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Research-Based Methods that Decrease and Prevent Childhood Obesity in the School Environment

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RESEARCH-BASED METHODS THAT DECREASE AND PREVENT CHILDHOOD OBESITY IN THE SCHOOL ENVIRONMENT

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ABSTRACT

Childhood obesity is a growing trend that shows no signs of slowing. Society has turned to the schools to provide programming to help alleviate this growing problem without considering the constraints schools face when implementing interventions. Many programs have been implemented to decrease the body mass index in students, but the data suggests that most have been unsuccessful. Many different factors play a role in creating healthy lifestyle habits in children including counseling and psychology programs, the overall school-health environment, health instruction, physical education, food service, health promotion programs for staff, health services, and integrated programs within the community (Khan et al., 2009). Schools have the opportunity to implement nutritional programs that offer healthier food options for breakfast and lunch, but are often limited by budget. Schools may look towards competitive food sales for additional income while failing to consider the health implications of serving sugar-sweetened beverages and other unhealthy food choices. This thesis explores the different intervention methods used in schools related to decreasing the Body Mass Index (BMI) in students with the attempt to prevent childhood obesity.

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CHAPTER I: INTRODUCTION

Background Information

Obesity is becoming a major public health issue in the United States. Over the past 20 years, the number of adolescent children who are overweight has increased from five to fourteen percent (Naumark-Sztainer, Story, Hannan, & Rex, 2003). This statistic is concerning as there are many long-term, negative effects caused by obesity. There are various lifestyle changes that contribute to obesity, such as an increase in the consumption of energy-dense foods and a decrease in physical activity (Warren, Henry, Lightowler, Bradshaw, & Perwaiz, 2003). It has been proven that preventing these negative lifestyle changes is more effective and less expensive than treating a person who is already considered obese (Warren et al., 2003). Educating children about healthy lifestyle choices and implementing preventative measures could assist in decreasing the rate of obesity among adolescents.

Based on the current research, it seems more could be done in the schools to help minimize the effects of obesity. Teaching practices have previously focused on promoting healthy eating and decreasing a person's cardiovascular risk, rather than focusing on the prevention of obesity (Warren et al., 2003). The schools have an opportunity to provide healthy food choices for their students, increase physical education, increase nutrition and health education, and teach other innovative ways of incorporating healthy lifestyle habits.

Historical Context

Dietary guidelines dictate the food that is being served and influence eating habits for millions of children. These guidelines are mandated by federal programs such as The Healthy,

Hunger-Free Kids Act of 2010, which was enacted to update nutritional standards for The National School Lunch Program (NSLP). These guidelines were initially put in place to help address the growing rates of obesity in US children. Many of the changes included increasing the amounts of fruits and vegetables, whole grain, and low-fat or fat-free milk. The changes also targeted decreasing total fat, saturated fat, and sodium levels (Hawkins et al., 2018).

The United States Department of Agriculture (USDA) has set guidelines for school meals and reimburses schools for following the guidelines. Ninety-nine percent of all public schools and 83 percent of all private schools participate in the program in order to be reimbursed for their meals. Schools have been required to meet these guidelines since 1995, yet more than 75% of schools do not meet the guidelines for fat content (Leviton, 2008). The guidelines set forth are optimistic, but follow through is required to ensure that the guidelines are being met.

Incident Data

In the United States, over 90% of children consume too much sodium, which can cause high blood pressure, leading to an increased likelihood of heart disease and stroke later in life (Hawkins et al., 2018). Knowing this information can help determine the levels of sodium that should be present in the food served in the schools. Many children eat two meals and a snack per day at school, which provides an opportunity to lower the amount of sodium served to students.

Following the guidelines set forth by the USDA is an important part in decreasing the access children have to unhealthy food choices, but schools have turned toward the use of competitive food sales to make up for short-comings in the budget. A study by Anderson,

Butcher, and Levine (2003) found that a ten percent increase in junk food sales is equal to a one percent increase in student body mass index.

Schools are continuously looking for creative ways to find additional funding and competitive food sales have provided steady revenue for them. Forty three percent of elementary schools, seventy four percent of middle schools, and ninety eight percent of high schools participate in competitive food sales, while eighty one percent of schools sell sugar sweetened beverages (Leviton, 2008). Schools are being compensated for the sales of competitive foods, but at what cost to the health of the students?

Obesity has become an increasingly important issue over the past thirty years. Mansfield and Savaiano (2017) explained that obesity rates have increased over 200 percent in US children, and 400 percent in adolescents in the past three decades. Today, more than one third of children are overweight or obese. Addressing childhood obesity is crucial to minimizing the negative effects it can cause later in life.

Current Societal Issues and Trends

Sugar sweetened beverages are becoming an increasingly large issue. They are aggressively targeted towards youth and make up eleven percent of their daily calories. Sugar sweetened beverages are the main source of added sugar in children's diets (Wang, Lemon, Clausen, Whyte, & Rosal, 2016). The recent increase of sales and consumption of sugar sweetened beverages in the schools has created negative effects on the health of the youth.

Schools are continuously seeking additional revenue to support the rising costs of providing education. The USDA reimburses schools for the cost of food, but it was found that

the USDA only reimbursed fifty one percent of the cost of a meal to the schools (Johnston, O'Malley, Delva, Bachman, & Schulenberg, 2005), requiring schools to make up for the cost of the meals in other ways.

