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Decreasing Physical Inactivity Among Adolescents

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This is to certify that the doctoral dissertation by

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Walden University
2021

Abstract

Decreasing Physical Inactivity Among Adolescents

by

Anthony Ware

MA, Kean University, 1998

BS, Virginia State University, 1974

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Health Psychology

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Abstract

Adolescents in the United States have become complacent about being involved in an adequate amount of physical activity and consuming a healthy diet. This has led to adolescents having health issues such as overweight status and obesity. The U.S. Department of Health and Human Services Centers for Disease Control and Prevention made recommendations for adolescents to maintain an adequate level of physical activity and to consume a healthy diet. In this study I hypothesized that students who were surveyed in the 2017 Youth Risk Behavior Survey who practiced both physical activity and healthy diet recommendations together would have a lower incidence of overweight status and obesity and report receiving higher grades during the past 12 months significantly more compared to students who practiced only physical activity recommendations alone or who practiced only healthy diet recommendations alone. I received results for the Chi-square analysis that were inconclusive for a sample of 191 students. In my report of the results that I received for a large sample of 14765 students I indicated my hypothesis was not supported for overweight status and obesity. My hypothesis was supported for the large sample of 14765 students for reporting higher grades during the past 12 months. Further research is warranted with composite scales which more clearly identify the variables in question. Information that I received from this study could be used for developing multicomponent invention for improving academic performance among high school students.

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Dedication

I dedicate this dissertation first to my Lord and Savior Jesus Christ who because of love has given me the strength to endure.

I dedicate this dissertation to my wife who has been a rock of support and encouragement and helped me to persevere.

I dedicate this dissertation to my oldest son who has given wisdom and encouragement, to my two younger sons and my daughters-in-law, to my sister and niece who helped me to never give up.

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Chapter 1: Introduction to the Study

Adolescents need to be involved in physical activity to maintain physical fitness and good health (Cheung et al., 2019). Current research has indicated that having a regular regimen of physical activity is a preventive measure for cardiovascular disease and obesity. Further, cognitive ability is also strengthened by physical activity (Hankonen et al., 2016). Although the United States Department of Health has recommended 60 minutes per day of moderate to vigorous physical activity (MVPA), a national survey completed in 2017 showed that only 26 % of adolescents in the United States met this requirement (Kann, McManus, Harris, et al., 2018)

Kann et al., (2018) contended that only 26 % of adolescents meeting the minimum requirement for physical activity (PA) is an indication that a considerable amount of youths are not reaping the benefits of adequate PA. For instance, health issues such as diabetes, obesity, and cardiovascular disease are occurring at an earlier age. To circumvent the early occurrence of health issues among adolescents, the Centers for Disease Control and Prevention (CDC) and its subdivision the Division of School and Adolescent Health (DASH) have been promoting initiatives to encourage adolescents to increase involvement in physical activity. My goal for this study was to compare the effects of certain intervention strategies used in multicomponent intervention programs implemented by school systems in the United States to reduce physical inactivity reduce the incidence of obesity/overweight status and support academic achievement among high school students in the United States.

Physical inactivity is one of the six health-risk behaviors that have been cited by the CDC as being associated with sickness, death, and social problems among adolescents and high school students (Kann et al., 2013). The CDC uses a surveillance system called the Youth Risk Behavior Surveillance System (YRBSS) to monitor the incidence of health risk behaviors among adolescents and high school students and track the progress of health initiatives implemented to improve the status of health profiles and support academic achievement among high school students. Kann et al. (2018) indicated that the CDC has developed a survey that is used as a tool within the YRBSS called the Youth Risk Behavior Survey (YRBS). This survey assesses the incidence of obesity and overweight status, the incidence of health risk behaviors, and academic performance among middle school and high school students. It also has questions about students' implementation of physical activity recommendations and healthy diet recommendations recommended as a part of health initiatives promoted by school systems. Students need an adequate amount of moderate to vigorous physical activity and a healthy diet to reduce the incidence of obesity and overweight status (Tucker & Lanningham-Foster, 2015).

The need to conduct the present study was evident in that in a survey taken in 2017 only 26% of high school students could respond that during the 7 seven days before the survey they met the recommended requirement for good health stipulated by the United States Department of Health (60 minutes per day of moderate to vigorous physical activity). Youths in the United States are also involved in the pandemic of obesity and other medical conditions that lead to sickness and early death (Smith et al. 2020). Further, Tucker and Lanningham-Foster (2015) indicated that 31.8 % (roughly one-third) of

school-age children have an unhealthy weight status which ranges from overweight (having a body mass index ranging from 25 to 29.9) to obese (having a body mass index above 30). Health agencies and school systems involved in initiatives to reduce health issues and support academic achievement among adolescents need to gain more insight into developing more effective intervention strategies. Although some progress has been made toward achieving goals that have been set by health initiatives such as Healthy People 2020, there is considerable room for improvement. More effective evidence-based interventions are needed.

The results of the present study may have the potential for positive social change in that the findings may yield valuable information about which pattern of implementing health recommendations is more effective for helping high schools to decrease the incidence of obesity and overweight status and maintain academic achievement. This information, in turn, could be used to develop evidence-based strategies that might help to reduce physical inactivity and the incidence of health issues among adolescents and also support academic achievement.

This chapter includes a discussion of the topic of physical inactivity among adolescents, the need for the study, and the social change that might be possible due to the findings of the study. The background section includes a discussion of the research literature related to the topic, the knowledge gap that is addressed, and the need for the study. The problem statement gives a summary of the evidence supporting the relevance to the current state of the field of health psychology. The problem statement is followed by a section entitled the purpose of the study where the problem that I addressed is

sufficiently connected to the focus of the study. In the research questions and hypotheses section I discuss and present the independent and dependent variables and the null hypothesis and the alternative hypothesis.

In the section entitled theoretical foundation I explain self-determination theory. I discuss the nature of the study including an explanation of the pertinent variables and a description of the methodology. I define the independent variables and dependent variables.

I clarify assumptions that I made in the study. I describe the research problem that I addressed in the study under scope and delimitations section. I also describe the limitations of the study in terms of design and/or methodological weakness. I explain the significance of the study in terms of how the study may help to advance psychological theory, advance the practice of health psychology, and promote positive social change such as a decreased incidence of overweight status and obesity among high school students.

Background of the Study

An increase in health problems among children age 6 - 18 such as obesity, Type II diabetes, and cardiovascular illness are due in part to physical inactivity (Koykka et al. 2019) A regular regimen of the required level of moderate to vigorous physical activity (as recommended by the United States Department of health) and a healthy diet are necessary to maintain of the optimum function of the cardiovascular, metabolic, muscle, and skeletal systems of the human body (Hallal et al. 2012). Also, researchers have determined that this combination of health practices stimulates the function of the brain

which in turn improves cognitive functioning (Pellicer-Chenoll et al. 2015; Lister et al. 2017).

As children are maturing and experiencing the stages of adolescence, they spend most of their time in school (Kriemler et al. 2011), making it a convenient and effective setting for implementing initiatives to increase physical activity behavior and thereby improve the status of health and fitness among adolescents (Dadaczynski & Vries, 2012). On the one hand, students need to be still to learn however, there is a point where sedentary behavior becomes detrimental to good health.

With the understanding that involvement in certain behaviors places students at risk for poor physical and mental health, poor academic achievement, and death, the Centers for Disease Control and Prevention (CDC) has encouraged school systems in the United States to implement initiatives to reduce targeted risky behaviors (Kann et al. 2017). Goals are set in these health initiatives which stipulate recommendations as to what the requirements of the United States Department of Health are for both physical activity and dietary practices for achieving good health and fitness while at the same time supporting academic achievement.

Over the years that school systems have been implementing these initiatives it has been found that advocating both physical activity recommendations for good health and dietary activities for good health has yielded good results (Sebire et al. 2018). There is a gap, however, in terms of understanding what adolescents need to do further to improve in fitness (in 2017 only 26% of adolescents responded as having met the requirement of the United States Department of Health for physical activity during the week before the

survey) and 30.4% of adolescents had a poor BMI status (as 14.8 % of adolescents are obese and 15.6 % are overweight). My goal for the present study was to help fill that gap by comparing the results of three different patterns that students followed when practicing the health measures recommended by the United States Department of Health (HHS): (a) practicing only recommendations for physical activity alone (b) practicing only healthy diet recommendations alone (c) practicing both recommendations for physical activity and recommendations for a healthy diet together. There was a need to complete this study as adolescents in the United States still have poor health profiles. The present study may provide more information for developing evidence-based interventions to address obesity, overweight status, and support academic performance.

Problem Statement

Donnelly and Lambourne (2011) noted increases that have occurred in the incidence of health issues such as obesity among adolescents. Cluss et al. (2016) included metabolic and cardiovascular problems among the health issues that have been occurring earlier in life. Hills, et al. (2015) noted that the rise in health issues among adolescents is due in part to less time being allotted for physical exercise at school and during leisure time. Janssen and Leblanc (2010) asserted that daily moderate to vigorous physical activity (MVPA) for 60 minutes will help adolescents to overcome issues with weight control, body composition, skeletal stability, metabolic problems, and cardiovascular issues.

The specific problem is that multicomponent invention strategy (promotion of activities and opportunities for increasing physical activity behavior and healthy diet

behavior) have been implemented by school systems in the United States to reduce health issues among high school schools but improvement in the area of risk factors such as physical activity has only been 26%. A gap exists in terms of understanding what students need to emphasize more when adhering to recommendations for health and fitness and mental acuity. In this study I provide information that may be instrumental in closing this gap. This information could be used to develop evidence-based intervention strategies for addressing obesity, overweight status, and academic performance.

Purpose of the Study

In this study I used a quantitative methodology to address the gap that was found relative to understanding what students need to change in terms of implementing recommendations for reducing the incidence of obesity and overweight status and supporting academic performance. In the present study, I determined the efficacy of three patterns used by high school students for following recommendations for reducing the incidence of obesity and overweight status and supporting academic achievements. The patterns were as follows: following a pattern of regularly following recommendations for physical activity and also recommendations for a healthy diet, practicing only recommendations for physical activity, and finally following only recommendations for a healthy diet. The independent variables were the physical activity and dietary behaviors high school students exhibited in response to the encouragement received through initiatives conducted by school systems in the United States to reduce the incidence of obesity and overweight status and support academic performance. The dependent

variables were obesity and overweight status and grades received by students over the past 12 months (as in *Mostly As, Mostly Bs, Mostly Cs, Mostly Ds, or Mostly Fs).*

The population sample was 14765 high school students in the United States that were involved in the national YRBS. I used secondary data records of the 2017 YRBS that was administered to high school students in the United States.

Research Questions and Hypotheses

Research Question 1 (RQ1):Was there a statistically significant difference in the incidence of obesity and overweight status among high school students in grades 9-12 depending upon the pattern that students used when practicing recommendations given by the CDC?

Null Hypothesis ($H_0 1$): When high school students followed a pattern of regularly practicing both physical activity recommendations and recommendations for a healthy diet together there was not a significantly lower incidence of overweight status and obesity compared to when students in grades 9 – 12 practiced only recommendations for physical activity alone or only recommendations for a healthy diet alone.

Alternative Hypothesis *($H_1 1$):* When high school students followed a pattern of regularly practicing both physical activity recommendations and recommendations for a healthy diet together there was a significantly lower incidence of overweight status and obesity compared to when students practiced only physical activity recommendations alone or when students practiced only health diet recommendations alone.

Research Question (RQ2): Was there a significant difference in high school students reporting that they received higher grades (as in Mostly A's, or Mostly B's)

depending upon the pattern students used when practicing recommendations by the CDC?

Null Hypothesis ($H_0 2$): High school students that practiced both physical activity recommendations and recommendations for a healthy diet together did not report receiving higher grades (as in Mostly A's or Mostly B's) during the past 12 months significantly more than students who only practiced recommendations for physical activity alone or only practiced recommendations for a healthy diet alone.

Alternative Hypothesis ($H_1 2$): High school students that practiced both physical activity recommendations and recommendations for a healthy diet together reported receiving higher grades (as in *Mostly As or Mostly Bs*) during the past 12 months significantly more than students who only practiced recommendations for physical activity alone or only practiced recommendations for a healthy diet alone.

Theoretical Foundation

Self-determination theory (SDT) is the foundation upon which I based this study. SDT is used in research as a basis for explaining how individuals can be motivated to become involved in life-changing behavior (Weigenberg et al. 2018). This theory is also frequently used in studies that involve evaluating the effectiveness of intervention strategies used by school systems to reduce the incidence of death, and health issues, and support academic achievement among high school students in the United States in Grades 9 - 12 (Seghers et al. 2014). Gonzalez et al. (2018) used SDT as a theoretical base to investigate the effects of a multidimensional intervention to increase physical activity in school among students that ranged in age from 14 – 17. Smith et al., (2014) used SDT to

develop effective strategies to encourage adolescents to increase physical activity behavior.

Other researchers such as Duncan et al. (2017) have used SDT to determine the effectiveness of interventions used to motivate children and adolescents to increase involvement in physical activity. Duncan et al. (2017) endeavored to understand what factors encouraged the adolescents and why the factors were encouraging. My objective for this study was understand which pattern of practicing recommendations given by the CDC was more efficacious to focus on when motivating high school students follow CDC guidelines. Therefore, SDT is well suited as the theoretical foundation for this study.

Nature of the Study

In this study I used quantitative methodology to compare different patterns high school students had when they practiced recommendations stipulated by the United States Department of Health for reducing the incidence of overweight status and obesity while at the same time supporting academic achievement among high school students. This study may provide information to develop more effective strategies to decrease health issues among high school students. I based the study on a positivist worldview. Creswell (2014) asserted that the postpositivists posit that all phenomena have causes and effects. In this study I investigated the effect of practicing both physical activity recommendations and healthy diet recommendation together, practicing only physical activity recommendation alone, and practicing only healthy diet recommendations alone.

