KNOWLEDGE AND BEHAVIOR CHANGE IN CHILDREN WITHIN THE UNIVERSITY OF MISSOURI EXTENSION FAMLY NUTRITION PROGRAM

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The undersigned, appointed by the Dean of the Graduate School, have examined the dissertation entitled

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Presented by Linda J. Morgan

A candidate for the degree of Doctor of Education

And hereby certify that in their opinion it is worthy of acceptance.

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DEDICATION PAGE

To my husband and best friend Scott who supported me each and every day, in so many ways ---I am forever grateful. I could not have made it through this process without you. I appreciate your love, support, and encouragement.

To me maw, you are one in a million and your love, support, and guidance has been a force that has kept me on a solid foundation. I thank you so much for keeping me focused and determined. Thank you for always being there. Love you always.

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CHAPTER 1

INTRODUCTION TO THE STUDY

The incidence of childhood overweight and obesity in the United States is high and steadily on the rise at an epidemic rate (Department of Health and Human Services, 2007). In children 6-11 years old, the incidence of obesity in children was 11.3% in 1994 compared to 17.5% in 2004 (Department of Health and Human Services, 2007). In Missouri, childhood overweight and obesity rates are higher than the national average at 31% (Bloom, Choen, & Freeman, 2009). Furthermore, the Southeast region of Missouri displays higher rates of heart disease, arthritis, and activity limitation when compared to the rest of the state (Homan, Yun, & Zhu, 2006). With these statistics, come many childhood chronic health conditions such as hypertension, diabetes, and high cholesterol (Ebbeling, Pawlak, & Ludwig, 2002; Barlow & Dietz, 2002) along with psychological issues such as depression and low self-esteem (Rich, DiMarco, Huettig, Essery, Anderson, and Sanborn, 2005; Braet, Mervielde, and Vandereycken, 1997; Strauss, 1999). Childhood nutrition and physical activity patterns can be traced into adulthood; therefore, schools and community organizations have an integral role in the treatment of this childhood obesity epidemic (Powers, Struempler, Guarino, and Parmer, 2005; Barlow and Dietz, 2002).

Behaviors such as insufficient physical activity and poor nutrition are acknowledged as primary mechanisms for childhood overweight and obesity. School based programs that combine healthful eating and physical activity education provides a good opportunity to enhance health and lower chronic disease (Veugelers & Fitzgerald, 2005). Although the University of Missouri Extension's Family Nutrition Program

addresses nutrition and physical activity through nutrition education curriculum in the school setting, the University does not know if the curriculum taught is changing knowledge and/or behaviors in 4th grade children related to both nutrition and physical activity. By researching the knowledge and behaviors of children who received nutrition education, the effectiveness and significance of the curriculum can be discovered.

The following paragraphs will reveal the background of this study including the problem statement, purpose, research questions, conceptual framework, design and methods of the study. The findings of the study may prove significant to the University of Missouri Extension program statewide. Significance of discovering the knowledge and behaviors of children regarding nutrition and exercise could certainly lead to modification and enhancement of the program for future children participating in the University of Missouri Extension's Family Nutrition Education Program.

Problem statement

Pyle, Sharkey, Yetter, Felix, Ferlong (2006) stated that program evaluation is needed to determine which outcome measures are most important to reveal how effective the programs are in relation to behavior change. In addition, Contento, Randell, and Basch (2002) stated that nutrition education is based on the paradigm that knowledge leads to attitude change, which in turn, leads to behavior change. Currently, the University of Missouri Extension's Family Nutrition Education Program evaluates teachers' observation and feedback regarding nutrition and physical activity education provided in the school setting; but it does not evaluate both nutrition and physical activity behavior change within fourth grade children participating in the program.