In more recent years, schools have been putting an emphasis on science, technology, engineering, art, and math (STEAM) fields. This shift in focus has led to fewer students participating in physical education programs. Fifty percent of elementary-aged students, twenty five percent of eighth graders, and five percent of twelfth graders are required to take a physical education class (Leviton, 2008). The trend of focusing on the STEAM areas could lead to less rigorous physical education and health programs.

Leviton (2008) argued that small, but consistent changes lead to prevention. The likelihood of decreasing childhood obesity increases when children are provided ample opportunities to consume healthy food and to be physically active. Schools tend to put less emphasis on physical activity and healthy eating, meaning the likelihood of decreasing childhood obesity is less.

Risks Associated with Childhood Obesity

Correa-Burrows, Burrows, Orellana, and Ivanovic (2014) highlighted many correlations between food and the performance of the human body. It was found that an unhealthy diet in early childhood has shown a lasting association with intelligence, suggesting that eating a healthier diet could lead to a higher level of intelligence. There was also a correlation found between cognitive abilities and dietary patterns. These cognitive abilities included higher levels of verbal and non-verbal abilities in childhood. It has also been found that saturated fats and simple carbohydrates are shown to have impairments in the learning and memory process

(Correa-Burrows et al, 2014). Children who are overweight are at an increased risk for chronic disease and adult obesity later in life. Addressing childhood obesity could reduce the risk of chronic disease and increased health care costs later in life.

Thesis Questions

It appears that more could be done to help battle the obesity epidemic that is sweeping the nation. There are a considerable number of factors when it comes to obesity; the author will explore what the contributing factors to childhood obesity are and what schools can be doing to decrease these factors.

Therefore, this researcher will explore the following questions:

1) What are the contributing factors to childhood obesity, and what programs can schools implement to help decrease these factors?
2) What are the implications of school based nutrition programs, competitive food sales, and physical education?

Once those questions have been explored, the researcher will explore how schools in the United States are addressing childhood obesity and what programs have been found to have positive results.

3) The overarching question remains, is there evidence to show that school-based programs are effective in battling childhood obesity?

CHAPTER II: LITERATURE REVIEW

Overview of the Research Process

A review of the literature was conducted primarily through the search engine EBSCO Host using databases such as Academic Search Premier. Various combinations of the following key terms were used to locate quality, peer-reviewed articles on the subject: obesity, overweight, adolescence, schools, physical education, health education, national school lunch program, competitive food sales, and body mass index.

Nutrition Programs

Schools are the ideal location to implement nutrition programs as they provide a large portion of a child's daily food. Schools have the ability to implement policies and create supportive environments that encourage healthy eating habits. The National School Lunch Program served 31 million students during the 2012-2013 school year (Mansfield & Savaiano, 2017). Targeting the food that is being served in the schools could have an impact on the nutrition of students.

The Healthy, Hunger Free Kids Act (HHFKA) of 2010 provided legislation for the National School Lunch Program. The primary goal of the program was to meet the caloric intake goals for children (Hawkins et al., 2018). Mansfield and Savaiano (2017) described that the program included general guidelines for evaluation and reporting, the development of wellness policies, community engagement plans, and federal standards for "nutritional guidelines to promote student health and reduce childhood obesity for all foods available in each school district."

Vaudrin, Lloyd, Yedidia, Todd and Ohri-Vachaspati (2018) explained that the federal guidelines put in place called for more fruits, vegetables, whole grains, low-fat and fat-free milk, with a reduction in sodium, saturated fat, and total fat amounts. Modifying the school cafeteria environment can show improvements in healthy eating and quality of dietary intake in children. These modifications include serving meals that are less than thirty percent energy from fat, less than ten percent from saturated fat, twenty to thirty grams of fiber, and five fruits and vegetables a day (Hawkins et al., 2018). This program also included guidelines put in place for food and beverages that were being sold outside of the school lunch program.

Participation in the National School Lunch Program (NSLP) is key when attempting to implement healthy changes. The NSLP is offered at 94% of public and private schools in the United States (Ralston, Newman, Clauson, Guthrie, & Buzby, 2008). The School Nutrition and Dietary Assessment IV reports (Fox & Condon, 2012) that 63% of all students in NSLP public schools participated in the program. Students who were eligible for free meals participated at 79% and students who were eligible for reduced priced meals participated at 73%. Students that paid full price for lunch participated at a rate of 48%.

Multiple studies indicated that there were not significant changes in the amount of students participating in the NSLP after the implementation of the HHFKA. Vaudrin et al. (2018) discovered through the use of qualitative methods that consumption patterns had not changed significantly in the schools that participated in their study. Students had initially shown resistance to the changes in the food choices, but Mansfield and Savaiano (2017) found that there were no meaningful changes in National School Lunch Program participation under the

new regulations of HHFKA and the effects that the HHFKA had on school meal participation were minimal.

The federal guidelines were put in place with the goal of lowering the overall BMI of students. Gleason and Dodd (2009) discovered that school breakfast participation was found to be associated with significantly lower BMI. There was no evidence to show that participation in the NSLP had a relationship with the BMI of students.

Competitive Food Sales

The sale of competitive food in schools has been a long contested topic. Competitive foods sales describe foods that are for sale outside of the school's breakfast and lunch program, and were not subject to federal nutritional standards until more recently. Typically, the foods sold are high in sugar, fat, and salt. In 1983, the National Soft Drink Association won a lawsuit that limited the scope of USDA regulations to only food service areas during meal hours (Datar & Nicosia, 2012). In 2015, Smart Snack standards were put in place for food and beverages sold outside of school meal programs (Datar & Nicosia, 2016).

