from each state. This include data collected from 2013, 2015, and 2017. The average obesity rate from all of the states where data was collected was 14.49%. The average overweight rate was 15.77%. The rate used in the correlations was a combined rate of obesity and overweight, and this average amongst the states was 30.26%.

YRBSS provided data from 47 states plus the District of Colombia for rates of students who did not participate in physical activity for 60 minutes a day for at least 5 days/weeks. States with missing data and the years which states' data reflected the data attained for obesity/overweight rates are noted above. The average rate of students who did not participate in physical activity for 60 minutes a day for at least 5 days/weeks across all the states was 42.78%. YRBSS provided data from 42 states on rates of students who did not attend PE at least one day/week. No data was collected or included in this study from Minnesota, Oregon, Washington, Delaware, New Hampshire, North Dakoda, Ohio, Vermont, or the District of Colombia for this variable. The average rate of students who did not attend PE at least one day/week was 51.06%.

The data on PE policy attained from the Society of Health and Physical Educators' 2016 Shape of the Nation report included data from all 50 states plus the district of Colombia. PE policy data from all 50 states plus the District of Colombia was used to formulate the PE policy scores for all 50 state plus the District of Colombia in the following results. Out of all the states, 86.3%, 80.4%, and 90.2% of states required schools to provide PE in elementary, middle, and high schools respectively. 37.3%, 29.4%, and 12% of states require specific time requirements for students in elementary, middle, and high school respectively. Portions of the country permits substitutions for PE class (62% of states), and 29.4% of states allow waivers from PE classes. As for assessment and accountability 32.7% of states assess students based on physical education standards, and 56.5% of states require that student PE results be sent home to the students' parents. Elementary, middle, and high schools are required to make sure that their PE teachers have an appropriate certification/licensure and endorsement to teach physical education in 71.4%, 87.8%, and 98% of states respectively.

Table II: High School Student Rates of Obesity/Overweight, Physical Activity, PE Attendance by Categorized Indices of State Physical Education Quality Scores

		PE Quality Scores															
		0		1		2		3		4		5		F	df	p	n
		M	SD	M	SD	M	SD	M	SD	M	SD	M	SD				
Basic PE (range 0-3)	Overweight/ obesity prevalence (%)	27.07	4.80	31.11	2.79	**27.33**	**3.12**	**30.90**	**4.08**					2.31	3, 44	.09	.14
	Students who were not physically active > 60 min/day on ≥ 5 days/week (%)	54.17	4.22	53.09	3.82	53.42	5.88	56.69	6.19					1.28	3, 44	.29	.08
	Did not go to PE ≥ 1 days/week (%)	58.00	4.73	**60.69**	**10.04**	53.45	5.49	**46.57**	**15.65**					2.66	3, 38	.06	.17
PE time (range 0-3)	Overweight/ obesity prevalence (%)	**29.44**	**3.66**	**30.00**	**3.63**	**34.12**	**3.26**	**27.85**	**3.55**					4.62	3, 44	.007	.24
	Students who were not physically active > 60 min/day on ≥ 5	**53.97**	**3.97**	**55.08**	**6.37**	**61.10**	**7.77**	**53.98**	**4.99**					4.40	3, 44	.009	.23

	days/week (%)														
	Did not go to PE ≥ 1 days/week (%)	**53.64**	**11.79**	**53.23**	**10.74**	**55.09**	**4.65**	**24.63**	**18.77**				7.71	3, 38	<.001	.38
Bad PE (range 0-4)	Overweight/ obesity prevalence (%)	31.12	3.59	28.86	3.93	31.45	4.21	27.43	3.92	31.75	4.31		1.53	4, 43	.21	.12
	Students who were not physically active > 60 min/day on ≥ 5 days/week (%)	**54.72**	**4.91**	**52.56**	**4.31**	**57.81**	**5.33**	57.23	5.41	**65.25**	**13.08**		3.60	4, 43	.01	.25
	Did not go to PE ≥ 1 days/week (%)	51.73	12.62	48.06	16.07	55.59	8.59	48.08	26.41	39.80	.		0.57	4, 37	.69	.06
PE quality (range 0-6)	Overweight/ obesity prevalence (%)	31.20	.	29.67	6.01	27.78	4.86	31.11	3.88	30.37	3.32	31.06	3.68	0.84	5, 42	.53	.09
	Students who were not physically active > 60 min/day on ≥ 5	58.60	.	51.10	5.41	54.55	5.87	55.44	6.12	54.57	3.22	58.61	7.73	1.05	5, 42	.40	.11

days/week (%)															
Did not go to PE ≥ 1 days/week (%)	57.40	.	50.77	6.05	51.69	9.08	50.59	18.50	48.98	17.15	53.39	10.56	0.11	5, 36	.99	.02

Note: PE= Physical Education, M= Mean, SD= Standard Deviation, Bolded Values= Significance

Table II shows the results of t-tests that examined differences in states' rates of obesity/overweight for high school students, high school students who were not physically active > 60 min/day on ≥ 5 days/week, and high school students who did not go to PE ≥ 1 days/week by physical education policy scores.