Quantitative methodology was appropriate and effective for this study as I used closed-ended questionnaires for demographic information, for data that have been collected on level of physical activity, grades (received by students for school work such as *As*, *Bs*, *Cs*, *Ds*, *Fs*), obesity, overweight status, and dietary behavior (eating, fruit, salad, and vegetables).

Williams and Mummery (2015) used quantitative methodology to understand what intervention strategies are needed in programs developed to reduce the incidence of obesity among adolescents. The results indicated that intervention strategies should include opportunities and encouragement for involvement in healthy nutrition, sports, and physical activity. Williams and Mummery (2015) also, noted the importance of parental and community involvement. Similarly, I implemented a secondary data analysis of high school student's responses to a national survey about obesity and overweight status, physical activity behavior, dietary behavior, and academic performance. It would not have been appropriate to conduct a correlation study because I would not have been able to determine a cause for changes that occurred. I compared the different results that occurred in the dependent variables (overweight status, obesity, and academic performance) when high school students had different patterns of practicing the independent variables which were health recommendations for physical activity and diet. Qualitative methodology with a mixed-method design was not be appropriate for this study as I used closed-ended questions rather open-ended questions.

In this study I statistically analyzed survey responses from high school students about behaviors that are relevant to maintaining health and fitness and academic

achievement. The high school students that completed the survey questionnaires were involved in multicomponent intervention programs implemented by school systems working with health agencies. The surveys were administered in 2013, 2015, and 2017. I conducted a secondary data analysis of the results for 2017.

Definitions

Body Mass Index: Designated as a number that indicates an individual's status in terms of obesity. It is calculated by the following formula: kg/ m^2= Weight (in kg)/ [height (in m) ^{2}]

Healthy diet recommendations: Eating breakfast 7 times a week, eating, eating fruit, potatoes, carrots, other vegetables, 3 times a day and green salads 2 times a day, drinking a glass of milk at least 2 times a day, drinking a glass of water at least 4 times a day, drinking a glass of 100% fruit juice 1 time a day, and drinking 8oz of soda such as Coke, Sprite or Pepsi, 3 times or less per week.

Height: How tall a person is designated in meters.

Obesity: Having a BMI that is equal to or greater than the 95th percentile for a person's age range.

Overweight: Having a BMI that is greater than or equal to or greater than the 85th percentile but less than the 95th percentile for a person's age range.

Physical Activity Behavior Recommendations: Activities recommended by HHS for reducing the incidence of overweight status and obesity and supporting academic performance among high school students. These include but are not limited to 1) 60 minutes per day of mild to vigorous physical activity. 2) Attending physical education

class 5 times a week. 3) Involvement exercise to strengthen and tone muscles 3 times a week. 4) Limiting sedentary leisure time behavior such as watching TV, playing video games, or using a computer for activities other than schoolwork to 2 hours or less.

. *Weight:* How heavy a person is designated in kilograms.

Assumptions

I made a number of assumptions when conducting this study. I assumed that the 14765 high school students from the United States in Grades 9 - 12 personally and honestly answered the survey questions and that an attempt was made to be as accurate as possible. I selected a sample of high school students who were presentative of high school students in the United States.

Scope and Delimitations

In this study I addressed issue of different outcomes that occurred for overweight status, obesity and academic performance for 3 different groups of students in grades 9-12: (a) the group of students that practiced both physical activity recommendations and healthy diet recommendations together (b) the group of students that practiced only physical activity recommendations alone (c) the group of students that practiced only healthy diet recommendations alone. My goal for this study was to fill the gap that exists due to a lack of evaluative information about the multicomponent strategies that have been implemented to help reduce the incidence of unhealthy weight status and support academic performance. The results of this study were representative of the general population of high school students in the United States. The datasets from the surveys were available at the CDC website but only permissible for use in this study upon

approval from the Internal Review Board (IRB) of Walden University. I did not interact with any of the participants. The results of the study may be pertinent to research that has self-determination theory as the theoretical foundation.

Limitations

This study had limitations. The YRBS data is self-reported and there was no way of knowing if students over-reported or under-reported information. Students were involved in the survey only if they attend school. Therefore, because a certain amount of absenteeism occurs, the resulting sample may not represent all students in Grades 9 – 12. Parental permission procedures are not the same at all survey sites.

Another limitation was that the sample size of the survey has been reduced somewhat by editing and cleaning of data. Answers that were not completed properly were deleted or set to missing.

Significance of the Study

Brannon and Cushing (2015) asserted that the use of psychological and behavioral techniques to improve health and fitness among middle school and high school students represents a major area that is addressed in the field of health psychology. This study is therefore significant in the field of health psychology because I addresses the issue of evaluating psychological and behavioral strategies designed to increase physical activity, decrease sedentary behavior, improve dietary behavior and thereby improve health and fitness and support academic achievement among high school students in Grades 9-12.

Significance to Theory

This study may provide useful information for using self-determination theory to develop intervention strategies to increase physical activity, improve healthy dietary habits, and support academic achievement among high school students. The study may also provide knowledge that could be used to close the gap in research concerning understanding the strengths and weaknesses of multicomponent interventions used by school systems to increase physical activity, reduce overweight status and obesity and support academic achievement among high school students.

Significance to Practice

The results of this study may provide information that could be used to develop evidence-based intervention strategies for school systems in the United States to use to decrease health issues and support academic achievement. Gonzales-Cutre et al. (2018) asserted when intervention strategies have been evaluated this may lead to evidence-based knowledge about methods of encouraging and counseling high school students to increase physical activity, improve fitness and reduce health issues and support academic achievement.

Significance to Social Change

Duncan et al. (2017) indicated healthy living practices should start in adolescence when signs of physical inactivity begin to appear. This approach supports positive social change by encouraging the development of healthy living practices during adolescents. Wallhead et al. (2017) asserted that school is where middle and high school students spend most of their time and therefore is an excellent setting to encourage students to

develop habits that support the maintenance of good health as adolescents move into adulthood. Knowledge gained from this study pertains to helping high school students to develop healthy living practices and perform well academically; the results may become a part of positive social change for high school students.

Summary and Transition

In Chapter 1 I introduced the main topic which was physical inactivity among adolescents which leads to health issues. I discussed the health issues caused by physical inactivity among high school students in the background section. In the problem statement I identified the specific problem as a gap in terms of understanding what pattern of practicing recommendations for physical activity and a healthy diet would produce a better outcome for reducing obesity and overweight status and supporting academic performance among high school students in the United States. In the section designated "Purpose of the Study" I indicated that I used quantitative methodology and I explained the independent and dependent variables. I discussed two research questions. I explain that SDT is the theoretical foundation of this study. I explain that this study has a secondary data analysis as the research design under "Nature of the Study." I give definitions for the key terms. I discuss the assumptions, limitations, and delimitations. I discuss the significance of the study to practice, theory, and positive social change.

Chapter 2 is next. I start the chapter with an introduction. I give a thorough explanation of the theoretical foundation, and extensively review literature on physical inactivity among adolescents and STD.

Chapter 2: Literature Review

A sedentary lifestyle has led to a worldwide pandemic of middle school and high school students having poor health profiles (Cesa et al., 2014). Health problems that heretofore happened later in life now occur earlier such as type II diabetes, cardiovascular problems, and obesity (Ogden et al. 2014). Fortunately, health promoters now understand that maintaining an adequate level of physical activity is an important aspect of securing a good health profile (Lubans et al., 2017). As early as 2008 the U. S. Department of Health and Human Services (HHS) recommended that youths from ages 6 – 17 engage in 60 minutes of physical activity daily. HHS further recommended in 2012 that strategies should be implemented in schools during the school day that would prompt increased physical activity for students and combat obesity among school-age children.

Systematic reviews have yielded some evidence that shows the use of school-based programs has been associated with increases in physical activity among adolescents (The Community Guide: What Works to Promote Health, 2013*).* School-based programs are successful in reducing the incidence of overweight status and obesity among high school students (Demetriou & Honer, 2012; Norris et al. 2015). An analysis completed by the Washington State Institute for Public Policy (WSIPP) found that health care costs for elementary and middle school students were less due to a decrease in the incidence of obesity. The WSIPP also found that increased physical activity among adolescents was associated with improvements in academic achievement.

Wong (2017), Wright, et al.,(2019) and Kelly et al.,(2019) note that communities in Massachusetts and Colorado have used multidimensional programs to increase

physical activity with positive results; however, these programs need to be used more widely across the country to achieve improvement on a national level. Further, a research gap exists for understanding which recommendations from the United States Department of Health need to be followed more or in a different pattern. Therefore, my goal for this study was to compare the incidence of overweight status and obesity and academic performance among three different categories of students: (a) students that practiced only recommendations for physical activity alone (b) students that practiced only the recommendation for a healthy diet alone (c) students that practiced both recommendations for physical activity and recommendations for a healthy diet together.

Section Overview

In Chapter 2 I thoroughly reviewed of the literature on using multidimensional intervention methods to increase physical activity among adolescents. I also elaborated on self-determination theory and its effectiveness as a theoretical foundation.

Literature Search Strategy

I searched multiple data bases to obtain relevant information for this study. The databases which I accessed through Walden University and Google are as follows: PsycArticles, Education Source, Science Direct, CINAHL & Medline, Medline, ProQuest Nursing & Allied Health Database, PsychInfo, EBSCOhost, and Dissertation and Theses @ Walden -Full Text. I also, obtained information through Google Scholar and the American Psychological Association. References I used were predominantly 5 – 10 years old. A few references I used were older than 10 years that involved groundbreaking work. The oldest reference was dated 2000. Some of the keywords I used to search for material

were: *BMI, academic performance, obesity, overweight status, dietary intervention, nutritional goals, self-determination theory, physical activity, intervention, school-based programs, high school students, adolescents, adherence, and physical education*. As an additional search strategy I used word combinations of keywords and reference lists of pertinent articles.

Theoretical Foundation

The theoretical framework that I used as a basis for inquiry was the self-determination theory(SDT). I used the references mentioned here to explain why SDT as presented by Deci and Ryan (2002) is relevant to this study. SDT is used to explain how individuals are motivated through psychological needs to change behavior. Teixeira et al. (2012) found evidence to support the efficacy of applying strategies recommended by SDT to motivate high school students to follow recommendations from the CDC for health and fitness and mental acuity. Gonzalez et al. (2018) also indicated that SDT has been found effective as a motivational technique for increasing behaviors that help to improve the health profiles of adolescents. Since this study involved high school students who have been exposed to principles of SDT through multicomponent intervention programs for maintaining a healthy weight status and performing well academically, SDT is suited as a theoretical framework.

Psychological Needs and SDT

In SDT three psychological needs are involved when an attempt is made to encourage an individual to have a positive attitude toward increasing physical activity and exercise behavior. Sebire et al. (2016) indicated that the three basic needs that are

involved are: competence, autonomy, and relatedness. Competence refers to the confidence an individual has to perform the desired tasks at hand and to surmount any obstacles. Relatedness involves a sense of connectedness that is developed through interaction with others in an individual's environment. The need for autonomy involves individuals engaging in behavior with free will without being managed by others having the benefit of making independent choices. The psychological needs described above are involved when individuals are being motivated to increase behavior. The constructs relate to this study because it involved motivating high school students to implement recommendations that helped in improving/maintaining health and fitness and also support academic achievement.

Research studies such as that conducted by Erdvik et al. (2014) show the interaction of competence as a construct involved in the motivational process of encouraging high school students to remain physically active after high school. A correlational analysis yielded results that indicated that perceived competence was positively associated with graduating senior's intentions to remain physically active after high school. This study showed that competence was associated with having a goal to remain physically active (Erdvik et al. 2014). The results of the study also showed the relevance of competence in matters of motivation for physical activity. Therefore satisfying the psychological need for competence is relative when high school students adhere to physical activity recommendations as in this study.

Gourlan et al. (2013) assessed overweight teenagers concerning involvement or motivation to be involved in physical activity, motivation for being physically active, and

level of satisfaction of psychological needs. The results indicated that satisfaction of psychological needs such as relatedness and increased motivation for involvement in physical activity was associated with increased physical activity among adolescents who were overweight. Gourlan et al. (2013) found evidence to support relatedness as being a factor that is involved in motivating adolescents to increase physical activity and is therefore relevant to my study which involved adhering to physical activity recommendations.

Schneider and Khan (2013) presented autonomy as a construct that influences the attitude of adolescents toward being involved in physical activity. Schneider and Khan assessed the participants for perception of autonomy before, during, and after completing a moderate intensity and a hard intensity exercise task. In their results Schneider and Khan indicated that the participants were more motivated to exercise when the need for autonomy was supported. Schneider and Khan showed how autonomy is important when motivating adolescents to increase involvement in physical activity or to maintain adequate involvement in physical activity. Likewise, my goal in this study was understand which pattern of practicing recommendations for physical activity and a healthy diet should be focused on when supporting the psychological needs of high school students.

How Competence, Relatedness, and Autonomy Are Related

Fin et al. (2017) investigated how to motivate adolescents to engage in physical activity. In their results they indicated that they found evidence to support the importance of satisfying the psychological needs of autonomy, relatedness, and competence when

encouraging adolescents to engage in physical activity. Using questionnaires students were assessed for a motivational profile (self-determined or not self-determined), perception of teacher autonomy support, psychological needs (autonomy, relatedness, and competence), exercise enjoyment, and level of physical activity.

Findings in the study by Fin et al., (2017) indicated students who had a profile of being self-determined were more fulfilled in the area of psychological needs (autonomy, competence, and relatedness). The self-determined students enjoyed physical education class more and were more involved in physical activity (PA). Students that had a profile of being not being self-determined, enjoyed physical education classes less, were less involved in PA, and did not perceive teachers as supportive of autonomy. Through the results of their study Fin et al. (2017) showed the importance of supporting psychological needs when attempting to motivate high school students to increase physical activity. This is relevant to my study because the psychological needs of the high students who were surveyed needed to be supported as they adhered to physical activity recommendations.