The availability of competitive food sales varies across different school settings. Fox and Condon (2012) found that as many as 97 percent of high schools and 82 percent of middle schools have vending machines, compared to 17 percent of elementary schools. Although these percentages may be staggering, a la carte lines are the main source of competitive food sales for many schools. Over 90 percent of middle and high schools offer a la carte choices, while 71 percent of elementary schools offer a la carte choices.

Many schools choose to offer these additional food choices outside of the national school breakfast and lunch programs to generate additional income. Elementary schools in the United States as a whole earn more than $442 million annually from competitive food sales (Stallings & Yaktin, 2007). Datar and Nacosa (2012) found that during the 2005-2006 school year, individual middle schools earned an average of nearly $11,000 from a la carte food options, while individual high schools earned an average of more than $15,000. In addition to the money earned through the sales of a la carte foods, schools also earn money from the vending machines, although the average amount earned varies depending on the school. A third of the schools earned up to $10,000 from vending machines sales alone. Older students are given more opportunities to purchase competitive foods, but elementary students are increasingly given the options to make these choices, as well.

The importance of providing funding to schools to minimize the use of competitive food sales as a source of additional income is glaring. The CDC's Nutrition, Physical Activity, and Obesity initiative provides funding to states to enact obesity-prevention legislation. States that received this funding were more likely to enact policies related to obesity prevention than states that did not receive this funding (Pelletier, Laska, MacLehose, Nelson, & Nanney, 2017). Marlow (2014) discovered that states with higher rates of obesity are more likely to enact policies surrounding obesity prevention programs, perhaps showing that states are motivated to enact policies if there is a widespread problem. Providing schools with the money required to enact obesity prevention programs with fidelity is crucial.

Other researchers have focused on whether collaborative relationships with multiple sources increase the likelihood that obesity prevention policies are put in place. Some of these

collaborative partnerships include organizations with a focus on advocacy and lobbying for legislation. There is an association between having multiple parties involved in the funding of programs and their resources to enact local policy change and implement programming (Hersey et al. 2012). Ensuring that multiple stakeholders are involved in the implementation of interventions is key to ensuring that the interventions have the support required to be implemented.

Offering competitive food options is associated with a decline in the nutritional quality of the food consumed while at school. Datar and Nicosia (2012) argued that the junk food purchased in schools is only a small caloric contribution to the amount of calories consumed by children, and that there was no evidence of more frequent consumption of soda and junk food by students due to the availability of competitive foods. Van Hook and Altman concluded that there was no evidence to prove that competitive food sales has an effect on BMI (2012). This is not to say that there was no effect on BMI, but that the researchers were unable to draw a conclusion. The authors discussed many influences that home and community have on eating habits and BMI, explaining that children have much more opportunity to engage in unhealthy eating when they are in an unstructured environment. The data concluded that socioeconomic status had no effect on the amount of competitive foods consumed, but the authors discussed that having less money creates less opportunities to purchase unhealthy foods, and that students who come from a low socioeconomic status are more likely to go to schools who have competitive food sales to help increase the school's revenue. Although the data was unable to draw conclusions, the authors discussed many factors that could have an effect on the data. On the other hand, Anderson and Butcher (2006) revealed that a ten percent increase in the

number of schools that offer junk food was correlated with a one percent increase in BMI. Additional research is required to draw a definitive conclusion.

Regardless of what the data may say, it seems that unhealthy food choices that are widely available in the schools contradicts the nutritional goals of the federally mandated breakfast and lunch programs (Sanchez-Vaznaugh, Sanchez, Baek, & Crawford, 2010). Ensuring that the food choices offered in the schools are both healthy and appealing could be the balance needed to have an effect on the food choices that students are allowed to make.

Physical Education Programs

As rates of obesity continue to rise, many are looking at schools to implement physical education programs as part of the solution. The National Center for Chronic Disease Prevention and Health Promotion (2011) recommends that elementary aged students are provided 150 minutes of physical education per week, and middle school and high school students are provided 225 minutes a week of physical education. Additional guidelines recommend that students receive daily physical education classes and that the students are active for at least half of the class time (Datar & Sturm, 2004). Research has found that 30-60 minutes per day of moderately intense activity can lead to a reduction in body fat percentage in overweight children (Leviton, 2008). Thoughtfully crafted physical education programs could help improve the amount of daily physical activity in which a student participates that could lead to a reduction in rates of obesity.

Taber et al. (2013) revealed that enacting stronger laws that outline physical education time requirements were positively associated with increased physical education attendance

and physical activity levels, especially among girls. They also discovered that the amount of female students that reported attending regular physical education classes was 22 percent higher in states that had physical education laws enacted. Putting legislation in place that supports the increase of physical activity in students is important. Even with the increase in physical education attendance and physical activity levels, researchers were unable to detect a significant effect on the BMI of the students. One explanation for this could be that the physical education classes are not providing rigorous enough physical activity opportunities. Creating programs where the physical activity is not only engaging, but also effective is key.