Basic PE scores

When comparing Basic PE scores and rates of obesity/overweight, states that scored a 2 (M= 27.33 ± 3.11) in Basic PE quality, had a significantly lower percentage of high school students who were either obese or overweight, than states that scored a 3 (M= 30.9 ± 4.08) (F= 2.31, p= 0.04). This was the only significant difference between groups for Basic PE scores and obesity/overweight rates. There was also no apparent trend between increasing Basic PE score and obesity/overweight rates. Mean state obesity/overweight rates were relatively similar across Basic PE scores.

There were no significant differences found between states when comparing the states' Basic PE score and the states' mean rates of students who were not physically active > 60 min/day on ≥ 5 days/week. Rates of students who were not physically active > 60 min/day on ≥ 5 days/week were relatively similar, but the highest rate was found in states that had the highest score for Basic PE quality, though this finding was not statistically significant.

When comparing Basic PE scores and the rates of students who did not go to PE ≥ 1 days/week, states that scored a 1 (M= 60.68 ± 10.03) in Basic PE quality, had a significantly higher percentage of high school students who reported not attending PE at least one day per week, than states that scored a 3 (M= 46.56 ± 15.64) (F= 2.66, p=0.01). Overall, the rate of students who did not go to PE ≥ 1 days/week decreased as Basic PE score increased, though this trend was not significant.

PE Time

When comparing PE Time scores and obesity/overweight rates, states that scored a 0 (M= 29.44 ± 3.66) in PE Time quality, had a significantly lower percentage of high school students who were either obese or overweight, than states that scored a 2 (M= 34.12 ± 3.26) (F= 4.62, p= .001). It was also found that states that scored a 1 (M= 30.00 ± 3.63) in PE Time quality, had a significantly lower percentage of high school students who were either obese or overweight, than states that scored a 2 (M= 34.12 ± 3.26) (F= 4.62, p=.034), whereas states that scored a 2 (M=34.12 ± 3.26) in PE Time quality, had a significantly higher percentage of high school students who were either obese or overweight, than states that scored a 3 (M=27.85 ± 3.55) (F=4.62, p=.006). Obesity/overweight rates trended upwards as PE Time score increased from 0 to 2, but states that scored the high in PE Time (3) had the lowest obesity/overweight rate, though this finding was not significant.

When comparing PE Time scores and rates of students who were not physically active > 60 min/day on ≥ 5 days/week, states that scored a 0 (M=53.97 ± 3.97) in PE time quality, had a significantly lower percentage of high school students who reported not attaining proper levels of physical activity, than states that scored a 2 (M=61.10 ± 7.77) (F=4.40, p=.001). It was also found that states that scored a 1 (M=55.08 ± 6.37) in PE time quality, had a significantly lower percentage of high school students who reported not attaining proper levels of physical activity, than states that scored a 2 (M= 61.10 ± 7.77) (F=4.40, p=.034), whereas states that scored a 2 (M=61.10 ± 7.77) in PE time quality, had a significantly higher percentage of high school students who reported not attaining proper levels of physical activity, than states that scored a 3 (M=53.98 ± 4.99) (F=4.40, p=.028). The rate of students who were not physically active > 60 min/day on ≥ 5 days/week increased as PE Time scores went from 0 to 2, but states that scored a

3 in PE Time saw the rate drop to almost equal to states that scored a 0 in PE Time, though this finding was not significant.

When comparing PE Time scores and rates of students who did not go to PE ≥ 1 days/week, states that scored a 0 (M=53.64 ± 11.79) in PE Time score, had a significantly higher percentage of high school students who reported not attending PE at least one day per week, than states that scored a 3 (M=24.63 ± 18.77) (F=7.71, p=.000). It was also found that states that scored a 1 (M=53.23 ± 10.74) in PE Time score had a significantly higher percentage of high school students who reported not attending PE at least one day per week, than states that scored a 3 (M=24.63 ± 18.77) (F=7.71, p=.000), whereas states that scored a 2 (M=55.09 ± 4.65) in PE Time score had a significantly higher percentage of high school students who reported not attending PE at least one day per week, than states that scored a 3 (M=24.63 ± 18.77) (F=7.71, p=.000). The rate of students who did not go to PE ≥ 1 days/week remained relatively constant for states that scored a PE Time score of 0 to 2, but states that scored a 3 in PE Time saw a drastic decrease in the rate of students who did not go to PE ≥ 1 days/week. The rate was cut in half. This finding was not significant.