Standage et al. (2012) investigated the interrelatedness of autonomy, relatedness, and competence within self-determination theory and how these constructs help illuminate the process of being motivated to increase involvement in a physical education class and other forms of physical activity. The researchers assessed an intervention based on SDT implemented to motivate secondary school students to increase involvement in physical education and exercise. Standage et al., (2012) studied the following variables: health-related quality of life (HRQoL), physical self-concept (PSC), and level of physical

activity per day for 4 days. The students were assessed by completing questionnaires. In their results Standage et al. (2012) indicated that the perception of autonomy support by physical education (PE) instructors were positively associated with PE-related satisfaction of psychological needs (autonomy, relatedness, and competence). Competence was positively associated with PSC and relatedness was positively associated with HRQoL. Autonomy and competence were positively associated with autonomous motivation toward PE. Autonomous motivation toward PE was associated with autonomous motivation toward exercise. In their findings Standage et al. (2012) show how psychological needs are involved in the process of motivation. This is relevant to my study because the high school students involved have been motivated to practice recommendations for physical activity and a healthy diet through the satisfaction of three psychological needs (autonomy, competence, and relatedness).

Intrinsic Motivation and SDT

Teixeira et al. (2012) asserted that individuals are intrinsically motivated if the behavior is done because it has some value in terms of personal satisfaction. For instance, when motivation is intrinsic the individual finds joy and excitement in exercising personal skills. Joy is experienced from the challenge of competing in an activity. The individual has a chance to win and show their prowess. Teixeira et al. (2012) reviewed 66 studies where researchers investigated factors involved in motivating individuals to exercise. In their results these researchers indicated that they found evidence that intrinsic motivation is needed for an individual to be consistent in an exercise regimen over time. Intrinsic motivation is relevant to this study because it was used in multicomponent

intervention programs to encourage high schools students involved in this study to practice recommendations for reducing the incidence of obesity and overweight status and for maintaining good academic performance.

Baena-Extremera et al., (2016) investigated the intention of adolescents to participate in leisure-time physical activity. The goal was to determine what factors explain the interest of Spanish high school students (age 13 – 18) in participating in leisure-time physical activity, given the present tradition of high school students being given to sedentary leisure time activities. Baena- Extremera et al. (2016) assessed the students for motivation, satisfaction, and competence in leisure time activity using questions taken from the Sports Motivation Scale, The Sports Satisfaction Instrument, the Basic Psychological Needs in Exercise Scale, and the Intention to Partake in Leisure Physical Activity Scale. Intrinsic motivation was associated with having satisfaction and fun and increased participation in leisure-time physical activity. In their results Baena-Extremera et al. (2016) showed how intrinsic motivation involves finding value in behavior because of personal satisfaction. Intrinsic motivation is relevant to this study because it was used multicomponent programs to help students find value in practicing recommendations for physical activity and a healthy diet.

Extrinsic Motivation and SDT

Extrinsic motivation is the opposite of intrinsic motivation in that the impetus comes from factions outside the individual. In the case of extrinsic motivation, the individual engages in an activity or performs some action to gain a certain vantage point

that is desirable (Teixeira et al. 2012). For instance, a person may engage in a behavior to gain social rewards or to avoid rejection.

One type of extrinsic motivation which is called controlled extrinsic motivation by motivational therapists. Controlled extrinsic motivation involves an individual having an external reward or punishment that can be avoided (Teixeira et al. 2012). When the reward is obtained the behavior begins to extinguish. Another type of extrinsic motivation is called autonomous. For instance, a person may maintain an exercise regimen because they value the positive outcome of good health. Extrinsic motivation is relevant to the present study because it represents a way that high students could be motivated to practice recommendations for better health and academic achievement.

Pardo et al. (2016) investigated the effects of implementing a multicomponent intervention to increase physical activity among adolescents. Those who conducted the experiment prompted the people working with the students in the school system to encourage students to become more physically active by providing more opportunities at school, at home, and in the community. In this study, researchers sought to understand the effects of this extrinsic motivation intervention on student's behavior. In their results researchers indicated that the students in the control group had greater extrinsic motivation which was associated with increases in moderate to vigorous physical activity. This showed that extrinsic motivation is an important construct when explaining increases in physical activity among adolescents. Hence, extrinsic motivation is relevant to this study because students may be extrinsically motivated to practice recommendations for physical activity and a healthy diet.

Duncan et al. (2017) showed the importance of intrinsic and extrinsic motivation when encouraging adolescents to increase involvement in physical activity. The inclination of a sample of adolescents toward involvement in physical activity was evaluated in terms of goals and styles of discipline. The researchers sought to understand what factors encouraged the adolescents and why each factor was encouraging. The results showed that both intrinsic and extrinsic motivational goals were positively associated with physical activity when autonomy was supported. This outcome shows the relevance of extrinsic motivation when individuals seek to motivate adolescents to increase physical activity and the relevance of extrinsic motivation to this study.

In the studies mentioned above (Deci & Ryan, 2002; Teixeira et al. 2012; Haagen, 2014; Baena-Extremera et al. 2016; Duncan et al. 2017; Gonzalez et al. 2018) I explain the constructs involved in SDT. The constructs are: psychological needs (autonomy, relatedness, and competence), intrinsic motivation, and extrinsic motivation. In their results Deci & Ryan, 2002; Teixeira et al. 2012; Haagen, 2014; Baena-Extremera et al. 2016; Duncan et al. 2017; Gonzalez et al. 2018 indicated the value of SDT constructs in terms of understanding how to motivate high school students to increase involvement in physical activity and healthy dietary behavior. SDT is, therefore, suited as a basis for this study because it is being used by staff working in the school systems to develop multicomponent intervention programs.

Literature Review

Duncan et al. (2017) asserted that engaging in regular physical activity helps to decrease the risk of cardiovascular disease, type II diabetes, and obesity. Duncan et al.,

(2017) also noted that if good habits for engaging in regular physical activity are developed by students during the adolescent years a high probability exists that this behavior will continue into adulthood. The U.S. Department of Health and Human Services (HHS, 2008) recommended that adolescents participate in 60 minutes per day of physical activity to maintain good health and fitness. The HHS also recommended that school-based programs be initiated that include strategies to increase physical activity and combat obesity among students in elementary school, middle school, and high school (HHS, ed. Washington D.C.,2012).

Unfortunately, the improvement of health profiles of adolescents has been slow and a survey completed as late as 2017 indicated that only 26 % of high school students surveyed participated in 60 minutes per day of physical activity during the week before the survey and only 30 % participated in physical education classes daily (Kahn, et al. 2018). Further, health-related issues still need to be addressed such as type II diabetes, cardiovascular disorder, and obesity (Roth, 2017).

Physical Activity and Nutrition and BMI

Duncan et al., (2017) indicated that according to studies completed in Europe the highest decline in physical activity happens between the ages of 12 and 16. The process of receiving an education adds to the problem of physical inactivity as it requires, at least in the traditional sense, that a person is still and concentrates on activities involved in learning such as studying, and expressing what has been learned. These activities are sedentary such as writing and answering test questions. Similarly, in the United States during this period of life from middle school to adulthood individuals become less

physically active (Hankonen et al., 2016). This condition coupled with poor dietary intake has led to high schools students having unhealthy weight status (as in being overweight with a body mass index [BMI] between the 85th and 95th percentile for individuals of the same age and obese with a BMI above the 95th percentile for individuals of the same age). Nayak and Bhat (2016) asserted that physical inactivity and consumption of junk food have caused youths to have issues with overweight status and obesity. Lahiri et al. (2019) noted the rising incidence of overweight status and obesity among adolescents and therefore investigated the detriments of poor diet and lack of physical activity. In the results Lahiri et al. (2019) rather pointedly indicated poor dietary habits as a risk factor for overweight status and obesity. Further, Lahiri et al. (2019) recommended combining regimens of physical activity and healthy dietary practices to address obesity and overweight status. Williams and Mummery (2015) found that healthy dietary behavior was associated with physical fitness in females, and spending time involved in sedentary education rather than sedentary leisure activities for males. Male students who practiced healthy nutrition spent less time on small screen leisure activities. Elliot and Hamlin (2018) found combining physical activity strategies with dietary strategies yielded a better result for improving weight status than only doing one or the other of these strategies.

Physical Activity and Nutrition and Academic Performance

In the results of his research study Dubuc et al. (2019) indicated that academic performance is affected by a lack of physical exercise and poor dietary habits. Dubuc et al. (2019) studied the effect of lifestyle habits on cognitive control and academic

performance. Dubuc et al. 2019 found evidence that academic performance can be improved by developing better lifestyle habits in the area of physical activity and diet. Faught et al. (2017) investigated whether students who adhered to guidelines recommended by Canada, America and the World Health Organization (WHO) did better academically than those who did not. Faught found that boy students who followed the guidelines for intake of free sugars did 5.67% better on exams than those who did not and boys who followed the guidelines for milk and alternatives did 3.45% better on exams than those who didn't follow the guidelines. Stea and Torstveit (2014) found evidence that students that performed well academically consumed less sugary drinks and were involved in physical activity more.

Loprinzi et al., (2018) investigated the effect of acute and pronounced exercise on cognitive ability. School systems in Georgia involved in the Student Health and Physical Education (SHAPE) initiative had students participate by following the practice of engaging in physical activity of moderate intensity during academic lessons. Loprinzi et al. (2018) found that students' cognitive ability improved as the students' performance improved on standardized tests of academic achievement. Kalantari and Esmaeilzadeh (2016) found evidence that physical fitness was related to academic achievement. Naveed et al. (2020) also found evidence to support encouraging high school students to develop healthy dietary habits and to engage in an adequate amount of moderate to vigorous physical activity helped in maintaining good cognitive functioning. The positive results about the effectiveness of physical activity and a healthy diet reported by Loprinzi et al. 2018, Kalantari and Esmaeilzadeh (2016), and Naveed et al. (2020) supports the

inclusion of dietary strategies and physical activity strategies in initiatives for improving weight status and academic performance among adolescents (age 14-18).

Inclusion of Both Physical Activity Recommendations and Healthy Diet Recommendations in Multicomponent Intervention Programs

Research evidence from reviews such as Shirley et al. (2015) indicated that multicomponent intervention programs have been very successful. De Bourdeaudhuij et al., (2011) and Watts et al., (2015) added that intervention initiatives are more effective when both physical activity strategies and dietary strategies are included rather than one or the other. Therefore, to combat the issues of unhealthy weight status and poor academic performance that has existed over the years (1999-2017), the CDC encouraged school systems and health agencies to capitalize on opportune periods during the school day to implement strategies for maintaining adequate levels of physical activity and encouraging healthy dietary habits as part of multicomponent intervention programs (Centers for Disease Control and Prevention, 2010).

Fernández et al. (2017) recommended the inclusion of strategies that address the barriers to increasing physical activity among adolescents such as the parameters of an individual's physical unfitness, psychological issues (poor self- image, social anxiety), tiredness/laziness, life demands/lack of time, and environment/facilities. French et al., (2018) recommended addressing barriers to increasing physical activity that emulates a student's home life and suggested including the use of trained program implementers who visited the homes of the participants and gave instructions to the parents of the participants and the participants on behavior change strategies for a healthy lifestyle. The

program implementers gave guidance and instruction for changing the home environment relative to healthy dietary habits and physical activity. Information was given for the resources of healthy foods. Parents were encouraged to attend classes on healthy living conducted at community-based locations. Finally, program implementers made follow-up interactions with the family units involved to encourage compliance and provide helpful suggestions and guidance. The results of French et al. 2018) were promising as children in the intervention group (called the NET Works group) who were obese and overweight at baseline had lower BMI than the control group (called the Usual Care group) after 36 months. The Net-Works group reduced sedentary leisure activity time (watching TV) more than the Usual Care group at the 24 months and 36 -month follow-ups. Sayyari et al., (2017) indicated that a multi-component intervention program involving instruction for students in healthy eating, adequate physical activity, and training to help teachers teach these principles helped increase students' knowledge about the detriments of overweight status and obesity and the importance of the physical activity.

Fernandez-Jimenez et al. (2019) evaluated a multicomponent intervention program used in Spain called Salud Integral-Comprehensive Health (the SI! Program). The program was implemented by teachers and involved computer-simulated games and activities. The participants were secondary school students 12-16 years of age. The basic format was that students participated in a video game that could be loaded on a cell phone, tablet, or computer. The task of the game was going on a virtual journey. During the journey, challenges were encountered for healthy living. Students gained points by registering out-of-school physical activity (PA). The points were converted into

kilometers for finishing the virtual trip. Additional points could be earned through classroom participation and for reaching milestones. The program was quite thorough and included training a core group of teachers in promoting cardiovascular health in a school setting. The teachers were also trained to present information to the families of students that were participants on healthy eating, involvement in PA, and on how to change the school environment in terms of more opportunities for PA and more options for healthy eating.

Serra-Paya et al., (2019) found that obesity and overweight status were decreased, dietary behaviors improved and involvement in PA increased among adolescents 6-12 years of age through a multicomponent intervention program called the Nereu Program (NP). The initiative included physical activity sessions for children, theoretical and practical sessions for parents, behavioral strategy sessions for children and parents, and weekend activities.

The (CDC) has promoted multicomponent initiatives nationally and recommended that administrators encourage students to engage in an adequate amount of physical activity per day and improve dietary behaviors. The main objective of the CDC in implementing multi component intervention programs was to reduce unhealthy weight status and support academic achievement among high school students.

The multicomponent intervention programs were implemented in the school systems that students who took the national YBRS attended. The programs included physical activity strategies, dietary strategies, and strategies for changing the school environment. Strategies for increasing consumption of healthy foods were included.

Students received counseling and encouragement health classes to increase physical activity (PA) to 60 minutes per day seven days a week, to reduce sedentary leisure time behavior to 2 hours or less per day, to increase involvement in physical education(PE) in classroom instruction of PE. Educators working with the students encouraged students to get involved in organized sports leagues for high school students. PE instructors were given opportunities for enhanced training. Teachers incorporated physical activity into regular classroom lessons and exercise breaks. Staff offered students opportunities to be involved in after school intramural sports. The CDC recommended that school administrators change the school environment by offering more nutritious foods at lunchtime and healthy snacks in vending machines. Staff also, offered counseling for improving dietary intake. Staff encouraged parents and community factions to provide opportunities for adolescents to engage in physical activity and opportunities for healthy eating outside the school setting.