Despite these recommendations, researchers from the Division of Adolescent and School Health (2008) discovered that only 4 percent of elementary schools, eight percent of middle schools, and 2 percent of high schools provided daily physical education opportunities. Leviton (2008) also revealed that only half of elementary aged students are required to take physical education classes. This number falls to 25 percent by the time a student reaches the eighth grade, and only five percent of seniors in high school are required to take a physical education course. Regardless of the recommendations, schools typically fail to provide enough physical education opportunities to their students.

The Child Nutrition and WIC Reauthorization Act of 2004 indicated that schools were required to implement a wellness policy by the fall of 2006. The wellness policy was to include requirements for physical education, health education, and nutrition. As of 2005, over 50 percent of schools did not have a wellness policy in place (Leviton, 2008). Implementation of these policies is much harder in practice, as only $4 million was set aside to support this government mandate.

Physical education can play a large part in lowering obesity in overweight or at-risk overweight girls. The effect of physical education on heavier boys was smaller and there was no effect found in ethnic groups or other children. Measuring the effects of physical education on students can be difficult because the benefits of physical activity may be higher in children who are sedentary versus children who previously participated in some kind of physical activity. Currently, there is not sufficient data to draw a conclusion between enacting standards for physical education and a reduction in the BMI of the students participating in the physical education, but data suggested having standards in place is associated with an increase in attendance and the amount of physical activity participation while at school (Taber et al, 2013).

While it is important to focus on all students, there is concern that girls are at a higher risk for a decline in physical activity during adolescence (Manley et al., 1997). Title IX was a federal law that was passed in 1972 that made physical education classes coeducational to create equity. Many girls, however, are self-conscious about their physical appearance or physical abilities, so this law may have had unintended consequences on the activity level of adolescent females. Some researchers have utilized this data to determine the focus of their programs. New Moves (a female only high school physical education program) was implemented in hopes of increasing the amount and focus of physical education courses offered to female students (Neumark-Sztainer, Story, Hannan, & Rex, 2003). The researchers focused on a female-only intervention as there is strong societal pressure to be thin, which can create unhealthy eating patterns and weight-related issues later in life.

The majority of the females who participated in the study by Neumark-Sztainer (2003) and their team reported that the program assisted them in increasing their level of physical

activity, improved their eating habits, and increased their self-confidence. Parents also reported on the positive effects of the New Moves program. This research had a few limitations, such as the size of the population they studied, but it shows promise for further research on the topic of coeducational physical education programs and the positive impact it can have on the females who participate.

Along with females, students who come from urban communities are less likely to meet the weekly physical education recommendations. Children from certain racial or ethnic minority groups (more specifically, African Americans, Hispanic/Latinos, females, and those who have a lower socioeconomic status) are disproportionately more likely to be obese (Ogden et al., 2010). Implementing a physical education program for these groups of students was an area of focus for other research. The Kids N Fitness (KNF) Intervention was used by Wright, Giger, Norris, and Suro in 2012 to research whether it had an effect on daily physical activity behaviors among underserved children. Their results concluded that gender-focused health promotion programs were more effective in targeting lowering BMI. Regardless of gender, results showed that the program created improved health outcomes for high-risk students, both males and females (including increased daily physical activity and physical education class attendance).

Multifaceted Approach

The Child Nutrition and WIC Reauthorization Act of 2004 included a wellness mandate that required schools to implement a wellness policy that included physical education, health education, and nutrition policies. Khan et al. (2009) explained that there are eight different components that play a part in lowering obesity among adolescents. These eight components

include health services, counseling and psychology programs, school-health environment, health instruction, physical education, food service, health promotion programs for staff, and integrated programs within the community. These components are all school-based, and the interventions can be implemented during the students' school day. The Center for Disease Control (CDC) has recommended following this model, as focusing on programs that have a multifaceted approach may be the most effective way to tackle the obesity epidemic facing adolescents in the United States (Veugelers & Fitzgerald, 2005). Focusing on the treatment of obesity is typically more effective than focusing on tackling the problem of obesity prevention, especially when interventions are limited to the time a student spends at school.

The goal of many interventions is to modify behavior, so understanding the theories that the interventions are based on is important. Understanding basic behavior modification allows researchers to design interventions based on the outcomes they desire. Centeio et al. (2018) claimed that interventions should include at least two sources of influence to be most effective. The social ecological model for teaching is centered around the idea that a person makes choices based on the levels of influence around them, including relationships, the community, and society as a whole. The interventions based on this model rely heavily on how the individual's behavior impacts society as a whole.

Other intervention programs focused on delivering direct instruction, allowing the students to observe the behavior, and allowing them the opportunity to imitate the behavior. This is the foundation of social learning theory, and programs based on this theory are heavily dependent on reinforcement, both positive and negative. Programs based on this model allow

ample opportunities for students to model and imitate the learned behaviors with aspects of positive reinforcement.

Some of the interventions were modeled after the ideals of the social cognitive theory, which is similar to social learning theory, but highlights the importance of social and environmental factors. Interventions based off of this theory focused heavily on social influence and how positive and negative reinforcement is provided through social relationships.

Gortmaker et al. (1999) highlighted another way to teach a new skill is through direct instruction, then allowing the student to practice as a way to strengthen their perceived competence, all while providing them support. This method is based on behavior choice theory and the idea that the individual has control of their actions and all behavior is a choice. This theory stems from the idea that all humans have five basic needs including love, power, freedom, fun, and survival and all behavior is a way to get basic human needs met. Being aware of these theories can be helpful when determining the efficacy of intervention programs.