Bad PE

There were significant differences between categories of states' Bad PE quality scores and their obesity/overweight rates. There rates fluctuated with no apparent pattern or trend.

When comparing Bad PE scores and rates of students who were not physically active > 60 min/day on ≥ 5 days/week, states that scored a 0 (M=54.72 ± 4.91) in Bad PE quality, had a significantly lower percentage of high school students who reported not attaining proper levels of physical activity, than states that scored a 4 (M=65.25 ± 13.08) (F=3.60, p=.010). It was also found that states that scored a 4 (M=65.25 ± 13.08) in Bad PE quality, had a significantly higher

percentage of high school students who reported not attaining proper levels of physical activity, than states that scored a 1 (M=52.56 ± 4.31) (F=3.60, p=.002), whereas states that scored a 2 (M=57.81 ± 5.33) in Bad PE quality, had a significantly higher percentage of high school students who reported not attaining proper levels of physical activity, than states that scored a 1 (M=52.56 ± 4.31) (F=3.60, p=.016). The percentage of students who were not physically active > 60 min/day on ≥ 5 days/week generally increased in states as the Bad PE scores increased, though this finding was not significant.

There were no significant differences between categories of states' Bad PE quality scores and their rates of students who did not go to PE ≥ 1 days/week. There was no apparent pattern, but states with the highest Bad PE score had the lowest rate of students who did not go to PE ≥ 1 days/week, though this finding was not significant.

PE Quality

There were no significant differences between categories of states' PE Quality scores and their rates of obesity/overweight among high school students. There no apparent pattern, as the mean rates of obesity/overweight among high school students were relatively similar.

There was no significant differences between categories of states' PE Quality scores and their rates of students who were not physically active > 60 min/day on ≥ 5 days/week. There is no apparent pattern in this set of data.

There were no significant differences between categories of states' PE Quality scores and their rates of students who did not go to PE ≥ 1 days/week. The rates of students who Did not go to PE ≥ 1 days/week stays relatively similar in states with PE Quality scores from 1 to 6, but states with the lowest PE Quality score (0) had states with the highest mean rates of students who did not go to PE ≥ 1 days/week, though this finding was not significant.

Summary Index

Table III: High School Student Rates of Obesity/Overweight, Physical Activity, PE Attendance by Summary Index of State Physical Education Quality

	Low		High			
	M	SD	M	SD	p	η2
Bottom Half (n=25) vs. Top Half (n=23) PE Policy Score						
Overweight/obesity prevalence (%)	29.50	3.92	31.07	3.95	.17	.04
Students who were not physically active > 60 min/day on ≥ 5 days/week (%)	**53.22**	**4.54**	**57.87**	**6.06**	**.004**	.17
Did not go to PE ≥ 1 days/week (%)	53.10	11.71	48.33	16.83	.28	.03
Bottom Quarter (n=12) vs. Top Quarter (n=11) PE Policy Score						
Overweight/obesity prevalence (%)	29.63	4.665	31.61	4.731	.32	.05
Students who were not physically active > 60 min/day on ≥ 5 days/week (%)	**52.81**	**4.069**	**59.43**	**7.221**	**.012**	.26
Did not go to PE ≥ 1 days/week (%)	**56.33**	**8.329**	**41.77**	**19.26**	**.04**	.20

Note: M=Mean, SD=Standard Deviation, Bolded=Significant Data

Table III shows the results of t-tests analysis that examined differences between states which had a given summary physical education policy index and those given states' rates of obesity/overweight for high school students, high school students who were not physically active > 60 min/day on ≥ 5 days/week, and high school students who did not go to PE ≥ 1 days/week.

When comparing the states in the bottom half of PE quality to the top half in terms of obesity/overweight rates, the top half (M=31.07 ± 3.95) had a mean obesity rate that was higher than the bottom half (M=29.50 ± 3.92). This difference was not significant (t=-1.39, p=0.17). When comparing the states in the bottom half of PE quality to the top half in terms of students who were not physically active > 60 min/day on ≥ 5 days/week, the top half (M=57.87 ± 6.06) had a mean rate that was higher than the bottom half (M=53.22 ± 4.54). This difference was significant (t=-3.02, p=0.004). When comparing the states in the bottom half of PE quality to the

top half in terms of students who did not go to PE ≥ 1 days/week, the top half (M=48.33 ± 16.83) had a mean rate that was lower than the bottom half (M=53.10 ± 11.71). This difference was not significant (t=1.08, p=0.29).