I presented evidence I found in the studies mentioned above (De Bourdeauduji et al. 2011; Watts et al. 2015; Fernandez et al. 2017; French et al. 2018; Sayyari et al. 2017; Fernandez-Jimenez et al. 2019; and Serra-Paya et al. 2019) that staff working in school systems and government agencies have had some success in encouraging high school students to increase physical activity, and improve dietary habits to reduce the incidence of obesity and overweight status while at the same time maintaining academic achievement. More improvement is needed as success has been estimated at 26 % for following recommended physical activity goals for health and fitness. Therefore, this study may help fill the gap in terms of knowledge about effective intervention strategies.

The goal of this study was to compare 3 different patterns high school students used when practicing recommendations for physical activity and a healthy diet: (a) some students practiced only recommendations for physical activity alone (b) some students practiced only recommendations for a healthy diet alone (c) some students practiced both recommendations for physical activity and recommendations for a healthy diet together. The focus of this study was to understand which adherence pattern of the high school students for practicing the recommendations for reducing the incidence of obesity and overweight status and supporting academic achievement stipulated by HHS yielded the best result. This information may be useful for establishing some best practices for multicomponent interventions.

Summary and Conclusions

In Chapter 2 I focused on two areas of risky behavior, physical inactivity and poor dietary habits that have contributed to an increase of overweight status and obesity among high school students (Paulo Rogério et al. 2017). I noted also, that academic performance is affected by physical inactivity and poor dietary habits (Stea & Torstveit, 2014). Duncan et al. (2017) found evidence that supported students engaging regular physical activity as a means to reduce the risk of poor health outcomes such as hypertension, diabetes, heart disease some cancers. Researchers such as Duncan et al. 2017 and Pellicer-Chenoll et al. 2015 found that engaging in regular physical activity also helped to reduce the incidence of obesity. While the benefits of engaging in regular physical activity are widely known and promoted by HHS, a problem still exists as only

26 percent of high school students surveyed in 2017 participated in the recommended 60 minutes of physical activity per day during the week before the survey.

In Chapter 2 I gave a thorough explanation of the theoretical framework of SDT on which I based this study. I explained the constructs of SDT (competence, relationship, and autonomy). I explained and the relevance of these constructs for increasing physical activity among adolescents. I indicated that in my findings I may be able to identify behavior on which factions that develop health policies should focus when supporting high school students' psychological needs (as recommended by SDT). Information from my findings may be useful for helping individuals working with students develop better strategies for reducing the incidence of obesity and overweight status and supporting academic achievement.

In my discussion in Chapter 2 I elaborated on studies about various multicomponent strategies that have been implemented for reducing physical inactivity, reducing the incidence of obesity, reducing the incidence of overweight status, and supporting academic performance among adolescents in the United States. I explained the results researchers received who conducted these studies. I discussed studies related to the independent variables (physical activity recommendations, healthy diet recommendations, or both) and the dependent variables (unhealthy weight status and academic performance) and the results that researchers received. Although there is substantial research evidence such as González-Cutre et al. (2018) and Demetriou and Höner (2012) to support the use of school-based programs that have multiple components, there remains a gap in terms of understanding what students need to do

differently that will have a more substantial effect on helping more students to achieve a BMI rank below the 85th percentile. More knowledge is needed about best practices as health issues such as overweight status and obesity among adolescents remain a substantial problem (Liew, 2018).

In this study I statistically analyzed secondary data that was available from the YRBS that was administered to high school students in the United States. My goal in this study was to compare outcomes for high school students when they followed either of the following patterns: (a) some students practiced only recommendations for physical activity alone. (b) some students practiced only recommendations for a healthy diet alone (c) some students practiced both recommendations for physical activity and recommendations for a healthy diet together. The information I gained in my results may help with the development of best practices for reducing obesity and overweight status and for supporting academic achievement among high school students in the United States.

In the next section, Chapter 3, I discussed the Research Design and Rationale, Methodology, and the analysis of archival data.

Chapter 3: Research Method

Introduction

Physical activity is a primary factor involved in the healthy growth and development of middle and high school students. HHS recommended that students should be involved in 60 minutes per day of MVPA to reduce the risk of obesity, type 2 diabetes, cardiovascular disease, and high blood pressure. Yet the HHS indicated that only 50% of American youths meet this requirement (Cluss et al. 2016). Kann et al. (2018) indicated that only 26% of youths that were surveyed responded as having met the requirement of HHS for physical activity on the 7 days before the survey was administered. In 2019 an even smaller amount of students (23.2%) responded as having met the requirement. The national government has surveyed high school students to determine the status of the incidence of risky behaviors such as physical inactivity, the incidence of obesity/overweight status, and the status of students' academic performance. The results received by individuals who conduct these surveys are used to measure the overall success of the initiatives that were promoted to bring about change (as in healthy weight status and better academic achievement). My purpose in conducting this study was to fill the gap that exists in terms of establishing best practices by comparing the results for 3 different patterns students used in practicing recommendations for physical activity and a healthy diet.

In Chapter 3 I discussed the research design rationale, methodology, the population, sampling procedures, data collection, and recruitment.

Research Design and Rationale

In this study I used quantitative methodology and secondary data analysis to compare the results I received for three different ways students practiced recommendations that were promoted in initiatives to improve physical fitness, reducing health issues, and support academic achievement among high school students in the United States. In this study I focused on the following ways students practiced recommendations for physical activity and a healthy diet: (a) some students practiced both recommendations for physical activity and a healthy diet together (b) some students practiced only recommendations for physical activity (c) some students practiced only recommendations for a healthy diet. The chi-square test was used for both research questions. I used Chi-square to determine which way of practicing recommendations for physical activity and a healthy diet used by the high school students yielded the best results in terms of affecting overweight status and obesity. I used Chi-square also to determine the effect of these variables on grades received during the last 12 months (*Mostly As, Mostly Bs, Mostly Cs, Mostly Ds or Mostly Fs).*

A true experiment was note appropriate for this study because I did not use random sampling. A correlation study was not for me to use appropriate for this study because that did not allow for the exploration of the differences that exist between the groups. Chi-square was suitable for both research questions because the dependent variables were categorical (overweight status, obesity, and academic performance). I compared three different patterns students followed when practicing recommendations

for physical activity and a healthy diet. I used secondary data that was available from the national YBRS of 2017.

Methodology

I found quantitative methodology appropriate to use because I was able to compare the outcomes when students followed different patterns when practicing recommendations for physical activity and a healthy diet. The dependent variables were obesity and overweight status and academic performance as measured by grades. The independent variables were recommendations given by HHS for physical activity and a healthy diet. I used a secondary data analysis design in this study. I used SPSS to analyze archival data. Qualitative methodology with a mixed-method design was not suitable for this study because I did not use open-ended questionnaires. Nor did I use qualitative data gathering through interviews as that was contrary to the type of questionnaires (close-ended) that were used in this study. Since I used quantitative methodology I was able to use close-ended questionnaires to collect demographic information, data on the level of physical activity of adolescents, dietary behavior, BMI, and academic performance among high school students.

Population

The target population for this study was high school students (in Grades 9 -12, ages 14 - 18) in regular public schools, charter schools, Catholic schools, and other non-public schools According to Kann et al. (2013) students from these schools were involved in national surveys conducted by the CDC. The students were from the 50 states of the United States, from the District of Columbia, Puerto Rico, the trusted territories, and the

Virgin Islands. The number of students' questionnaires that were useable from the national survey of 2017 was 14, 765. For this study, I analyzed smaller sample of 191 students using SPSS and then I analyzed all 14,765 surveys. I explained this more fully in the section entitled Sampling and Sampling Procedures. Adolescents are now experiencing early occurrence of health issues such as Type II diabetes, obesity, and cardiovascular disease that heretofore were experienced by adults later in life. The CDC has conducted initiatives to help those who work in the educational system in the United States to reverse the tide of students being physical inactivity which has led to health issues among adolescents. In this study I focused on comparing three different patterns high school students used as they practiced recommendations for physical activity and a healthy diet (practicing only physical activity recommendations alone, practicing healthy diet recommendations alone, and practicing both physical activity and healthy diet recommendations together.

Confidence Interval

Dean and Voss (1999) noted the importance of establishing a confidence interval when conducting a statistical analysis. Dean and Voss also asserted that an individual conducting a statistical analysis should set limits for statistical significance by designating the confidence interval. The confidence interval that I chose for the present study is 95%. The margin of error I set for a Type I error (e. g., rejecting the null hypothesis when in fact it is true) was .05. According to Andrade (2019) the *p*-value I find must be less than .05 to attain statistical significance.

Sampling and Sampling Procedures

Bradley and Brand (2013) established that the power of a statistical analysis is affected by the sample size. My purpose in making sample selection for this study was to ultimately make inferences about the general population of high school students in the United States involved in multicomponent intervention programs for reducing the incidence of obesity and supporting academic achievement.

The CDC used cluster sampling to determine a sample that was representative of high school students in the United States in 2017. According to Balkin and Sheperis (2011), cluster sampling is appropriate for determining a population when the participants are clumped together in clusters. All the students in a school represent a large cluster. Balkin and Sheperis noted that it would be expedient to randomly select a few schools, and then randomly select two classes (e.g., a social studies class and an English class) then survey all the students in those classes. The CDC used cluster sampling and derived a sample of high school students in Grades 9 - 12 who were representative of all high school students in Grades 9-12 in the United States in 2017. The sampling procedure included three stages. In the first stage l, 257 primary sampling units (PSUs) were formed by sampling schools in counties and large sub-areas of counties all over the United States. The PSUs were then divided into 16 categories. Each category was defined by the size of cities in square miles and the amount of Black and Hispanic students starting with a population amount of 500,000 and above. Cities with more square miles and a larger population were designated as urban PSUs. The PSUs with fewer square miles and smaller populations were designated as rural. Fifty- four PSUs were then sampled from

the l, 257 PSUs with a probability that was proportional to the enrollment size of the PSU.

The CDC staff divided 54 PSUs that they sampled in the first stage into smaller units called secondary sampling units (SSUs). Thus the CDC staff formed 162 SSUs in their second stage of cluster sampling. The CDC staff designated each SSU as representing as a physical school with Grades 9 - 12. The CDC staff used random sampling on the third and final stage of sampling to sample students in Grades 9-12 in clusters. The CDC staff grouped together all of the students from one or two whole classes of a required subject such as history or English or all of the students from a required period such as homeroom or study hall. I used secondary data compiled by the CDC from the national YRBS completed in 2017. The number of students who had usable surveys in 2017 was 14,765. RQ1 includes data measured categorically with two categories overweight and obese. RQ2 includes ordinal data represented by letter grades from highest to lowest (as in *Mostly A*s, *Mostly B*s, *Mostly Cs*, etc.). To determine the appropriate sample size for the chi-square analysis for RQ1and RQ2 I used a G*Power 3.1 application. The results I received shown in Table 1 was that with a power of .95 and a margin of error of .05 a sample size of 191 would be appropriate for a medium effect of .30. When I included the total sample of students (14765) in the calculation the effect size was .034010

Table 1

Power Analysis for Chi-Square Test

Effect size	N
.0341068	14760
.10	1717
.30	191
.50	69

Note. Power = .95. Calculations based on a one-tail alpha of .05

Procedures for Recruitment, Participation, and Data Collection (Primary Data)

Recruitment

The CDC provides funding for state, territorial, tribal, and large urban school districts to conduct the YRBS. The purpose of the CDC in conducting this survey is to monitor the incidence and severity of risky behaviors. In turn, this information is used by responsible staff to improve public health programs. Staff working for the CDC send out information about the YRBS to school administrative staff nationwide. Teachers and school administrators within the school systems recruit the students participate in the survey. My goal for this study was to use the data that was collected to compare the effectiveness of three patterns that students used when practicing recommendations for physical activity and a healthy diet as interventions for decreasing unhealthy weight status and supporting academic achievement.

Participation

If the administrators of a school decided to have the students participate in the survey, they developed protocols to follow for students to gain parental permission and informed consent. Students obtained parental permission through a passive system of protocols or an active system of protocols. In the active protocol system of obtaining or

denying permission parents had to indicate their child could or could not participate by checking off a yes or no response on a permission slip. When staff involved used the passive protocol system of obtaining or denying permission parents either sent in a permission slip to allow their child to participate or did not return a permission slip when they wanted to deny their child permission.

I used secondary data in this study. I did not interact with the actual participants.

Data Collection

I observed data about patterns followed by high school students and the extent to which the high school students used the patterns as they practiced recommendations for physical activity and a healthy diet as part of an intervention program for maintaining or improving healthy weight status and maintaining or improving academic performance. I chose the locations specified in this study because records of high school students were available on the CDC website. I obtained approval to use secondary data from the Walden IRB. I did not need to directly interact with the subjects.

Other variables that I observed were grade level, race, and gender. I received records in Excel in a spreadsheet format. The staff that prepared the dataset did not include any identifying information. I satisfied the requirements of HIPAA for anonymity and confidentiality.

The Survey Data Management System (SDMS) staff edited and cleaned the dataset. I further edited and cleaned the dataset to ensure that the dataset was ready for analysis.

Instrumentation and Operationalization of Constructs

The YRBS was the instrument the CDC staff used to survey high students. According to Kann et al. (2018), the YRBS was developed by the CDC as part of a surveillance program of the YRBSS to monitor health-related behaviors displayed by people ages 10 – 24. Kann et al. (2018) indicated that certain health-related behaviors among individuals ages 10 - 24 have been consistently linked with sickness, death, and social problems. The social problems Kann et al. listed were poor academic achievement, low economic status, and criminal activity. In this study, I was concerned with the student's responses to questions on the YRBS that pertain to practicing recommendations for physical activity and a healthy diet. I used datasets generated from the national YRBS.