Prior literature has researched knowledge, attitudes, and behaviors of children and found significant knowledge and/or behavior change in students while other studies had inconsistent results. For example, the Child and Adolescent Trial of Cardiovascular health (CATCH) was a multi-year, coordinated elementary school program that found third-to-fifth grade students consumed less fat and were more physically active both in and outside of school. It also noted that the produced change was maintained over time (Hoelscher, Kelder, Murray, Cribb, Conroy, and Parcel, 2007). Another study by Powers, et al. (2005) researched the effects of a 12 week garden-based nutrition education program on dietary behaviors and nutrition knowledge in children. This program sought to increase fruit and vegetable intake and found an increase in consumption of both after the program. Fahlman, Dake, McCaughtry, and Martin (2008) researched the effects of a nutrition intervention on nutrition knowledge, behaviors, and efficacy expectations in middle school children and found significant positive changes in both nutrition knowledge and behaviors. The researchers found that students were more likely to eat fruits and vegetables and less likely to eat junk food. The students also felt more confident that they could make healthy food choices.

These were just a few findings in the literature that demonstrated how intervention through nutrition education curriculum can change knowledge and/or behaviors in children. Although there were many studies showing positive results concerning knowledge and behavior change through curriculum within children in the school setting; there were also many negative outcomes with no knowledge and / or behavior change found (Kandiah & Jones, 2001; Devault, et al., 2009; Frobisher, Jepson, & Maxwell, 2005; Sallis, et al., 2003; Simons-Morton, et al., 1991).

With these inconsistencies related to nutrition education and its effect on knowledge and behavior change in children, the significance of research that discovers the impact and effectiveness of a particular curriculum is very important to determine if that curriculum is changing behaviors that will decrease the obesity epidemic in children. The lack of research of both nutrition and physical activity behaviors within the University of Missouri's Family Nutrition Program is problematic, and should be conducted in order to reveal the impact of the curriculum. Participant knowledge and behavior change in both nutrition and physical activity must be known to determine the impact of the program.

Discovering the knowledge and behaviors of children regarding nutrition and physical activity through nutrition education is one way to impact the childhood overweight and obesity epidemic. Nutrition education can be defined as "any set of learning experiences designed to facilitate the voluntary adoption of eating and other nutrition-related behaviors conducive to health and well being" (Contento, Randell & Basch, 2002, p 3). This definition suggests that behavioral change is the appropriate outcome criteria for evaluating the effectiveness of nutrition education (Contento, Randell, & Basch, 2002). Schools are logical treatment arenas given their unparalleled access to children in terms of time and attention, duration of exposure, and impact on the behavior of children (Pyle, et al., 2006).

Successful school nutrition education programs require a combination of determinants of behavior and an evaluation plan (Hoelscher et al, 2003; Veugler & Fitzgerald, 2005). Further, Powers, et al. (2005) stated that educators should assess program effectiveness through evaluation. Additionally, Pyle, et al. (2006) stated,

individuals may be more motivated to make a change following intervention programs, thus, researchers need to capture these changes.

Currently, there is no evaluation of both nutrition and physical activity knowledge and behaviors of children within the University of Missouri Extension's Family Nutrition Program. Discovering the effectiveness of a nutrition education program through evaluation is very important to deter the childhood obesity epidemic. Therefore, the purpose of this research was to discover the knowledge and behaviors of children who participate in the University of Missouri's Family Nutrition Program versus children who do not participate in the program. The study answered the research questions that are listed in the next section.

Research Questions

The University of Missouri Extension's Family Nutrition Program has not evaluated whether the curriculum taught is changing both knowledge and behaviors in children related to both nutrition and physical activity. This lack of research is problematic and should be conducted in order to reveal possible changes in participants. To discover information regarding knowledge and behaviors, the following questions and null hypothesis will be investigated:

1.) What differences exist in knowledge and attitudes regarding nutrition by children who participate in the University of Missouri Extension's Family Nutrition Program compared to the knowledge and attitudes regarding nutrition of children who do not participate in the program?

Hypothesis 1: there will be no difference in knowledge and attitudes regarding nutrition held by participants of the University of Missouri Extension's Family Nutrition Program versus non participants.

2.) What differences exist in nutrition and physical activity behaviors of children who participate in the University of Missouri Extension's Family Nutrition Education program compared to the nutrition and physical activity behaviors of children who do not participate in the program?