In 2003, there was a Children's Lifestyle and School Performance Study sent to students, parents, and school administrators of schools who participate in a program called The Annapolis Valley Health Promoting Schools Project. The goal of this program was to enable children to make healthy decisions about nutrition and physical activity on a daily basis. The survey collected data on body weight, diet, and physical activity. Veugelers & Fitzgerald (2005) then compiled the data to compare schools with and without the Annapolis Valley Health Promoting Schools Project. They assessed the quality of the dietary intake of the students (amount of fruits and vegetables consumed, percent of daily calories from fat, and a summary

of their diet) and the amount of physical and sedentary activities that the children participated in.

The researchers discovered that schools who had implemented this intervention program were more likely to have students that consumed more fruits and vegetables and consumed less calories from fat. They also discovered that students who participated in this program were more likely to participate in physical activities and less likely to participate in sedentary activities. They noted that there was no data to support the theory that providing healthy food options at school would lead to a healthier body weight in the students. They highlighted the importance of providing interventions based on the CDC's guidelines stating that interventions should include health services, counseling and psychology programs, school-health environment, health instruction, physical education, food service, health promotion programs for staff, and integrated programs within the community (Khan et al., 2009).

Programs based on a socio-economic framework that cover multiple places of influence are more likely to produce results. For example, interventions that targeted healthy eating, lifestyle changes, and family environment outcomes were more effective than interventions that targeted only one area of influence (Centeio et al., 2018). Research was conducted about an intervention program called Building Healthy Communities (BHC) that focused on six different components. These components were principal engagement, classroom nutrition lessons and breaks for physical activity, active recess, quality physical education, student leadership, and an after-school Healthy Kids Club. The authors concluded that the BHC is an effective program when it comes to decreasing the prevalence of obesity in children. It was suggested that the treatment group had a lower BMI over long term measurements, suggesting

weight stabilization among that group. This is a promising sign as weight stabilization can be a predictor for future health. The authors included different components of healthy eating and physical activity, such as including the school's administrative team, creating student leadership teams, and other innovative ideas. The inclusion of these different components is thought to play part in the success of the program. The authors suggested further research into each component to determine the role that each component might play.

Research surrounding obesity has shown that children are most likely to gain accelerated amounts of weight between the ages of 7 and 11 years old (Vogeltanz-Holm & Holm, 2018). Armed with this information, implementing policies and creating programs targeted towards elementary-aged children should be a priority. One intervention program called the Coordinated Approach to Child Health Program (CATCH) included components of nutrition services, physical education, classroom curricula, and parental involvement. This program was implemented for over 5,000 children and is one of the most rigorously evaluated obesity prevention programs. Vogeltanz-Holm and Holm (2018) aimed to implement this program to determine whether it had a different effect on white children when compared to Native American Children. They found there was a decrease in the BMI of white students, but no significant reduction in BMI among Native American children. Although there was no reduction in BMI, there was also no increase, suggesting that the program may have had some benefits. The authors suggested measuring indicators that lead to an increase in BMI (factors such as sleep, gross motor function, and other indicators), rather than just the level of BMI could reveal the true efficacy of the program.

The Active Programme Promoting Lifestyle Education in Schools (APPLES) Program is another multifaceted approach to tackling obesity in the schools. This program was created to target all children, rather than only the children who are already obese. The goal of this program was to create a connection between home, school, and the community. The school portion of the intervention included changes in policies, management style, and staff attitudes with the goal of creating consistency in communication of the central messaging. The lessons focused on influencing the behavior of students' dietary and physical activity choices, rather than merely educating them about the importance of these choices. The program included nutrition education, physical education, improved playground equipment, healthy lunches and snacks, competitions, and after-school activities.

The APPLES program successfully increased the amount of healthy eating, increased the amount of physical activity, and an increase in self-reported healthy behaviors (Sahota et al., 2001). The researchers suggested action steps that were impactful for the intervention included providing healthy meals and snacks, focusing on public health rather than children who are already at risk, and focusing on education and increasing the knowledge of the participants in hopes that they will utilize this information to make healthier choices. As with most interventions, the key to success is the quality of the programming and the fidelity in which it is implemented.

Be Smart is another multi-faceted program aimed at preventing obesity. Warren, Henry, Lightowler, Bradshaw, and Perwaiz (2003) determined that prevention is a less expensive, more feasible goal when compared to the treatment of obesity. Their goal was to influence life-style habits in elementary aged students, rather than merely lowering the BMI. Researchers

designed the interventions to change the behavior of the students while focusing on the whole-school environment and the wider community. This intervention provided healthy snack choices, non-competitive physical activity, incentive to reinforce desired behaviors, practical skills for applying the information presented, and working closely with the families. The intervention implemented included a nutrition program, a physical activity portion, a combined group that received both interventions.

Data collected revealed that there were no changes in the BMI of the students. Data also determined that fruit and vegetable consumption increased in the students, showing that the intervention had positive outcomes, even if it was not the desired outcome (lowering the BMI of the student body). Given sufficient duration of the intervention, along with adequate follow-up, data could show if the goals of the intervention were successful.

New Moves is another program aimed at lowering the BMI of female students. New Moves is a school based obesity prevention program for girls that attempts to address the unique needs of adolescent females. The researchers hoped to assess the feasibility of implementing and evaluating the New Moves physical education class within high schools, measure the satisfaction among girls, parents, and staff, gather recommendations for program modifications, and evaluate the short-term impact on a range of behavioral, personal, and socio-environmental variables. The program provided physical activity four times weekly, with additional nutrition classes provided to the participants covering topics to implement long-term changes in the eating habits.