The CDC conducted two test-retest studies to establish the reliability of the national YRBS questionnaire. The CDC staff received the best results from the first study which was completed in 1992 using the 1991 version of the YRBS. In this study, staff administered the survey to 1,679 students in two separate sessions. Both middle school (seventh and eighth graders) and high school students (Grades 9-12) were involved. Staff found that reliability was 61% to 100% for 75% of the questions. The answers given by high school students (Grades 9 -12) were considered more consistent compared to responses made by seventh graders. Therefore, the study implementers concluded that this version of the YRBS was a better fit for high school students. The CDC staff completed a second study in 2000 using the 1999 version of the YRBS. The staff implementing the study administered survey questions to 4,619 high school students.

Students again had two sessions of responding to survey questions. The CDC staff that implemented the study found: (a) about 22% of the questions had significantly different prevalence amounts between the two times the staff administered the survey.(b) staff found 14% of the questions had low reliability (less than 61%) and significantly different prevalence estimates between the first and second time the staff administered the survey. The staff that conducted the study concluded that the reliability percentages were because students were confused by the questions (Kann et al., 2013). Therefore, the survey developers revised some questions and eliminated other questions from the survey.

The questionnaire had a total of 99 questions. I was concerned with 14 of the questions on the survey. These include questions about demographics such as age, weight, height, race/ethnicity, and Grade as in 9 -12. Two questions (four and five) were about race. For Question 4 the responded by indicating if they were Hispanic or Latino. In Question 5 the student could select one or more of five options to indicate their race. Question 6 was: How tall are you without your shoes on?" The students had to follow the following instructions: "Write your height in the shaded blank boxes. Fill in the matching oval below each number." For Question 7 the students indicated how much they weighed without their clothes on? The participant had to follow the following instructions: "Write your weight in shaded blank boxes. Fill in the matching oval below each number. Question 70 was: "During the past 7 days how many times did you drink 100% fruit juice such as orange juice, apple juice, or grape juice?" The response choices ranged from "I did not drink 100% fruit juice during the past 7 days" to "4 times or more per day." Question 71 was: "During the past 7 days how many times did you eat fruit" (Do not

count fruit juice). The response choices ranged from “I did not eat fruit in the past 7 days.” to “4 times per day.” Question 72 was: “How many times during the past 7 days did you eat a green salad. The response choices range from “I did not eat a green salad in the past 7 days” to “5 times a day.”Questions73-75 were as follows: “During the past 7 days how many times did you eat potatoes, carrots, or other vegetables. The response choices ranged from “I did not eat potatoes, carrots or other vegetables to “Four times a day.” Question 76 was: “During the past 7 days how many times did you drink a can, glass, or bottle of soda or pop, such as Coke Sprite, or Pepsi? Choices ranged from “I did not drink soda or pop during the past 7 days” to “ 4 or more times a day.” Question 79 was: “During the past 7 days how times did you drink a glass, bottle, or can, of a sports drink such as Gatorade or Powerade (Don’t count low-calorie sports drinks such as Propel-2 or G2)? The response choices range from “I did not drink a sports drink in the past 7days” to “4 or more times per day.” Question 80 was: “During the past 7 days how many times did you drink a glass or bottle of plain water days did you eat breakfast?” The response choices ranged from “I did not drink water during the past 7days” to “4 or more times per day.” (Count tap bottle or unflavored sparkling water). Question 77 was “During the past 7 days how many glasses of milk did you drink? (Count the milk you drank in a glass, cup, or carton or with cereal. Count the half-pint carton served at school as a glass of milk)”. The response choices ranged from, “I did not did not drink milk during the past 7 days,” to “5 or more glasses per day.” Question 78 was: “During the past 7 days on how many days did you eat breakfast?” The response choices were “0 - 7 days.” Question 79 was: “During the past 7 days, on how many days were you physically

active for at least 60 minutes?" "(Add up all the time you spent any kind of physical activity that increased your heart rate and made you breathe hard some of the time)." The response choices range from "0 - 7days." Question 80 was: "On an average school day, how many hours do you spend watching television?" The response choices ranged from "I do not watch television on an average school day" to "Five or more hours per day." Question 81 was: "On an average school day, how many hours do you spend playing video or computer games or use a computer for something that is not school work?" The response choices ranged from "I do not play video or computer games or use a computer for something other than schoolwork." to "5 or more hours per day." Question 82 was: "In an average week when you are in school, how many days are you in physical education (PE) classes. The response choices ranged from "0 - 5 days" In Question 89 the students responded by indicating if they received *Mostly As, Mostly Bs, Mostly Cs, Mostly Ds, or Mostly Fs* for their report care grades during for the past 12 months.

Data Analysis Plan

Analysis Software

Several applications were available for analyzing data. I chose the SPSS application because it is beneficial for analyzing results when using a quasi-experimental design with quantitative data. Johnson (2016) used the missing value analysis of the SPSS 22 program to clean the data for use. SPSS was used by Johnson (2016) for regression diagnostics, outliers, influential cases, and the normal distribution of error. Top et al. (2019) used SPSS to run a Pearson Chi-square analysis. I investigated the association between categorical independent variables and a categorical dependent

variable. I found SPSS suitable for conducting the Chi-square to compare the outcomes for overweight status and obesity and academic performance among high school students when the students used different patterns when they practiced recommendations for physical activity and a healthy diet.

Data Cleaning and Screening Procedures

According to Tran et al. (2016), appropriate data cleaning methods are an integral part of creating usable data. For example, Kaigang et al., (2016) removed extraneous responses to effectively improve the quality of the data. This study used datasets that have already been edited. The questionnaires from the national survey were sent to the contractor that developed the questionnaires and the individuals working for the contractor constructed raw electronic datasets. The contractor then sent raw datasets back to the CDC. The SDMS edited and cleaned I further organized the data for my specific analyses. I used SPSS to transform the data and analyzing data for the variables.

Statistical Method

McBee and Field (2017) indicated that descriptive analysis is a priority in experimental research. I used descriptive statistics such as measures of central tendency to describe the sample of high school students demographically. Age, grade level, race and sex were the demographic variables that I included.

I provided a summary of tables and graphical printouts. I also provided a graphic view of the statistical analysis done through a Chi-square analysis. The steps I followed above such as the explanation of central tendency and the summary of results presented in graphs were efficacious and important for understanding which pattern of adherence

used by the high school students was the most successful for maintaining or improving a healthy weight status and for maintaining or improving academic performance. I explained the analyses for the research questions in the next section.

Chi-Square

The chi-square test was used for both research questions. Muderedzwa and Matsungo (2020) used Chi-square to analyze the relationship between categorical variables. In this study I used Chi-square to assess if significant decreases resulted in the incidence of overweight status and obesity and if higher grades were received by students during the past 12 months when physical activity recommendations were combined with healthy diet recommendations as opposed to only using physical activity recommendations alone or only using healthy dietary recommendations alone

Each time I received significant results in the analyses, I conducted a Cramer's V test determine the areas where the significant differences existed.

Research Questions and Hypotheses

RQ 1: Was there a statistically significant difference in the incidence of obesity and overweight status among high school students in grades 9-12 depending upon the pattern that students use when practicing recommendations given by the CDC?

H$_0$1: When high school students followed a pattern of regularly practicing both physical activity recommendations and recommendations for a healthy diet there was not a significantly lower incidence of overweight status and obesity compared to when

students in grades 9-12 practiced only recommendations for physical activity alone or only recommendations for a healthy diet alone.

$H_1$1: When high school students followed a pattern of regularly practicing both physical activity recommendations and recommendations for a healthy diet together there was a significantly lower incidence of overweight status and obesity compared to when students in Grades 9-12 practiced only recommendations for physical activity or only recommendations for a healthy diet alone.

RQ2: Was there a significant difference in high students reporting receiving higher grades during the past 12 months (as in *Mostly A's, or Mostly B's*) depending upon the pattern students used when practicing recommendations by the CDC?

$H_0$2: High school students that followed a pattern of regularly practicing recommendations for both physical activity and recommendations for a healthy diet together did not report that they received higher grades (as *Mostly A's or Mostly B's*) during the past 12 months significantly more than students who only practiced recommendations for physical activity alone or only practiced recommendations for a healthy diet alone.

$H_1$2: High school students that followed a pattern of regularly practicing recommendations for both physical activity and recommendations for a healthy diet together reported receiving higher grades (as *Mostly A's or Mostly B's*) during the past 12

months significantly more than students who only practiced recommendations for physical activity alone or only practiced recommendations for a healthy diet alone.

Intervention and Manipulation of Variables

The CDC reviewed the leading causes of sickness and death among adolescents and adults. From the series of reviews the CDC staff conducted, they determined that most of the major causes of sickness, death, and social problems could be placed in one of six priority categories. In this study I was concerned with categories 5 and 6, unhealthy dietary behavior, and physical activity respectively. Having categorized areas that could be targeted for improvement, the CDC proceeded to develop YRBSS. The YRBSS staff compiles continuous data on health-related behavior, and the incidence of obesity, overweight status, and asthma among high school students with the YRBS. The YRBSS is a surveillance system and the YRBS is a survey used by staff that run YRBSS. The YRBS is administered by CDC staff on a national, state, and urban school district level. The CDC has encouraged health and education agencies on a national, state, and local level to use the YRBS on a biennial basis since 1991. The results received by CDC staff are used to develop, maintain, and enhance health programs.

The YRBSS staff assesses trends in health risk behaviors over time. The purpose of these assessments is for YRBSS staff to supply information to national, state, territorial, tribal, and local health agencies about progress toward fulfilling national health objectives that have been laid out in health initiatives such as Healthy People 2020. I used statistical analysis in this study to understand if any advantage exists for reducing the incidence of obesity and overweight status and maintaining or improving

academic performance among high students when the students practice both recommendations for physical activity and recommendations for a healthy diet together as opposed to only practicing physical activity recommendations alone or only recommendations for a healthy diet alone.

In this study I focused on the following physical activity recommendations: involvement in 60 minutes per day of moderate to vigorous physical activity at least five days a week, participating in PE classes five times a week, having at least 6 hours of sleep on an average school night, watching TV, playing computer or video games or using a computer for something other schoolwork two hours or less per day. The healthy diet recommendations that I focused on were. drinking a glass of milk at least two or more times per day, drinking a glass or bottle of water 4 or more times per day, eating breakfast at least 5 times a week, drinking soda such as Sprite, Coke, or Pepsi 3 times or less per week, consuming fruits at least three times per day, and consuming potatoes, carrots, other vegetables or a green salad at least two times per day.

Threats to Validity

External Validity

This study had threats to external validity that affected my ability to generalization the results to the larger population which would be the population of all high school students in Grades 9 -12 in the United States. The dataset used in this study is from the 2017 national YRBS which consisted of clusters of students sampled from 1,276 primary sampling units (PSUs) from large counties all over the United States. The

resulting number of students that were sampled was 18,324. Only 14,956 responded and only 14,765 had usable surveys after editing was completed.

One threat to external validity, however, is that some youths in the targeted age bracket (14 – 18) were not enrolled in school. Therefore, the results may not be representative of all youths in the United States between the ages of 14 – 18. Another threat to external validity is the integrity of the students. For some of the questions, there was no means by which staff could confirm that the students responded truthfully.

Internal Validity

Internal validity is a measure taken by an individual conducting a study of how much the effect that they observed is a result of the experimental condition that they set up. One area where problems occurred with internal validity was self-reporting of weight and height by students. For instance, a student's perception of their height and weight may not be as objective as having a third-party record weight as read from scales. Two of the questions were assessed by the CDC to determine the validity of the students' responses to questions about weight and height. The CDC completed a study that involved comparing the students' self-reported survey responses about weight and height to measurements taken after the survey using weight and height measuring equipment. CDC staff conducted the study twice with two weeks between the first and second implementation. The result received by CDC staff was that students reported their weight as 3.5 pounds less than their actual weight and their height as 2.7 inches more than their actual height. Therefore, overweight status and the incidence of obesity may have been under-reported. If students under or over-reported their weight or height this affected the

internal validity as this would distort the true effect of the experimental condition on the variables.

Staff working for the CDC completed two test-retest studies to determine the reliability and validity of the YRBS. Staff from the CDC completed an initial study in 1992 using the 1991 version of the questionnaire. CDC staff surveyed a sample of 1,679 students on two occasions separated in time by 14 days. The students surveyed were in Grades 7 - 12. Staff that implemented the study found the reliability of 75% of the scores were in the range of kappa = 61%-100%. The implementers did not find any significant statistical differences in the prevalence estimates for test and retest scores. The scores that students in Grade 7 received were less consistent than scores received by students in Grades 9-12. The CDC staff conducting the study concluded that the survey was more suited for students in Grades 9-12.

In 2000 CDC staff completed a second study which included 4,619 students. CDC staff surveyed high school students twice with 14 days between each survey test. This time the reliability of some questions were questionable. CDC staff found that 22% of the time estimates for prevalence were different for each of the two survey tests. Also, staff found that 14% (10 questions) had significantly different prevalence estimates between the first and second administrations with kappa below 61%. CDC staff revised some of the questions and some of the questions were eliminated from the earlier version of the questionnaire. Since, there was no report of the revised questionnaire being evaluated for validity I considered this as a threat to the reliability and validity of the survey.

Construct Validity

Wieland et al. (2017) asserted that scientific investigators should focus on statistical analysis of constructs along with ruling out variables that they feel won't lead participants to give a response that reveals a measurement of the attribute that is being measured. Borsboom et al. (2004) in a more in depth way explained that to determine construct validity the investigator has to statically analyze the test scores received by participants on comparable surveys or scale tests and determine if they consistently receive an interpretation that is consistent with the theoretical and empirical concepts that the investigator was investigating. For example, Barkoukis et al. (2012) examined construct validity of the Physical Education Trait Anxiety Scale (PETAS). The PETAS is a multi-dimensional psychological test that measures trait anxiety. To determine construct validity the PETAS was administered by staff to 149 students. Staff assisting with study administered the Trait Anxiety Inventory (TrAI) and the Test Anxiety Inventory (TsAI) to the same 149 students. The objective was to administer the PETAS with other validated and reliable tests. Staff conducted a statistical analysis and found that the scores received by high school students on the subscales of the PETAS, the TrAI, and the TsAI were moderately correlated. Barkoukis et al. (2012) concluded that construct validity level they calculated for the PETAS was substantial.