Hypothesis 2: there will be no difference in nutrition and physical activity behaviors held by participants of the University of Missouri Extension's Family Nutrition Program versus non participants.

The objective of this research study is to prove that the outcomes of the research questions did not occur by chance. According to Fink (2009), this is accomplished by setting up a strict environment that assumes the mean scores of the two groups will be the same. Utilization of a null-hypothesis will prove or disprove this assumption. Therefore, the null hypothesis for this research will be that there will be no differences between the experimental and control group of student knowledge and behaviors related to nutrition and physical activity.

Conceptual Framework

Contento, Randell, and Basch (2002) stated that nutrition education is based on the paradigm that knowledge leads to attitude change, which in turn, leads to behavior change. The conceptual framework explaining the sentence above is detailed through the knowledge-attitude-behavior (KAB) model, theory of reasoned action (TRA), and the theory of planned behavior (PB). The three theories together give justification and

relationship between knowledge, attitude, and behavior change that informed this research study.

The knowledge-attitude-behavior (KAB) Model was proposed as a way of explaining the role of knowledge and behavior change (Flegal, 1996). The idea was that as knowledge formulates in a health behavior domain, changes in attitude are initiated, eventually leading to changes in behaviors (Baranowski, Cullen, Nicklas, Thomson & Baranowski 2003; Lin, et al., 2007). Researchers stated that the KAB model established that if people had knowledge that the consumption of certain foods prevented a chronic illness, it could motivate a person to consume those foods. Although several studies have used the KAB model as a framework, knowledge by itself does not seem helpful in understanding or promoting dietary and or physical activity behavior change (Baronowski, et al. 2003; Contento, Balch, Bronner, et al. 1995; Contento, 2008). Baranowski, et al. (2003), explained that knowledge may be integrated into larger frameworks providing insight into the process of change. Thus, the concepts of knowledge and behavior change can be more clearly defined by including the theory of reasoned action (TRA) and theory of planned behavior (PB) in the conceptual framework of this study.

The theory of reasoned action (TRA) emphasized behavior change was a direct result of behavioral intent (Ajzen & Madden, 1986). The goal of the theory was to predict and understand an individual's behavior regarding intent to perform or not perform was the main determinant of the behavior (Fishbein & Azjen, 1975; Fishbein & Azjen, 1981). It is defined by an individual's attitudes toward the behavior and beliefs regarding subjective norms. Subjective norms define the beliefs about whether specific people want

them to perform the behavior (or not) and the strength of the person's desire to please or comply with those people. The theory of planned behavior (PB) added to the theory of reasoned action the concept of perceived control over opportunity, resources, and skills needed to perform behaviors (Ajzen, 1985). This concept reflected a person's perceived ability to perform the behavior, and was believed to be a critical aspect of behavior change (Fila & Smith, 2006). The TRA/PB model provided a framework for preventive interventions by targeting variables tailored to participants' motivation for change (Romano & Netland, 2008). Baranowski, Cullen, Nicklas, Thomson & Baranowski (2003) concurred, and stated that intention is determined by the person's attitude toward the behavior including beliefs about outcomes, value of the outcomes, as well as the influence of the person's social environment. Baronowski, et al. (2003) stated that many investigators have confidence in the TRA/PB theories when applied to obesity research. Further, extensive empirical research supports the TRA/PB in health interventions and that the models seemed quite good for explaining intention and perceived behavior approaches (Godin & Kok; 1996; Ickes & Sharma, 2011; Romano & Netland, 2008; Redding, et al., 2000; Fishbein, 2008; Sheppard, Hartwick & Warshaw, 1988; Hunt & Gross, 2009).

The KAB theory is based on the premise that nutrition knowledge leads to behavior change through attitude only; whereas the TRA/PB offers the awareness that intention to perform the behavior through attitudes, subjective norms, control, and ability are additional factors regarding behavior change. Using all three theories gives the researcher rationale, guidance, and framework for nutrition and physical activity knowledge and behavior change throughout this study.