The researchers found that the differences between the control and the intervention group were not statistically significant, and there was no difference in the BMI of the girls in the

control group versus the participants in the intervention group at the post-intervention or the eight week follow-up. Despite there being no significant changes in BMI, there were positive improvements made in daily habits of the participants. Participant interviews revealed that the girls saw a positive impact on their levels of physical activity, eating patterns and self-image (Flattum, Friend, Story, Neumark-Sztainer, 2011). Although not quantifiable data, the comments made during the interviews spoke highly of the New Moves program.

Planet Health is another program with a multifaceted approach to tackling obesity in children. This program focused on four main goals: reducing the amount of time spent watching television per day to two hours or less, increasing the amount of physical activity, decreasing the amount of high fat foods consumed, and increasing the amount of fruits and vegetables consumed to five or more per day. The lessons were taught in each core subject area, as well as physical education class, creating an interdisciplinary approach. This program was different from the others presented as they focused on the reduction of television viewing as a factor in decreasing obesity. Gortmaker et al. (1999) argued that including the reduction of television is important because it could inadvertently decrease the amount of sedentary time while increasing access to physical activity, which has been shown to decrease obesity. Food is the number one item advertised, so the authors hypothesized that minimizing television time could have an effect on eating habits as students would not be exposed to as much advertising for unhealthy foods choices.

Data collected about Planet Health indicated a lower prevalence of obesity in girls, but there were no significant changes in obesity in the boys. Both the males and females experienced a reduction in the amount of television that they watched daily. Females also

exhibited an increase in the amount of fruits and vegetables that they consumed. These results are promising, as these habits can be indicators of obesity in children.

Eat Well and Keep Moving is another school-based intervention with an interdisciplinary approach. The focus of this intervention was to provide a low-cost, sustainable program for schools that focused on behavioral changes in the areas of healthy eating, television viewing, and physical activity. The intervention is an interdisciplinary approach that incorporates the lessons into reading, math, science, social studies, and physical education classes. Like the Planet Health intervention program, the researchers who implemented the Eat Well and Keep Moving program noted the importance that television plays in regards to living a healthy lifestyle. They also recognized the importance of providing intervention options to implement in the home to create a stronger connection. The program included many lessons and activities that the children could utilize in their time outside of the classroom.

Eat Well and Keep Moving was an effective intervention to reduce the amount of television that the students watched (Gortmarker et al., 1999). The Program was also successful at improving dietary choices in the children. Data collected showed that the amounts of total energy from fat consumed were reduced, while the amount of fruits, vegetables, vitamin c, and dietary fiber increased. Portions of this intervention, such as the focus on the reduction of television viewing, and the lessons for students to use outside of the classroom were imperative to the success of this program.

Other researchers have focused their interventions on providing knowledge to students so they can be empowered to make healthy decisions. Healthy Schools is a program aimed at teaching behavioral skills so students are able to establish and maintain healthy eating habits.

This intervention, like most others, focused primarily on creating healthy diet and nutrition habits, increasing levels of physical activity, and creating a healthy environment. Unlike other interventions, this program also included an element on tobacco cessation. The program included a trained nutritionist that supported the implementation of a nutrition education program, with a focus on incentives for choosing healthy snacks. The program also included parental involvement, allowing the families to utilize the information obtained at school. The students were given lessons that provided hands on experience to teach the importance of making healthy choices. The program also required schools to implement 90 minutes per week of additional physical activity, as well as extra recess time.

The Healthy Schools program was successful in decreasing the BMI of male students, but not females (Kain et al., 2004). Students were also required to participate in a physical activity test, and the scores from this test increased in both genders after the intervention. Regardless of changes in BMI, the scores of the physical activity test indicate positive changes in the aerobic endurance of the students.

As the research shows, there is no right answer to how to tackle the problem of obesity in our children. Data collected tends to prove that providing interventions that include many different forms of influence are more effective than single-focus programs. Data also supported the interdisciplinary approach to interventions, indicating that programs should be implemented throughout the subject areas within a school. Lastly, creating a connection between the schools, the community, and families is imperative to the success of any intervention program.

CHAPTER III: DISCUSSION AND CONCLUSION

Summary

National and State legislation plays a large part in the foods served to students at school. The Healthy, Hunger Free Kids Act of 2010 provided legislation in hopes of limiting the amount of calories that students consume at school (Hawkins et al., 2018). This legislation provided guidelines for the National School Lunch Program, that serves more than 31 million school-aged children during the 2012-2013 school year (Mansfield & Savaiano, 2017). This wide-reaching program has the capabilities of impacting the eating habits of millions of children each year. Targeting legislation to ensure that the foods served in schools is lower in saturated and total fat, and sodium, while increasing the amounts of fruits, vegetables, and whole grain foods is key to improving the eating habits of children. Fox and Condon (2012) revealed that 63 percent of all students in public schools participated in the NSLP, highlighting the importance of targeting the food that is served to the students.

Access to unhealthy food choices in school is an issue of concern due to the increasing obesity problem. Competitive food sales have typically had a stronghold in middle or high schools, but there are an increasing number of elementary schools who have turned to competitive food sales as a source of income. Schools need to make up for shortfalls in the budget, so they turn to competitive food sales. While this can be a good source of additional income for schools, it has been found that it degrades the quality of the food consumed by students.