Both Wieland et al. (2017) and Borsboom et al. (2004) reported on evaluating construct validity for psychological tests. The tests that Wieland et al. (2017) and Borsboom et al. (2004) studied measured human trait or attribute constructs. Threats to construct validity are common with human trait or attribute constructs because the

specific definitions that the investigators are studying may not be readily clear to the participants. The staff from the CDC did not develop the YRBS to measure traits or attributes therefore there was less likelihood for threats to that involved construct validity.

I found only one threat that affected construct validity. Sometimes participants in a survey change their behavior or respond to a survey question in certain way because they have knowledge of a preferred outcome or they estimated the preferred outcome. This is called hypothesis guessing. In the section on threats to internal validity above, I mentioned a study on the fallacies of self-reporting for a survey. Some students that responded to the YRBS gave responses to questions of about their height and weight that were not truthful. These students gave responses according what they thought was desirable for weight and height.

I found no evidence that a study was done to evaluate the construct validity of the survey. The efforts that were made by the CDC, in the original development of the YRBS only supported the establishment of content validity. For example, agencies that were responsible for enhancing and monitoring the frequency of behavioral risk factors in the six priority categories were asked by CDC to designate people to work as part of a steering committee (Kann et al., 2013). The committee was assigned the task of dividing into panels that would establish priority behaviors and then develop questions to be used on a survey to measure the priority behaviors.. The staff working on this project finished the original version of the survey in 1989. Several different sources of manpower

reviewed the survey. Specialists from the National Center for Health Statistics (NCHS) also contributed to the review with a critical analysis.

Staff administered the YRBS for a second time in 1991. This survey was considered a national-level survey as high school students were represented from almost all of the states that make up the United States of America. Staff completed laboratory testing of the 1991 version of the survey at the Questionnaire Design Laboratory at NCHS. Staff working at the Questionnaire Design Laboratory at NCHS administered the survey to high school students. The responses made by the high school students on the questionnaire were analyzed by the NCHS staff and recommendations were given for clearing up any vagueness in how the questions were worded.

The consistency of responses on survey questions for students in Grades 9 -12 was compared to responses from seventh-grade students. The responses of the seventh graders were less consistent. It was concluded that the survey was more suitable for students in Grades 9 - 12. Examining the variables and clearing up vagueness in the wording of the questions was a good procedure for evaluating content validity but not for establishing construct validity. Survey results of high school students on the YRBS have not been compared statistically with survey results of high school students on comparable surveys as in Barkouskis et al., (2012) mentioned above.

Although construct validity has not been scientifically established, the questions about concepts such as weight, height, physical activity, and consuming vegetables are straightforward and may help in terms of clarity for measuring what is claimed to be

measured. Also, questions about weight, height and physical activity were checked with mechanical instruments.

Ethical Procedures

The CDC intended to protect the privacy of the students involved (Brener et al. 2017). Therefore, students did not supply any identifying information, and participation was voluntary. Parental permission was obtained by students according to local regulations. Staff surveyed the students via a self-administered questionnaire during one class period. Students recorded answers in a computer booklet which can be scanned. The YRBS protocol was approved by the CDC's Internal Review Board (IRB). I obtained permission to use data on the CDC website from the Walden University IRB.

Summary

In Chapter 3 I explained the design and methodology of the method of inquiry. In the introduction I discussed the poor health status of high school students. Although this could be improved by students increasing physical activity to the level recommended by HHS (60 minutes per day of moderate to vigorous physical activity), Cluss et al. (2016) noted that50% of American youths did not meet this requirement. Staff who were assigned administered the YRBS to high school students who were involved in initiatives implemented by national, state, territorial, tribal entities to increase physical activity among adolescents. In this study I investigated the effectiveness of three patterns used by high school students when they practiced recommendations for physical activity and a healthy diet from the CDC for reducing the incidence unhealthy weight status (practicing both physical activity recommendations and healthy diet recommendations together,

practicing only physical activity recommendations alone, or practicing only healthy diet recommendations alone).

In Chapter 3 I reported that I used a secondary data analysis research design and quantitative methodology. I described the population as high school students in the United States that were involved in initiatives to increase physical activity, decrease the incidence of obesity, decrease the incidence of overweight status, and support academic achievement.

I explained that the data was already collected. I analyzed secondary data about physical activity (PA) behavior, the incidence of obesity, the incidence of self-reported overweight status, dietary behavior, and the academic performance of high school students in the United States. I explained that YRBS was administered by CDC staff. Students participated in 2017 YRBS from most of the states of the union. The locations I specified in this study were chosen because the survey responses of those students from those locations were available on the CDC website.

I explained that the recruitment process. I indicated that students participated on a voluntary basis. I reported that students obtained parental permission by having their parents sign permission slips. I explained that I did not violate the confidentiality of the students that participated in the survey. Students did not submit any identifying information. The CDC staff that conducted the survey used cluster sampling to select the sample of students that participated in the 2017 YRBS. I used a G*Power 3.1 application to calculate the sample size.

I indicated that the data analysis for the research questions was the Pearson Chi-Square statistic. I used the Chi-square statistic to analyze the effect of the independent variables (3 patterns that students used when practicing recommendations for physical activity and a healthy diet) had on the dependent variables which are overweight status and obesity and academic performance.

I discussed the reliability of the questionnaire and indicated that it was affected by the self-report of the participants. I explained that the self-report of participants and vagueness of the wording of some of the survey questions was a threat to internal validity. I noted that the external validity of the survey was threatened because approximately 5% of high school age youths were not enrolled in high school when the survey was given. I explained that absence of a study done to determine Construct validity was a threat to construct validity.

The next section is Chapter 4. In the introduction I made a brief statement about the purpose of the study. I stated the research questions and hypotheses. Then I explained the data collection and recruitment process. I discussed the implementation of a multicomponent intervention program for reducing the incidence of unhealthy weight status and to enhance academic achievement. I also discussed how effectiveness of the program. I ended this section with a summary and transitions to Chapter 5.

Chapter 4: Results

In Chapter 4 I reviewed the purpose and background of the study. I explained of the data collection, treatment fidelity, and results that I received. I ended Chapter 4 with a summary, and transition to Chapter 5. In the data collection section, I described the time frame for data collection as well as the actual recruitment and response rates. I reported the descriptive and demographic characteristics of the sample. I explained the representativeness of the sample relative to the population of interest. I state the results of the Chi-square analyses.

Purpose and Background of the Study

I used quantitative methodology in this study to understand possible improvements that could be implemented when guiding high school students to follow recommendations presented by the CDC for reducing the incidence of obesity and overweight status and supporting academic achievement among high school students. The goal of the CDC is to help students to improve and maintain physical health and mental acuity leading into adulthood by presenting information through programs and instruction presented in PE classes. In addition, an effort is made to provide more opportunities for physical activity and healthy eating during and after the school day. The information from the results that I receive may help to fill a gap in knowledge about best practices for programs for reducing the incidence of unhealthy weight status.

The independent variables are patterns used by high students when they practiced recommendations for physical activity behavior and healthy diet behavior given by the

CDC. The dependent variables were obesity and overweight status and grades such as *A*s, *Bs, Cs,* etc., received by high school students during the past 12 months.

Data Collection

The dataset for this study was originally obtained by Market Data Retrieval, Inc. (MDR) and The National Center for Education Statistics as part of a larger dataset which included YRBS from 1991 – 2017. This dataset was available for public use on the CDC website (US Department of Education, National Center for Education Statistics, 2013-14; Market Data Retrieval, 2016.)

The CDC included charter schools, all public schools, other nonpublic schools, and catholic schools in the 2017 national survey. Students that CDC included in the national survey were in Grades 9 - 12 and were from the 50 states and the District of Columbia. The staff excluded schools with 40 or fewer students enrolled in Grades 9-12.

The staff that implemented the sampling excluded schools for individuals with intellectual disabilities. Schools run by the Department of Defense, by the Bureau of Indian Education, and vocational schools that only served exclusive populations were also excluded by staff implementing the sampling.

The CDC staff implementing the sampling completed cluster sampling in 3 stages. The staff selected a population sample of high school students from the United States which numbered 18,324. This sample was about 1.24% of the total population of high school students in the United States and the District of Columbia in 2017. Only 14765 of the 18,324 surveys that the students submitted were usable after data cleaning.

Treatment and/or Intervention Fidelity

In this study, I used secondary data that were available from the YRBS of 2017 at the CDC website. The YRBS has questions about overweight status, obesity, grades received in the last 12 months, involvement in physical activity and consumption of healthy foods. I did not implement a treatment or intervention as part of this study. I did not have any direct or indirect contact with the high school students that completed the surveys. According to information that I found at the CDC website, students participated in the survey anonymously and voluntarily. The administrative staff that organized the survey did not allow students to participate in the survey unless they had parental permission. High school students placed answers to the survey questions in a booklet that could be scanned by computer. The test period was equal to one class period. No challenges were reported by staff relative to the implementation of the survey.

Study Results

In the following section I reported the descriptive statistics, statistical assumptions, and statistical analysis findings, for the research hypotheses (H_I1 and H_I2). In Table 2 I indicated that the target population was 48.6% male and 51.0 % female. I used Table 3 to show the quantities of students in each grade.

Table 2

Frequencies of Males& Females

	N	%
Male	7112	48.6%
Female	7526	51.0%
Missing System	122	0.8%
Total	14760	100.0%

Note: N= Number of Males and Females

Table 3

Demographic Characteristics of Target Population

Grade	N	%
9th	3921	26.6%
10th	3715	25.2%
11th	3602	24.4%
12th	3383	22.9
Missing System	139	0.9%

Note. N= Number of Students in each grade

In Table 4 I showed the percentages of students broken down by race. Most of the students were White (42.5%) followed by Hispanic/Latino (24.7%) and Black or African American (18.9%).

Table 4

Race Variables

Race	N	%
White	6261	42.4%
Black or African American	2796	18.9%
Hispanic/Latino	3647	24.7%
All other races	1724	11.7%
Missing System	332	2.2%
Total	14760	100.0%

Note: N=Number of students in each race category

Findings for $H_1 1$ and $H_1 2$ with Sample of 191 Students

$H_1 1$: The Incidence of Overweight Status and Obesity

For $H_1 1$ I hypothesized that when students regularly practiced both physical activity recommendations and healthy diet recommendations together the incidence of overweight status and obesity was significantly lower compared to when students in Grades 9 - 12 practiced only recommendations for physical activity or only

recommendations for a healthy diet. I used SPSS to calculate the Pearson Chi-square statistic for the smaller sample of 191 students to determine if H_I1 held true for the high school students that responded to 2017 YRBS.

I displayed the results in Table 5. I indicated that 13 students practiced both physical activity recommendations and healthy diet recommendations together. Two of those students (15.4%) had overweight status. A total of 3 students practiced either physical activity recommendations alone or only healthy diet recommendations alone. Of those 3 students who practiced only physical activity recommendations alone or only healthy diet recommendations alone 33.3% (1) had overweight status. Among the students who practiced only physical activity recommendation alone or only healthy diet recommendations alone the incidence of overweight status (33.3%) was higher than it was among students who practiced both physical activity recommendations and healthy diet recommendations together (15.4%). Although the results that I received here supported what I predicted in H_I1 (lower incidence of overweight status among students who practiced both physical activity recommendations and healthy diet recommendations together), the *P* value for the Chi-square analysis that I displayed in Table 6 was .473. I did not use this significance value as an assumption of McHugh (2013) for using the Chi-square results that I received was violated.

Table 5

DiPa Had Overweight Crosstabulation

			Were overweight		
			1	2	Total
DiPa	2.00	Count	1	2	3
		Expected Count	.6	2.4	3.0
		% within DiPa	33.3%	66.7%	100.0%
		% within Were overweight	33.3%	15.4%	18.8%
	4.00	Count	2	11	13
		Expected Count	2.4	10.6	13.0
		% within DiPa	15.4%	84.6%	100.0%
		% within Were overweight	66.7%	84.6%	81.3%
Total		Count	3	13	16
		Expected Count	3.0	13.0	16.0
		% within DiPa	18.8%	81.3%	100.0%
		% within Were overweight	100.0%	100.0%	100.0%

According to McHugh (2013) when more than 20% of the table cells have an expected count less than 5 the individual that conducted the Chi-square analysis should determine the significance level through the likelihood ratio rather than using the Pearson Chi-square significance level. The results I displayed in Table 6 (.497) for the likelihood ratio was also above .05 and therefore the association between these variables was not significant.

Table 6

Chi-Square Tests Had Overweight

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.515[a]	1	.473		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.461	1	.497		
Fisher's Exact Test				.489	.489
Linear-by-Linear Association	.483	1	.487		
N of Valid Cases	16				

a. 3 cells (75.0%) have an expected count less than 5. The minimum expected count is .56.
b. Computed only for a 2x2 table

The results I reported in Tables 7, 8, and 9 were for the incidence of obesity among the sample of 191 high school students that took the YRBS. In Table 7 I indicated that 3 of the students in this sample practiced physical activity recommendations only or healthy diet recommendations alone and 13 students practiced both physical activity recommendations and healthy diet recommendations together. None of the students that practiced only physical activity recommendations alone or healthy diet recommendations alone had obesity.

Table 7

*DiPa * Had Obesity 191 Crosstabulation*

			Had obesity		
			1	2	Total
DiPa	2.00	Count	0	3	3
		Expected Count	.2	2.8	3.0
		% within DiPa	0.0%	100.0%	100.0%
		% within Had obesity	0.0%	20.0%	18.8%
	4.00	Count	1	12	13
		Expected Count	.8	12.2	13.0
		% within DiPa	7.7%	92.3%	100.0%
		% within Had obesity	100.0%	80.0%	81.3%
Total		Count	1	15	16
		Expected Count	1.0	15.0	16.0
		% within DiPa	6.3%	93.8%	100.0%
		% within Had obesity	100.0%	100.0%	100.0%

On the other hand, one of the students that practiced both physical activity recommendations and health diet recommendations together had obesity. The incidence of obesity was greater (7.7% versus 0.0%) among students that practiced both physical activity recommendations and health diet recommendations together. I used the significance value of .512 for the Likelihood Ratio to determine significance. The results that I received were not significant as .512 was above the margin of error of p =.05.