Design & Methodology

Quantitative research is rooted in the post-positivist paradigm approach, for the purpose of developing confidence that a particular knowledge claim about an educational phenomenon is true or false by collecting evidence in the form of objective observations of relevant phenomena (Mertens, 2005; Fink, 2009). Therefore, the design of this research study was a quantitative, quasi-experimental approach to gain confidence of the claim of a difference in the knowledge and behaviors of children that participate in the University of Missouri's Extension's Family Nutrition Program versus children that do not participate. This type of research established the effect of the experiment on intact groups rather than being able to randomly assign participants to experimental and control groups and then manipulating treatment variables to test the effect (Mertens, 2005).

To control variables, the schools that were used in the study had as many of the same demographics as possible. This process began with meetings with school administration in both the experimental and control schools. Meetings regarding the importance of the study, research procedures, IRB information, student assent and parental consent, as well as the extent of school involvement were discussed. Approximately 100 students were chosen to give a valid sample size of 50 students for the experimental group and 50 for the control group to ensure greater validity of the study. Students were from a convenience sampling of a control group of 4th grade students who received nutrition education compared to a convenience sampling of an experimental group of 4th grade students who received nutrition education curriculum. The 4th grade lessons were from the Show Me Nutrition curriculum entitled *Choosing Foods for Me* from the University of Missouri Extension's Family Nutrition Program. A

pre & post survey was given to both groups, with the experimental group receiving the curriculum lessons.

The researcher utilized the School Physical Activity and Nutrition (SPAN) survey questionnaires with 4th grade students. The questionnaire was designed to assess intake behaviors, nutrition attitudes and knowledge, and physical activity behaviors among 4th grade students (Kelder, et al., 2009). The School Physical Activity and Nutrition (SPAN) survey has been validated for reproducibility, internal & test-re-test reliability, an construct validity (Fahlman, Dake, McCaughtry, and Martin, 2008; Thiagarajah, et al., 2008; Hoelscher, Day, Kelder, and Ward, 2003). Penkilo, George, & Hoelscher (2008) found the SPAN survey provided valuable feedback that evaluated school based interventions, specifically, to monitor elementary school children's food and physical activity knowledge and behaviors in an elementary classroom among 9-10 year old school children.

The instrument was critiqued by University of Missouri Extension Program Directors, as well as professors from Southeast Missouri State University; prior to the study. Pilot testing of the SPAN survey questionnaire was administered prior to the study with fourth grade students to observe content validity, and reactions to the questions as well as time taken to complete the survey (Mertens, 2005).

The objective for using the survey questionnaire was to gather data and facts about knowledge and behaviors regarding nutrition and physical activity in 4th grade children. The survey results will capture knowledge and behavior change in children and potentially be used long-term through the University of Missouri's Family Nutrition Program. The survey consisted of 44 multiple choice questions on nutrition behaviors,

knowledge, and attitudes, and seven questions related to physical activity behaviors for a total of 51 questions.

Each survey question was coded, calibrated, and put in a data set. Analysis was conducted with the Statistical Package for Social Sciences program comparing statistically significant differences between the experimental and control groups outcomes. Independent and dependent T-Tests and Chi Square was used to compare pre-survey and post-survey for both groups (Field, 2009). The dependent t-test was used to look at the differences between pairs of scores from the same participant, while the independent t-tests were used between groups comparing the experimental versus the control group. Chi-square tests determined the relationship between categorical variables of survey questions between the experimental versus control groups.

Significance

This research within the University of Missouri Extension's Family Nutrition Program detailed knowledge & behavior change in children regarding nutrition and physical activity. Not only will the research provide contributions to literature and feedback on the effectiveness of nutrition education programs (McAleese and Rankin, 2007), it will ensure that educators were better able to set evidence based health policy and justify broader implementation of successful interventions (Devault, et al., 2009). The research has potential to inform local/state/federal legislators of the importance of nutrition education for behavior change that could lower obesity in children that could result in decreased chronic disease, consequently lowering health care costs of Missourians. Lastly, this study comprehensively researched both nutrition and physical activity knowledge and behaviors within 4th grade children within the University of

Missouri Extension's Family Nutrition Education Program with both a control and experimental group. It could potentially be a pilot for use throughout the state with program participants each year, encompassing long term study including nutrition and physical activity knowledge and behavior change.