In regards to physical education programming and implementation, Taber et al. (2013) revealed that enacting stronger laws outlining physical education time requirements were

positively associated with increased physical education attendance and physical activity levels. Enacting laws that support the health and wellbeing of students appears to be an effective way to increase attendance. In order to have an effect on the BMI of the students, the physical education intervention programs that are implemented need to be considered carefully. Data was unable to make a correlation between participation in a physical education program and a decrease in the BMI of the students, which raises concern. Intervention programs should be crafted in a way that creates competitive opportunities for those who desire, while also providing equal opportunity to those who prefer a more casual approach to physical activity. Physical education programs need to be implemented with consistency and fidelity to ensure effective outcomes.

Much of the research argued that educating the general population to encourage healthier choices rather than focusing on students who are already obese is a more effective intervention (Sahota et al., 2001). Creating programs that focus on the entire student body rather than exclusively students who are already overweight is a more effective and less costly way to target the problem. Including the entire student population in the interventions also ensures that student's mental health and self-esteem is protected, as it could be detrimental to create an intervention group of only students who are overweight.

Programs that focus on multiple areas of intervention that create cohesive relationships between home, school, and the community are more effective than interventions that are implemented in one only environment (Kahn et al., 2009). The CDC recommends including health services, counseling and psychology programs, school-health environment, health instruction, physical education, food service, health promotion programs for staff, and

integrated programs within the community into the intervention to ensure that the skills and knowledge obtained at school are transferable and applicable in other settings (Kahn et al., 2009).

Personal Connection to the Topic

Throughout childhood, the author was always overweight. Her parents lacked the funds and the nutritional knowledge to provide the family with consistently healthy meals. She was involved in a few sports for the camaraderie, but was not fully aware of the benefits of daily exercise. Once she entered high school, her nutrition was severely lacking and her weight continued to increase until she weighed over 300 pounds. The author spent years of her life considered morbidly obese before she decided to make a change. Becoming informed about the importance of healthy nutrition and daily exercise and implementing huge changes in their own lifestyle lead the author on a weight loss journey of over one hundred pounds that is still continuing to this day. The author spent many of their high school days at the doctor's office attempting to determine why she continued to gain weight. None of the doctors suggested attempting to eat nutritiously for an extended period or introduce exercise into daily life, but rather they prescribed many drugs and tests to determine what was happening inside of the body. Had this author been taught about proper nutrition, the importance of exercise, and had access to healthier food options, she may have been able to prevent becoming obese, rather than working to undo the damage done to her body.

Due to the constant battle with being a healthy weight, and throughout researching the most maintainable ways to go about losing weight, the author came to a realization that a shift in the way that physical education and nutrition is presented in the schools could have a

positive outcome on the obesity rates of children. Therefore, this thesis writer chose to research and write about this topic to gain insight on what is currently being implemented, what strategies or programs have yielded positive outcomes, and how those programs can be implemented in the schools, where children spend the majority of their day.

Professional Application

Data shows that physical activity is positively associated with academic achievement. Providing this information to school administrators, legislators, lobbyists, and other stakeholders could increase the likelihood of physical education programs being implemented with integrity. Being a leader in my own community allows me to distribute this information in hopes that it will motivate decision makers to implement additional physical education programs.

Other researchers discovered that funding to implement obesity prevention programs increases the likelihood that programs are put in place (Hersey et al., 2012). Again, being a leader within the school and wider community allows for the distribution of this information, increasing the likelihood that prevention programs are put in place. Being an advocate for the health and wellness of students is paramount in the fight against the obesity epidemic.

The profession of teaching allows for contact with many students, family, and stakeholders who make decisions about the programming and interventions implemented in the schools. Priority needs to be put on the collection and distribution of data that supports healthy initiatives in the schools. Advocating for the implementation of programming that has a

focus on the health and wellbeing of students should be of concern to all who work in the school system.

The information obtained throughout the research process is imperative when convincing school administrators or lawmakers to make a change. Raising awareness about the issues surrounding childhood obesity, providing information about interventions that have shown success, and sharing the data through staff development opportunities is of utmost importance.

Limitations of the Research

There is a limit to what schools can do about the growing obesity problem. Funding is typically a barrier that schools face when it comes to implementing new or non-required programs. In fact, many schools are in the position of cutting additional programming due to funding, rather than adding new programs. Supporting schools through funding so they can afford to implement an all-encompassing BMI reduction program would help alleviate the budgetary issues, allowing schools to focus on the quality and fidelity of implementation of the program being put in place.

Many of the studies came to the conclusion that the programs implemented were not successful at lowering the BMI of students. While the data did not prove a reduction in BMI, many of the studies revealed a reduction of behaviors and markers that lead to obesity. Vogeltanz-Holm and Holm (2018) implemented a program that was successful in decreasing the consumption of fat and increasing knowledge and attitude towards healthy behavior, but the data showed no reduction of BMI. Measuring the factors that influence BMI could reveal the efficacy of a program, even if there was not a decrease in BMI observed.

Another limitation of the research is the length and schedule of the school day. Schools are typically required to provide instruction in the core areas, limiting the ability to implement additional curriculum due to time constraints. These time constraints often cause schools to cut additional programming, limiting time to provide physical activity while at school. While some school districts have made an effort to provide physical education classes, other districts have cut physical education programs altogether.