Table 8

Chi-Square Tests Had Obesity 191

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.246[a]	1	.620		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.430	1	.512		
Fisher's Exact Test				1.000	.813
Linear-by-Linear Association	.231	1	.631		
N of Valid Cases	16				

a. 3 cells (75.0%) have an expected count less than 5. The minimum expected count is .19.
b. Computed only for a 2x2 table

- ***$H_1$2*: Higher Grades During the Past 12 Months**

I hypothesized that students who practiced both physical activity recommendations and healthy diet recommendations together would report having higher grades during the past 12 months significantly more frequently compared to students who practiced only physical activity recommendations alone or students who practiced only healthy diet recommendations alone.

I also used the smaller sample size of 191 students for *$H_1$2*. In Table 9 I indicated that 57.1% (4 out of 7) of the students that practiced both physical activity recommendations and healthy diet recommendations together reported having higher grades during the past twelve months. The results I indicated in Table 9 for the Pearson Chi-square analysis was that only one student practiced only physical activity recommendations alone and reported receiving *As* or *Bs* during the past 12 months. Also, I displayed in Table 9 that

only one student practiced only healthy diet recommendations alone and reported that they received mostly *As* and *Bs* during the past 12 months. That means that reporting of receiving mostly *As* and *Bs* was 100% for students that practiced only physical activity recommendations alone or healthy diet recommendations alone. The percentage for reporting of higher grades was greater among students that practiced either physical activity recommendations alone or healthy diet recommendations alone.

Table 9

*Combine *Higher Grades 191 Crosstabulation*

			Described their grades in school as mostly A's or B's		
			1	2	Total
Combine	4.00	Count	1	0	1
		Expected Count	.7	.3	1.0
		% within Combine	100.0%	0.0%	100.0%
		% within Described their grades in school as mostly A's or B's	16.7%	0.0%	11.1%
	6.00	Count	1	0	1
		Expected Count	.7	.3	1.0
		% within Combine	100.0%	0.0%	100.0%
		% within Described their grades in school as mostly A's or B's	16.7%	0.0%	11.1%
	8.00	Count	4	3	7
		Expected Count	4.7	2.3	7.0
		% within Combine	57.1%	42.9%	100.0%
		% within Described their grades in school as mostly A's or B's	66.7%	100.0%	77.8%
Total		Count	6	3	9
		Expected Count	6.0	3.0	9.0
		% within Combine	66.7%	33.3%	100.0%
		% within Described their grades in school as mostly A's or B's	100.0%	100.0%	100.0%

The value that I calculated for significance through SPSS (.387) was above the *p* value of .05 and therefore significance was not established.

Table 10

Chi-Square Test For Higher Grade 191

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.286[a]	2	.526
Likelihood Ratio	1.897	2	.387
Linear-by-Linear Association	1.000	1	.317
N of Valid Cases	9		

a. 6 cells (100.0%) have an expected count less than 5. The minimum expected count is .33.

Findings for $H_1$1 and $H_1$2 with Sample of 14,765 Students

I also used SPSS to run the Chi-square analysis on the total population of 14,765 students who took the YRBS in 2017. I reported the case summary for the analysis of the incidence of overweight status in Table 11. In Table 12 I indicated that among students that practiced only healthy diet recommendations alone 14.4% had overweight status.

$H_1$1: Lower incidence of overweight status

Table 11

Case Processing Summary for Overweight

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Combine * Were overweight	12290	83.3%	2470	16.7%	14760	100.0%

I also indicated in Table 12 that 16.0% of the students that practiced only physical activity recommendations alone had overweight status. The percentage of students who

had overweight status among the students who practiced both physical activity recommendations and healthy diet recommendations together was 16.9%. I displayed the value for the Pearson's Chi-square statistic in Table 13. It was χ^2= 9.418. The *P* value was .024 which is below .05 and therefore it was significant.

Table 12

*Combine * Were Overweight Crosstabulation*

			Were overweight		
			1	2	Total
Combine	3.00	Count	107	496	603
		Expected Count	98.8	504.2	603.0
		% within Combine	17.7%	82.3%	100.0%
		% within Were overweight	5.3%	4.8%	4.9%
		% of Total	0.9%	4.0%	4.9%
	4.00	Count	349	2071	2420
		Expected Count	396.6	2023.4	2420.0
		% within Combine	14.4%	85.6%	100.0%
		% within Were overweight	17.3%	20.2%	19.7%
		% of Total	2.8%	16.9%	19.7%
	6.00	Count	161	846	1007
		Expected Count	165.0	842.0	1007.0
		% within Combine	16.0%	84.0%	100.0%
		% within Were overweight	8.0%	8.2%	8.2%
		% of Total	1.3%	6.9%	8.2%
	8.00	Count	1397	6863	8260
		Expected Count	1353.6	6906.4	8260.0
		% within Combine	16.9%	83.1%	100.0%
		% within Were overweight	69.4%	66.8%	67.2%
		% of Total	11.4%	55.8%	67.2%
Total		Count	2014	10276	12290
		Expected Count	2014.0	10276.0	12290.0
		% within Combine	16.4%	83.6%	100.0%
		% within Were overweight	100.0%	100.0%	100.0%
		% of Total	16.4%	83.6%	100.0%

Table 13

Chi-Square Tests for Overweight Status

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9.418[a]	3	.024
Likelihood Ratio	9.622	3	.022
Linear-by-Linear Association	4.496	1	.034
N of Valid Cases	12290		

Note: a. 0 cells (.0%) have an expected count less than 5. The minimum expected count is 98.82.

Since the results that I received for the analysis was significant, I used SPSS to calculate the effect of the significant results I received. I found that value of the Cramer's V test was .028. I display the results I received in Table 14. According to Cramer (1946) the effect of my results was small because it was between 0 which is no effect and .159 which is below moderate (.32).

Table 14

Symmetric Measures Overweight

		Value	Approximate Significance
Nominal by Nominal	Phi	.028	.024
	Cramer's V	.028	.024
N of Valid Cases		12290	

I displayed the results I received for the incidence of obesity in Table 15. I indicated that the percentage of students that had obesity among the group that practiced only healthy diet recommendations alone was 14.3%. Among the students that practiced

only physical activity recommendations alone 11.1% had obesity. Among the students that practiced both physical activity recommendations and health diet recommendations together, 69.9% had obesity. The percentage of students that had obesity was greatest among the students that practiced both physical activity recommendations and healthy diet recommendations together. The second greatest percentage for incidence of obesity was among the students who practiced only healthy diet recommendations alone. My report about the results that I received here for the incidence of obesity did not support what I hypothesized in $\underline{H_1 1}$ (that students who practiced both physical activity recommendations and healthy diet recommendations together had a statistically significant lower incidence of obesity than students who practiced only physical activity recommendations alone or healthy diet recommendations alone).

In Table 16 I indicated that the results that I received for the Pearson Chi-square test was $\chi^2 = 55.656$ and that the *P* value was .000. I found that .000 was below my margin of error (.05). Therefore, the association between the variables was significant and what I hypothesized in $\underline{H_1 1}$ was not supported by what reported as my findings. Students who used both physical activity recommendations and healthy diet recommendations together did not have the statistically lowest incidence of obesity of the three groups.

Table 15

*Combine *Had Obesity Crosstabulation*

		Had obesity					
		1		2		Total	
		N	%	N	%	N	%
Combine	3.00	86	4.7%	517	4.9%	603	4.9%
	4.00	259	14.3%	2161	20.6%	2420	19.7%
	6.00	201	11.1%	806	7.7%	1007	8.2%
	8.00	1267	69.9%	6993	66.7%	8260	67.2%
Total		1813	100.0%	10477	100.0%	12290	100.0%

Table 16

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	55.656[a]	3	.000
Likelihood Ratio	56.635	3	.000
Linear-by-Linear Association	18.013	1	.000
N of Valid Cases	12290		

a. 0 cells (0.0%) have an expected count less than 5. The minimum expected count is 88.95.

Table 17

Symmetric Measures Had Obesity

		Value	Approximate Significance
Nominal by Nominal	Phi	.067	.000
	Cramer's V	.067	.000
N of Valid Cases		12290	

In Table 17 I displayed the results I received for the Cramer's V test. The value for Cramer's V was .067. I concluded that .067 was considerably below the moderate value of .32 and therefore it was a low effect value for the relationship between the incidence of obesity and the pattern of implementing the recommendations for physical activity and a healthy diet.

H_I2: Reporting of higher Grades during the past 12 months.

I hypothesized for H_I2 that students that practiced both physical activity recommendations and healthy diet recommendations together would report having higher grades during the past twelve months significantly more frequently than students who only practiced physical activity recommendations alone and students that practiced only healthy diet recommendations alone.

In Table 18 I displayed the case summary of the interaction between the four patterns of implementing recommendations students used and students describing their grades as mostly *As* or *Bs* based on the sample of 14765 students.

Table 18

Case Processing Summary Higher Grades

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Combine * Described their grades in school as mostly A's or B's	11160	75.6%	3605	24.4%	14765	100.0%

In Table 19 I indicated that 66.8% of students that practiced both physical activity recommendations and healthy diet recommendations together reported higher grades as

As and 65.8% reported higher grades as *Bs*. Only 19.4% of the students that practiced only healthy diet recommendations reported having higher grades as *As* and 21.5% reported having higher grades as *Bs*.

Table 19

*Grades in School*Combine Crosstabulation*

			Combine				
			3.00	4.00	6.00	8.00	Total
Grades in school	Mostly A's	Count	197	798	367	2743	4105
		Expected Count	210.2	839.3	351.6	2703.8	4105.0
		% within Grades in school	4.8%	19.4%	8.9%	66.8%	100.0%
		% within Combine	35.8%	36.3%	39.9%	38.8%	38.2%
	Mostly B's	Count	212	899	320	2755	4186
		Expected Count	214.4	855.9	358.6	2757.1	4186.0
		% within Grades in school	5.1%	21.5%	7.6%	65.8%	100.0%
		% within Combine	38.5%	40.9%	34.8%	38.9%	39.0%
	Mostly C's	Count	120	414	181	1245	1960
		Expected Count	100.4	400.8	167.9	1291.0	1960.0
		% within Grades in school	6.1%	21.1%	9.2%	63.5%	100.0%
		% within Combine	21.8%	18.9%	19.7%	17.6%	18.2%
	Mostly D's	Count	13	60	42	238	353
		Expected Count	18.1	72.2	30.2	232.5	353.0
		% within Grades in school	3.7%	17.0%	11.9%	67.4%	100.0%
		% within Combine	2.4%	2.7%	4.6%	3.4%	3.3%
	Mostly F's	Count	8	25	10	93	136
		Expected Count	7.0	27.8	11.6	89.6	136.0
		% within Grades in school	5.9%	18.4%	7.4%	68.4%	100.0%
		% within Combine	1.5%	1.1%	1.1%	1.3%	1.3%
Total		Count	550	2196	920	7074	10740
		Expected Count	550.0	2196.0	920.0	7074.0	10740.0
		% within Grades in school	5.1%	20.4%	8.6%	65.9%	100.0%
		% within Combine	100.0%	100.0%	100.0%	100.0%	100.0%

The percentage of students that reported receiving higher grades as *As* among students that practiced only physical activity recommendations was 8.9%. The percentage of students that reported receiving higher grades as *Bs* among the students that practiced

only physical activity recommendations was 7.6%. I supported what I predicted in H_I2 with what I reported about results I received for the analysis. The students that practiced both physical activity recommendations and healthy diet recommendations together reported receiving higher grades as *As* or *Bs* significantly more frequently than students who only practiced physical activity recommendation alone or those who only practiced healthy diet recommendations alone.

I displayed the results of the Chi-square analysis in Table 20. The results I received was $\chi 2=26.378$. The significance level was .009 which is less than the margin of error $p = .05$. The results I received were significant.

Table 20

*Chi-Square Tests Higher Grades *Combine*

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	26.378[a]	12	.009
Likelihood Ratio	26.096	12	.010
Linear-by-Linear Association	2.153	1	.142
N of Valid Cases	10740		

a. 0 cells (0.0%) have an expected count less than 5. The minimum expected count is 6.96.

The effect value for Cramer's V (.029) that I displayed in Table 21 was below moderate. I concluded that strength of the relationships between patterns of implementation for physical activity recommendations and healthy diet recommendations and frequency of students reporting that they received higher grades was weak.

Table 21

*Symmetric Measures for Grades in School*Combine*

		Value	Approximate Significance
Nominal by Nominal	Phi	.050	.009
	Cramer's V	.029	.009
N of Valid Cases		10740	

Summary and Transition

In Chapter Four, I gave a review of the purpose of the study and background of the study. I explained that for data collection I obtained a dataset from Market Data Retrieval Inc. (MDR) and the National Center Of Education Statistics. I indicated that Charter schools, public schools, nonpublic schools, and catholic schools were included in the survey. The participants were students were in Grades 9-12 and from the 50 contiguous states and the District of Columbia.

I indicated that CDC staff responsible for implementing the survey used cluster sampling that was completed in three stages. The size of the total population of high school students who responded to the YRBS in 2017 was 18,324. This amounted to about 1.17% of the total population of high school students in the United States and the District of Columbia in 2017(Duffin, 2021). After the staff responsible for preparing the data for analysis finished cleaning the dataset, only 14765 students had usable surveys. I displayed the demographics of the population were in Tables 2, 3, and 4.

In Chapter 4, I explained that this study did not involve any treatment or intervention. I explained that I used two sample sizes (191 and 14765). When I conducted the Chi-square analysis on the small sample of 191 students I found that what I reported

for the results that I received only supported what I hypothesized for $H_1 1$ for the incidence of overweight status but not for the incidence of obesity. The results that I received for both the incidence of overweight status and the incidence of obesity were not significant. My report of the results that I received for Chi-square using the dataset for the sample of 191 students did not support $H_1 2$. I found that the *p* value was above .05 and not significant.