Definition of Key Terms

The following definitions are used throughout the study are described below:

1.) *FNEP – Family Nutrition Education Programs*. This is a key term used to refer to University of Missouri (MU) Extension's nutrition education programs for low-income Missourians. The Family Nutrition Education Program (FNP) funding comes from USDA's, Supplemental Nutrition Assistance Program (SNAP) to the University of Missouri Extension to be utilized throughout Missouri educating children and adults.

2.) *Show Me Nutrition* – The Show Me Nutrition curriculum is research based developmentally appropriate curriculum written by professors and nutrition professionals within the University of Missouri Extension. It contains lessons from Pre K to 8th grades and is taught throughout Missouri by trained para-professionals.

Summary

Current research tells us that the incidence of childhood obesity is prevalent and on the rise (Department of Health and Human Services, 2007). Through various nutrition education programs such as the University of Missouri Extension's Family Nutrition Program, researchers can discover if the nutrition education curriculum is significant in changing knowledge and behaviors in children that could potentially impact the

childhood overweight and obesity epidemic. Therefore, it is important to capture evaluation data to discover the effectiveness of the curriculum in relation to behavior change.

Through this study, the researcher discovered knowledge & behavioral change in children related to nutrition and physical activity through the School Physical Activity and Nutrition Survey. Children were chosen from a convenience sampling of a control group of 4th grade students who did not receive nutrition education compared to a convenience sampling of an experimental group of 4th grade students who received nutrition education curriculum. Independent and dependent T-Tests as well as Chi-square analysis determined if there was a statistical significant difference between the two groups.

This research proposal has detailed the background of this study including the problem statement, purpose, research questions, conceptual framework, design and methods, and the significance of discovering the knowledge and behaviors of children participating in the University of Missouri Extension's Family Nutrition Education Program. The significance of the research will not only provide contributions to literature and justification of effective nutrition education programs (McAleese and Rankin, 2007), but will inform local/state/federal legislators of the importance of nutrition education for behavior change that could lower obesity in children, and finally, this research could potentially be a pilot for adaption statewide within the University of Missouri's Family Nutrition Program participants each year, illuminating long term research regarding knowledge and behavior change regarding nutrition and physical activity in children.

CHAPTER 2

REVIEW OF RELATED LITERATURE

To begin the study, the researcher examined literature to gain knowledge regarding the outcomes of nutrition education related to knowledge and behaviors in children. The literature review illuminated the topic thoroughly and gave insight to the framework and organization of the study. Through this discussion and review of literature education, research with students will be addressed.

Purpose

Discovering the knowledge and behaviors of children regarding nutrition and physical activity through nutrition education is one way to possibly impact the childhood overweight and obesity epidemic. Nutrition education can be defined as "any set of learning experiences designed to facilitate the voluntary adoption of eating and other nutrition-related behaviors conducive to health and well-being" (Contento, Randell & Basch, 2002, p 3). This definition suggests that behavioral change is the appropriate outcome criteria for evaluating the effectiveness of nutrition education (Contento, Randell, & Basch, 2002). Schools are logical treatment arenas given their unparalleled access to children in terms of time and attention, duration of exposure, and impact on the behavior of children (Pyle, et al., 2006).

Successful school nutrition education programs require a combination of determinants of behavior and an evaluation plan (Hoelscher et al, 2003; Veuglers and Fitzgerald, 2005). Further, Powers, et al. (2005) stated that educators should assess program effectiveness through evaluation. Additionally, Pyle (2006) stated, individuals

may be more motivated to make a change following intervention programs, thus, researchers need to capture these changes.

Currently, there is no evaluation of nutrition and physical activity knowledge and behaviors from children within the University of Missouri Extension's Family Nutrition Program within a control and experimental group. Discovering the effectiveness of a nutrition education program through evaluation is very important to deter the childhood obesity epidemic. Therefore, the purpose of this research study is to discover the nutrition and physical activity knowledge and behaviors of children who participate in the University of Missouri's Family Nutrition Program compared to children who do not participate in the program which will answer the following research questions.