When comparing the states in the bottom quartile of PE quality to the top quartile in terms of obesity/overweight rates, the top quartile (M=31.61 ± 4.73) had a mean obesity rate that was higher than the bottom quartile (M=29.633 ± 4.67). This difference was not significant (t=-1.01, p=0.33). When comparing the states in the bottom quartile of PE quality to the top in terms of students who were not physically active > 60 min/day on ≥ 5 days/week, the top quartile (M=59.43 ± 7.22) had a mean rate that was higher than the bottom half (M=52.81 ± 4.07). This difference was significant (t=-2.74, p=0.01). When comparing the states in the bottom quartile of PE quality to the top quartile in terms of students who did not go to PE ≥ 1 days/week, the top quartile (M=41.77 ± 19.26) had a mean rate that was lower than the bottom quartile (M=56.33 ± 8.33). This difference was significant (t=2.37, p=0.03).

Chapter 5 Discussion

The purpose of this research was to analyze the relationship between states' physical education policy and their obesity/overweight rates, physical activity rates, and physical education participation rates of high school students. Based on prior research, it was hypothesized that states with better quality physical education, based on the scoring of physical education policy, would have better rates relating to obesity/overweight, physical activity, and physical education participation.

The results from the current study both supported and contradicted the hypothesis. There were also several analyses that were not statistically significant. Overall, there was very little significant findings when comparing state's PE quality to their obesity/overweight rates. Out of the findings that were significant, the majority indicated that states with better PE quality had higher obesity/overweight rates which contradicted the hypothesis. The significant results concerning a state's PE quality and their levels of physical activity also contradicted the hypothesis. The data yielded results that indicated that states with better PE quality had lower levels of physical activity. The only finding that was statistically significant and supported the hypothesis was the comparisons between states' PE quality and their physical education class attendance. The results indicated that states better PE had higher rates of PE attendance.

The finding that states with better PE practices had higher rates of obesity/overweight is interesting considering that physical activity has been found to decrease the likelihood of becoming obese (US Department of HHS, 2008). There have even been studies that have found that children who experience quality physical education partake in higher levels of physical activity (Le Masurier & Corbin, 2006). The findings in the current study contradict the trends

noted in past research findings. Reasoning for these findings could be that there are other factors, other than physical education quality, that are affecting rates of childhood obesity. Researchers have identified poor diets, increases in sedentary lifestyles, genetics, and access to recreational facilities as factors affecting the rates of obesity in pediatric populations (State of Obesity, 2019). Another possible explanation for this finding is that the study did not take into account socio-economic status of the populations in each state. Some states have more low-income populations than others, and it has been found that students coming from low socioeconomic backgrounds are more likely to be obese (Rogers et al., 2015).

Another interesting finding from the study was how some states with higher quality PE had significantly higher levels students who reported not partaking in physical activity. This contradicts the hypothesis that stated how it would be expected that higher quality PE in states would give rise to higher levels of physical activity among students. Similar to the finding that states with higher quality PE saw higher levels of obesity, this could be due to the fact that socioeconomic levels of the school populations were not taken into consideration. It has been found that low socioeconomic populations tend to be more obese which is linked to lower levels of physical activity (Rogers et al., 2015). This finding can also indicate that variables other than PE practices are playing a role in varying levels of physical activity like genetics, rises in sedentary lifestyle culture, and access to recreational facilities (State of Obesity, 2019).

The one set of findings that supported the hypothesis was that states with higher quality PE had lower levels of students who reported not attending PE at least one day/week. Considering some of the policy points that went into the PE policy score was related to PE class time requirements, PE requirements for students, and whether not PE waivers or substitutions are allowed, one would expect that students would be attending PE more often in states where

students have more strict PE attendance requirements than in states with more lenient PE attendance. This finding does not indicate much along the lines of what are the affects of higher quality PE, it reinforces that the state-level PE policies are actually being carried out in schools. This helps answer the question of whether or not stricter PE attendance standards are actually getting students to attend more PE. The results of this study would suggest that states with higher quality PE, which includes more strict PE attendance standards, are seeing higher PE class attendance rates.