When I conducted the Chi-square analysis for dataset of the total population of 14765 students, my report of the results that I received did not support $H_1 1$ (lower incidence of overweight status and obesity when students practiced both physical activity recommendations and healthy diet recommendation together) however, the results I received were not significant.

My report of the results that I received when I conducted the Chi-square analysis for the population of 14765 students supported what I hypothesized for $H_1 2$ (that students who practiced both physical activity recommendations and healthy diet recommendation together reported that they received higher grades more frequently during the past 12 months than student who practiced only physical activity recommendations alone and students who practiced only healthy diet recommendations alone). I also found that the *p* value that I received when I analyzed the dataset for $H_1 2$ for the population of 14765 students was significant.

In Chapter 5 I discussed and interpreted the findings mentioned in Chapter 4. I explained the limitations and implications of the study. I discussed recommendations for future studies. I ended the Chapter with concluding thoughts.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of my study was to understand what changes were needed when instructing high school students to reduce the incidence of overweight status and obesity and at the same time support academic achievement. I used quantitative methodology to determine which of three patterns of practicing recommendations promoted by the CDC was most effective for reducing the incidence of overweight status and obesity and supporting academic achievement. I conducted the Chi-square analysis for 2 sample sizes. The results I received when I conducted a power analysis using the G*Power 3.1 application was that the small sample size of 191 students was appropriate for a medium effect of .30. When I used the larger sample size of 14,765 students, the effect size was smaller (.034), however I had more opportunities to note the interaction of the variables.

Interpretation of Findings RQ1

I conducted the Chi-square analysis using data from the small sample of 191 students. In RQ1 I asked: Was there a significant difference in the incidence of overweight status and obesity depending upon the pattern that students used when following recommendations given by the CDC. I found that $H_1$1 was supported for overweight status but not for obesity. The incidence of overweight status was lower among students who practiced physical activity and healthy diet recommendations together. The incidence of obesity was not lower among students who practiced both physical activity and healthy diet recommendations together. The results that I received for the Chi-square analysis for overweight status and obesity were not significant. Therefore I could not rule in $H_1$1 for overweight status because I found that the

association between following different patterns when the students practiced recommendation from the CDC and overweight status was not significant. The opposite was true with my findings for obesity. I could not reject $H_0 1$ because I found that the association between the independent variable students following different patterns when they practiced recommendations from the CDC and obesity was not significant.

I conducted a Chi-square analysis using data from the total population of 14765 students. In RQ1 I asked: Was there a significant difference in the incidence of overweight status and obesity depending upon the pattern that the students used when they practiced recommendations given by CDC ? I found that $H_1 1$ was not supported for overweight status and obesity. The incidence of overweight status and obesity were not lower among students that practiced both physical activity recommendations and healthy diet recommendations together compared to incidence overweight status and obesity among students who practiced only physical activity recommendations alone or only healthy diet recommendations alone. The results that I received for the Chi-square analysis of the data from the total population of 14765 students were significant for both overweight status and obesity. The strength of the relationship that I received for overweight status when I conducted the Cramer's V test was .028. The strength of relationship that I received for obesity when I conducted the Cramer's V test was .067. According to the measurement process used by Cramer (1946) .028 and .067 are considered weak because both values are considerably below the moderate level of .32.

Interpretation of Findings RQ2

For RQ2 I followed the same procedure of conducting a Chi-square analysis using data from the small sample of 191 students first and then using data for the total population of 14765 students. In RQ2 I asked: Was there a significant difference in students reporting that they received higher grades during the past 12 months depending upon the pattern they followed when they practiced recommendations by the CDC? When I conducted a Chi-square analysis using data from the sample of 191 students I found that 100% of students that practiced only physical activity alone and 100% of the students that practiced only healthy diet recommendation alone reported that they received higher grades (As in *As* and *Bs*) during the past 12 months. The percentage of students that reported that they received higher grades during the past 12 months among the students that practiced both physical activity recommendations and healthy diet recommendations together was 57.1%. This did not support what I predicted in $H_1 2$ which was that the number of students reporting higher grades during the past 12 months was greater among students how practiced both physical activity recommendations and healthy diet recommendations together. The *p* value that I received (.487) was below the margin of error .05. It was not significant. Therefore, I found that this association was not significant. The alternative hypothesis was not disproved or proved.

When I conducted the Chi-square analysis using data from the population of 14765 students surveyed in 2017, the result that I received were significant and $H_1 2$ was supported (that among the students that practiced both physical activity and healthy diet recommendations together a greater amount reported that they received higher grades

during the past 12 months compared to the students that practiced only physical activity recommendations alone or only practiced healthy diet recommendations alone). In Table 19 I reported that among the students that practiced both physical activity recommendations and healthy diet recommendations together 2755 students reported receiving higher grades as *As* and 2743 reported receiving higher grades as *Bs* compared to 798 students reporting higher grades as *As* and 899 students reporting higher grades as *Bs* among the students that practiced only healthy diet recommendations alone, followed by students that practiced only physical activity recommendations alone who reported that received higher grades the least. The strength of the relationship that I calculated with SPSS was .029. According the

Comparison to Peer-Reviewed Literature

In peer-reviewed literature Kann et al. 2018 indicated that 15.6% of the high school students in the United States surveyed with the YRBS in 2017 had overweight status and 14.8% of high school students in the United States surveyed with the YRBS in 2017 had obesity. Dupart et al. 2019 asserted that students having overweight status and obesity was due to a sedentary lifestyle and poor dietary habits. Wieland et al.2020 noted that the incidence of overweight status and obesity was decreased through a routine of physical activity and practicing healthy dietary habits. When I conducted the Chi-square analysis using data from a sample of 191 students I supported $H_1$1 of RQ1 when I reported that I found that for overweight status that practicing both physical activity recommendations and healthy diet recommendations together was superior to practicing only physical activity recommendations alone or practicing only healthy diet

recommendations alone. What I reported was in agreement with what researches reported in peer reviewed literature such as Wieland et al. 2020 mentioned above. On the other hand what I reported for the results that I received for RQ1 for obesity did not support $H_1$1 as the results that I received was that practicing both physical activity recommendations and healthy diet recommendations together was not superior to practicing only physical activity recommendations alone or practicing only healthy diet recommendations alone. Therefore, my report of the results that I received for obesity did not agree with what was reported by researchers in peer viewed literature. My report of the results that I received for overweight status using the data from the sample of 191 status supported what was indicated in peer-reviewed literature. My report of the results that I received for obesity using the sample of 191 students did not support what was indicated in peer reviewed literature, however neither analysis was significant. Therefore, the results that I received cannot be used as evidence for or against what was reported in peer-reviewed literature.

On the other hand, the results that I received when I analyzed the data from the larger sample of 14,765 were significant. In that case, the students that practiced both physical activity recommendations and healthy diet recommendations together had the highest incidence of overweight status and the second-highest incidence of obesity. The results that I received for $H_1$1 of RQ1 were significant. The results that I received are evidence for a view that is contrary to what was indicated by researchers in the peer-reviewed literature which was that those students who practiced both physical activity

recommendation and healthy diet recommendations together would have the lowest incidence of overweight status and obesity.

Rasberry et al. 2017 indicated in peer-reviewed literature that having a routine of physical activity along with consuming a healthy diet helped students maintain good cognitive ability. When I analyzed the smaller sample of 191 students the results I received did not agree with what I wrote in $H_1 2$ nor did it agree with what researchers such as Rasberry et al. 2017 indicated in the peer-reviewed literature that practicing both physical activity recommendations and healthy diet recommendations together is beneficial for good cognitive ability. The results I received for the analysis were not significant and I could not use that information for or against what researchers reported in peer reviewed literature.

I analyzed the data from sample of 14,765 students and found that among the students that practiced both physical activity recommendation and healthy diet recommendations together more students reported that they received higher grades during the past 12 months than students who practiced only physical activity recommendations alone or students who only practiced healthy diet recommendations alone. My report of the results that I received here agreed with what I indicated in $H_1 2$ and with the report of results received by researcher in peer-reviewed literature (that among students who practiced both recommendations for physical activity and recommendations for a healthy diet together more students reported that they received higher grades during the past 12 months compared to students who practice only physical activity recommendations alone

or only practiced healthy diet recommendations alone). The results that I received for this analysis was significant with a weak effect of .029 for the Cramer's V test.

The Context of Self Determination Theory

SDT as put forth by Deci and Ryan (2002) is a motivational theory. It was relevant to this study because overweight status and obesity remain a problem among adolescents and there is a great need to motivate adolescents to achieve and maintain physical fitness and healthy diet goals. Therefore, the CDC has been promoting the development of multicomponent invention programs which use the principles of SDT (autonomy, competence, and relationship). For instance, the Boys and Girls Club and the Rochester Healthy Community Partnership (RHCP) in Minnesota have a multicomponent program with five components of intervention. Administrative staff from RHCP use the first intervention component The Club Fit Policy to set standards for healthy eating and physical activity for members. In this way staff implementing the program address the need for autonomy as members embrace standards to maintain. Staff working for the program set goals for individuals in the program to achieve to win rewards through The Club Fit Challenge component. In that way the staff address the needs of autonomy, and competency as members strive to be successful and achieve rewards. Staff address the competency and relationship needs of the members through The Club Fit Coach Program which is the third component of the program. Members develop their relationship skills and develop competence as they learn to coach their peers.

School systems in Georgia and other states have students that are involved in the YBRS survey. Staff working in the school systems make arrangements for students to have opportunities to learn about and actively take part in healthy dietary behavior and increased physical activity behavior. Students' need for autonomy was satisfied as they learned about and then desired to practice recommendations for increased physical activity and a healthy diet. Students' need for competency was addressed when they were successful at improving their health status by applying what they learned.

My goal in this study was to understand which of three patterns of practicing recommendations from the CDC for reducing overweight status and obesity and supporting academic achievement among high school students was most effective. I found evidence to support the efficacy of using the principles of SDT autonomy, relationship, and competency to motivate students to practice both physical activity recommendations and healthy diet recommendations together in order to support academic achievement.

Limitations of the Study

One of the limitations of this study was self-reporting by the students in answering the questions about weight and height. CDC staff who were responsible for analyzing the survey compared students' survey responses for questions on weight and recordings of weight and height that was done by a third party. Staff found discrepancies as students reported their weight as 3.5 pounds less than what was indicated on a weight scale. Students reported their height as 2.7 inches more than what was indicated by

mechanical measurement. Questions about practicing recommendations for physical activity and a healthy diet depended upon the integrity of students completing the survey. Therefore, it is possible that some of the students did not answer the questions truthfully.

Another limitation of my study was absenteeism. Some students did not attend school when the survey was administered. Therefore, it is possible that students that did take the survey were not totally representative of the population of high school students in the United States in 2017.

Finally, it was difficult to identify the specific information with which this I was concerned. The way survey questions were constructed it was difficult to distinguish the students that practiced only physical activity recommendations alone or only healthy diet recommendations alone from the students that practiced both physical activity recommendation and health diet recommendations together.

Recommendations

Further research should include the investigator developing composite scales that clearly show which recommendations are included in the analysis for each student for physical activity and a healthy diet. For instance, my statistical analyses only dealt with moderate to vigorous physical activity in general but did not include information about muscle strengthening, involvement in organized sports, or attendance in physical education classes. Also, I did not include information bout adequate sleep, eating fruit, drinking water, eating breakfast, or unhealthy diet choices.

Implications for Social Change

My purpose in study was to understand if using different patterns of practicing recommendations given by the CDC was associated with the incidence of overweight status, obesity, and reporting of higher grades among high school students age 14 -18 in Grades 9 - 12. Watts et al., (2016) indicated the one in five adolescents has obesity in the United States. Obesity leads to psychosocial and health issues. More programs are needed for reducing the incidence of obesity. This study has contributed to social change by providing evidence that supports following a pattern of practicing both physical activity recommendations and healthy diet *recommendations* together to support academic achievement. The evidence that I provided had to do with $H_1 2$ (students reporting that they received high grades significantly more frequently). Students who practiced both physical activity recommendations and healthy diet recommendations together reported higher grades significantly more frequently than students who practiced only physical activity recommendations alone or students that practiced only healthy diet recommendations alone. The evidence that I reported about the efficacy of practicing both recommendations for physical activity and recommendations for a healthy diet is a contribution to social change as it can be added to the body of knowledge about intervention for academic performance. This knowledge is available to inspire future educators and health profession when they develop multicomponent interventions programs.

Conclusion

In conclusion, the goal of my study was to determine which of three patterns of practicing recommendations given by the CDC was most effective for reducing overweight status and obesity and supporting academic achievement. The results I received for H_I2 (reporting of higher grades during the past 12 months) was that practicing both physical activity recommendations and healthy diet recommendations together was associated with students receiving higher grades. My report of these finding supports what researchers have indicated in peer-reviewed literature. Further investigation is warranted by researchers to confirm that pairing adequate physical activity with good dietary habits is more efficacious than practicing only physical activity recommendations alone or only practicing healthy diet recommendations alone for supporting academic achievement. Researchers' knowledge of the efficacy of practicing both physical activity recommendation and healthy diet recommendations together could be beneficial to educators and health professionals for developing best practices.

The results that I reported for the I conducted a statistical analysis for RQ1(Was there a statically significant difference in the incidence of overweight status and obesity depending upon the pattern that students used when they practiced recommendations for physical activity and a healthy diet given by the CDC?) using a sample of 191 students. The results that I reported did not support H_I1 (that students that practiced both physical activity recommendations and healthy diet recommendations together had a lower incidence of overweight status and obesity). Further investigation is warranted by researchers for two reasons. First, some of my results were inconclusive. Second, I

reported in Table 12 and Table 15 that some progress has been made as most of the students did not have overweight status or obesity. Further investigation by researchers will help them to understand if practicing both physical activity recommendations and healthy diet recommendations is supporting the improvements that have occurred as most of the students that did not have overweight status or obesity practiced both physical activity recommendations and healthy diet recommendations together.

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