Research Questions

The University of Missouri Extension's Family Nutrition Program does not know if the curriculum taught is changing knowledge and behaviors in children related to both nutrition and physical activity. This lack of research is problematic and should be conducted in order to reveal possible changes in participants. To discover information regarding nutrition and physical activity knowledge and behaviors, the following questions were investigated:

1.) What differences exist in knowledge and attitudes regarding nutrition by children who participate in the University of Missouri Extension's Family Nutrition Program compared to the knowledge and attitudes regarding nutrition of children who do not participate in the program?

Hypothesis 1: there will be no difference in knowledge and attitudes regarding nutrition held by participants of the University of Missouri Extension's Family Nutrition Program versus non participants.

2.) What differences exist in nutrition and physical activity behaviors of children who participate in the University of Missouri Extension's Family Nutrition Education program compared to the nutrition and physical activity behaviors of children who do not participate in the program?

Hypothesis 2: there will be no difference in nutrition and physical activity behaviors held by participants of the University of Missouri Extension's Family Nutrition Program versus non participants.

The objective of this research study is to prove that the outcomes of the research questions will not occur by chance. According to Fink (2009), this is accomplished by setting up a strict environment that assumes the mean scores of the two groups will be the same. Utilization of a null-hypothesis will prove or disprove this assumption. Therefore, the null hypothesis for this research was that there will be no differences between the experimental and control group of student knowledge and behaviors related to nutrition and physical activity.

Literature review of nutrition education

A brief overview of the foundational underpinnings of this study recognizing the knowledge-attitude-behavior (KAB) model, theory of reasoned action (TRA), and theory planned behavior (PB) will begin this examination of nutrition education literature.

The Knowledge-Attitude-Behavior (KAB) model was proposed as a way of explaining the role of knowledge and behavior change (Flegal, 1996). Although there

have been many studies utilizing the KAB theory resulting in positive correlation to behavior change (Lin, Yang, Hang, & Pan, 2007; Rimal, 2001; Pirouznia, 2001), it has been shown minimal in guiding nutrition education (Contento, 2008). Baranowski, et al. (2003), stated that the KAB model by itself seemed to be inadequate as a means of understanding or promoting dietary and physical activity behavior change. Knowledge and behavior change can be clearly detailed by including the theory of reasoned action (TRA) and planned behavior (PB) in the framework of this study.

The theory of reasoned action (TRA) emphasized behavior change as a direct result of behavioral intent (Ajzen & Madden, 1986). The theory of planned behavior (PB) added to the theory of reasoned action the concept of perceived control over opportunity, resources, and skills needed to perform the behaviors (Ajzen, 1985). This concept reflected a person's perceived ability to perform the behavior and was believed to be a critical aspect of behavior change (Fila & Smith, 2006). Extensive empirical research supports the TRA/PB in health promotion and interventions (Godin & Kok; 1996; Ickes & Sharma, 2011; Romano & Netland, 2008; Redding, et al., 2000; Fishbein, 2008; Sheppard, Hartwick & Warshaw, 1988; Hunt & Gross, 2009; Baranowski, et al., 2003). The following paragraphs detail literature related to both positive and negative outcomes in nutrition education related to knowledge and behavior change in children.

Positive student knowledge/behavior change after nutrition education

Literature regarding knowledge, attitudes, and behaviors in children found significant changes in students through nutrition programming. For example, the Child and Adolescent Trial of Cardiovascular Health (CATCH) was a multi-year, coordinated elementary school program that found third-to-fifth grade students consumed less fat and