Problems with this study could have been related to the fact that the rates of obesity/overweight, physical activity, and physical education was self-reported by high school students, conducted by the CDC via the Youth Risk Behavior Surveillance System. This could result in response bias, where students give answers that are inaccurate based on what they presume to be socially acceptable. The problem of response bias could have also been relevant in the accumulation of data by the Shape the Nation study, where the data concerning state physical education quality was collected from. Physical education supervisors from the states' respective Departments of Education were surveyed about their requirements for physical education K-12. Wanting their state to be viewed in a positive light, relating to dedication to PE standard, could have led to inaccurate or exaggerated reports of physical education quality. The quality of physical education was also examined via a legal analysis of Public Health Law Center and State School Health Policy Matrix 2.0. This could have mitigated the inaccuracies of the self-report surveys. Another limitation of this study was that not all states provided YRBSS with data on their obesity/overweight, physical activity, and physical education attendance rates of their population. YRBSS did not have obesity/overweight, physical activity, or physical education attendance rate information for Oregon, Washington, and Minnesota. YRBSS also did not have

physical education rate information for Delaware, New Hampshire, North Dakoda, Ohio, Vermont, or the District of Colombia. This deficiency took away from the thoroughness of the study.

The purpose of this study was to examine both the student reported rates of obesity/overweight, physical activity, and PE attendance, and the PE policy in each state. Comparisons were made between the two categories of data in order to determine if there are any relations between the quality of PE policy in a state, and that states' rates of health outcomes stated above. The findings were mixed in whether they supported, contradicted, or were inconclusive in relation to the hypothesis. Based on previous research, it was hypothesized that states with better PE policy would have lower levels of obesity/overweight rates, lower levels of students who report not attaining adequate levels of physical activity, and lower levels of students who report not attending PE at least once/week. The statistically significant data points for obesity/overweight and physical activity rates suggested states with high quality of physical education has higher levels of obesity/overweight in children and higher levels of students who do not attain adequate levels of physical activity. As stated above, these results are most likely affected by a wide range of variables that would be confounding to this study. States with higher quality PE were found to have lower rates of students who did not attend PE at least once/week. This is a positive result for stakeholders who want to see PE policy being effectively turned into practice. It is possible, based on this data, that stronger PE policy is able to get more students to participate in physical education.

Even though this study did not support the notion that physical education can improve levels of physical activity and obesity amongst student populations, research has shown that physical education can have positive health benefits for children (Le Masurier & Corbin, 2006).

The deficiencies in research surrounding this topic, along with the wide range of obesity and physical activity in different states across the country, call for more research to be conducted on this topic (State of Obesity, 2019). Not only should the differences in physical education be further analyzed, other state to state differences (income levels, access to recreational facilities, etc.) should be studied in the context of improving physical activity related childhood health outcomes.

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ACADEMIC VITA-MATTHEW LYONS

EDUCATION

Penn State University-University Park
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HONORS/ AWARDS

- Dean's List
- Schreyer Honors College

LEADERSHIP

- American College of Healthcare Administrators (2016 Philadelphia, PA)
- Fundraising Chair – Thon Operations Committee Sophomore year
- Fundraising Chair – Thon Communications Committee Junior year
- Sleep Shift Officer – Thon Communications Committee Junior year
- Crew Member EMT for University Ambulance Service-mentored new volunteers

EMS

- Certified EMT via Commonwealth of Pennsylvania Department of Health Bureau of Emergency Medical Services – Cert # 230550
- Basic Life Support (CPR and AED) Certified – American Heart Association
- Paid Crew Member EMT for University Ambulance Service (August 2018-Present)
- Volunteer EMT for University Ambulance Service (Fall 2017-August 2018)

PHILANTHROPY

- Thon 2017 – Operations Committee Member
- Thon 2018 – Communications Committee Member
- Volunteered at city Soup Kitchen with Student Leadership group
- Volunteered/ served meals VISIONS-homeless with Church group
- Alter Server with Church and School
- Volunteered with Habitat for Humanity

WORK EXPERIENCE

- University Ambulance Service – Volunteer/Paid EMT
- Emergency Room Doctor Shadowing-Dr. Botti at Mount Nittany Medical Center
- Wegmans - Cashier/ Customer Service – Summer 2014-Present
- Hub Dining at Penn State – Food Server, Preparer, and Runner – August 2015-May 2017
- IM Sports Official – November 2017-Present
- Personal Trainer Shadowing at One On One Fitness in State College, PA

Research Experience

- Motor Control Lab in the Department of Kinesiology-Helping with experiments and shadowing
- Honors Thesis-The Role of Physical Education in the Fight Against Childhood Obesity

EXTRACURRICULAR ACTIVITIES/CLUBS

- Kinesiology Club
- Pre-Medical Society
- Undergraduate Research Society
- Club Soccer-Freshman year
- Club Golf-Freshman year
- Health Policy Administration Club-Freshman year
- American College of Healthcare Administrators