Schools are unable to control what the students are exposed to outside of the school day. Regardless of what food is consumed, how much information is presented, and the influence that schools can have on children, students return to their homes on nights and weekends where they are free to make their own choices. Many students are not making their own choices about the food they consume or the amount of physical activity they are exposed to outside of school, making it difficult to implement interventions through all environments. Another barrier to implementation is the socio-economic status of schools and families because they may lack the resources to implement the interventions.

Lastly, much of the research conducted about implementing school-based obesity programs were over ten years old. Obesity has become more of a concern over the past ten years and aging intervention programs may not be as effective as ones that utilize more recent methods. More recent research surrounding obesity prevention programs is necessary to determine new methods that may be effective.

There is a balance between providing interventions and support without labeling or stigmatizing children, or creating additional self-image or other weight-related issues later in life. Researchers who design interventions with goals surrounding BMI need to be conscious

about the providing mental health portion as part of their interventions. Programs with a focus on the entire student body that aim to implement healthy lifestyle choices are likely to be less controversial.

Implications for Future Research

Researchers highlighted the importance on focusing interventions on the prevention of obesity, rather than treatment of those who are already obese (Leviton, 2008). Creating interventions that focus on the whole student population rather than the students who already have an increased BMI may have an effect on students before they become obese. Future research could collect data to support the multi-faceted approach towards whole-group education and the effect it has on the BMI of the overall population.

Data has shown that community based and narrative based interventions have the potential to lower sugar-sweetened beverage consumption among children (Wang, Lemon, Clausen, Whyte, & Rosal, 2016). Knowing this information will allow researchers to develop interventions that are narrative based in order to have the greatest impact on the success of said intervention. Interventions that reach beyond the school and include community support, as well as family inclusion may be more successful at creating habits that help to lower BMI.

Typically, schools are underfunded and lack the monetary resources to implement new programs. Due to these budgetary shortfalls, many districts look for additional ways to increase their revenue. Additional research is needed to determine what effect having competitive food sales has on an overall budget, the financial consequences schools face when the food offerings are healthier than past options, and additional sources for funding that may not have a conflict of interest like providing unhealthy food options to students.

Funding from outside sources can be a highly contested topic when it comes to the education system. Many argue that accepting money from outside sources could create a conflict of interest. Additional research is needed to collect data on whether funding sources have an impact on the implementation of the programming.

Academic achievement is at the forefront of concern for schools. Often, physical education programs are some of the first to be eliminated. Having evidence that is backed by research could provide the data needed to ensure the implementation and fidelity of physical education programs, health education programs, and wellness policies. Previous research has also shown a correlation between the increase in physical activity and an increase in academic performance (Taber et al., 2013). Future research could highlight physical activity and the correlation with academic performance, collecting data to support the importance of implementing physical education programs with fidelity, rather than cutting these programs from the schools.

Datar and Sturm (2004) revealed that being a male, non-white child (more specifically, Latino), a child who has a mother with an education of a high school diploma or less, or a child who comes from a low-income family increases the likelihood of being overweight during elementary school. Kain et al. (2004) explained that increased urbanization and rising income levels can lead to increased amounts of fat consumption among children. Creating interventions that target these groups of students in future research might provide guidance on the best way to implement programs that would benefit groups of students who are at an increased risk of having a high BMI.

Gleason and Dodd (2009) conducted research to study the impact of participation in the school breakfast and lunch program. They discovered that school breakfast participation was found to be associated with significantly lower BMI, but there was no evidence to show that participation in the NSLP had a relationship with the BMI of students. Further research could be conducted to study what aspects of the school breakfast program make it successful in lowering BMI when compared to the lunch program. Perhaps focusing on measuring indicators for reduction of BMI rather than a reduction in BMI would reveal additional data to support the implementation of more robust breakfast and lunch programs in the schools.

There is a substantial amount of research surrounding schools and the role that they play in the fight against obesity. Additional research surrounding intervention programs and the effect they have on students is key to revealing the most successful ways to implement change. Future research is required in order for effective intervention programs to be created. Research should highlight the areas that have the greatest impact on the widest range of students while also considering the budgetary and time constraints that come with implementing a program within the schools.

Conclusion

There is a direct correlation between implementing a healthy diet and exercise routine and the academic success, mental health, and physical well-being of a child. With childhood and adult obesity on the rise in the United States, it is crucial to provide school age children with both the knowledge and opportunities to lead healthy lifestyles in their school environments that they can take with them into adulthood. Accessing these research based methods could support the decrease of childhood obesity in the school environment. A critical challenge that

schools face is implementing interventions with the limited amount of time, money, and support that they have. Ensuring that many stakeholders have the data that supports certain interventions so they can make informed decisions is imperative. Schools also need the funding required to implement additional interventions. The majority of the programs that target creating a healthy lifestyle in students require specialized staff members from the medical field or the community. They also require new curriculum, changes in food offerings, and opportunities for physical activity. If schools do not have healthy food choices in place, appropriate facilities for physical activity, or curriculum that supports healthy life choices, they are required to find money in the budget to support these changes. Schools are notorious for having budgetary shortfalls, so implementing an additional program that requires additional funding can be a barrier for some districts. As an educator, utilizing the data collected on the various interventions can be beneficial when supporting administrators and other stakeholders within the school community.

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