were more physically active both in and outside of school (Hoelscher, Kelder, Murray, Cribb, Conroy, & Parcel, 2001). The study looked at lunch intake and moderate to vigorous physical education in school and child self-reported physical activity and fat intake outside of school. Both improved in CATCH schools when compared to control schools. Another study by Powers, et al. (2005), researched the effects of a 12 week garden-based nutrition education program on dietary behaviors and nutrition knowledge in children to increase fruit and vegetable intake and found an increase in consumption of both. Fahlman, Dake, McCaughtry, and Martin (2008), researched the effects of a nutrition intervention on nutrition knowledge, behaviors, and efficacy expectations in middle school children and found significant positive changes in both nutrition knowledge and behaviors. The researchers found that students were more likely to eat fruits and vegetables and less likely to eat junk food. Also, the students felt more confident that they could make healthy food choices. Kandiah and Jones (2001) found that through investigation of the effect of a three week school based nutrition education program regarding nutrition knowledge and healthy food choices, the experimental group who received nutrition education for three weeks had significantly greater increases in nutrition knowledge scores as well as substantial changes in compliance in meeting the dietary guidelines and food pyramid recommendations. Further, a research of a school based obesity program called *Shape It Up* delivered positive messages about eating healthy as well as modeled fruit and vegetable consumption during education workshops (Bellman, Barone, Jessen, and Arnold, 2009). The results of the program showed higher levels of knowledge and positive attitudes about fruit and vegetables compared to baseline results. Shariff, Bukhari, Othman, Hashim, Ismail, Jamil, et al. (2008) and

Powers, Struempler, Guarino, and Parmer (2005) looked at the effectiveness of school based nutrition education programs with regard to knowledge, attitudes, and practices of primary school children after receiving nutrition education for six weeks. The results showed intervention students had significant improvements in nutrition knowledge, attitudes, and practices when compared to the comparison group. Another study researched groups of children who received nutrition education while the control group received no education. Experimental and Control group both received pre and post questionnaires at the beginning and end of the sessions. The study found that knowledge, attitudes, and food consumption behaviors in students compared before and after the nutrition education had positive outcomes of knowledge, attitudes, and eating behaviors in students (Watson, Kwon, Nichols, & Rew, 2009). Through the *Be a Fit Kid* curriculum, researchers found improvements in fitness, nutrition knowledge, and dietary habits in the intervention group compared to baseline levels (Slawta & DeNeuri, 2009). Also, changes in fitness, body fat, and nutrition knowledge were significant compared to control groups. Another study looking at school based intervention nutrition programs found during a randomized controlled field trial in 498 children ages 8-10 years that there was a significant increase in the performance of moderate physical activity among children in the intervention group (Colin-Ramirez, Catillo-Martinez, et al., 2010). The study also concluded that there was a significant reduction in the proportion of children who spent more than 3 hours a day playing video games versus the control group. Another positive result from curriculum intervention was with 479 fourth grade students in a quasi-experimental study that showed effectiveness in improving dietary intake of students and reducing television viewing (Gortmaker, Cheung, Peterson, Chomitz,

Cradle, Dart, Fox, Bullock, Sobol, Colditz, Field & Laird, 1999). Six intervention and eight control schools used student survey's for food frequency and activity measures before and after the *Eat Well and Keep Moving* curriculum that focused on decreasing consumption of foods high in fat and increasing fruit and vegetable intake as well as reducing television viewing and increasing physical activity.

The previous paragraphs reviewed many studies showing positive outcomes related to knowledge and behavior change in children, however, there are also negative outcomes which will be discussed in the subsequent paragraphs.

Negative student knowledge/behavior change after nutrition education

The literature review illuminated several studies that had no knowledge and/or behavioral change in nutrition and physical activity in children during educational programming. For example, Devault, et al., (2005) found that 140 fourth grade students in nutrition education intervention groups showed improvements in knowledge and intentions of food choices, but consumption (behavioral) results showed no significance. Another study by Frobisher, Jepson, & Maxwell (2005) with 669, 11-12 year-old children showed that although attitudes and nutritional knowledge of children were greater, the results of eating behaviors had not changed. Further literature study showed that 24 middle school nutrition interventions were not effective in reducing fat intake within school children (Sallis, et al., 2003). Research looking at the effectiveness of nutrition instruction on student nutrition knowledge and food choices after 14 hours of nutrition education and a pre/post-test, found knowledge increased but there was no difference in food selection between the experimental and control groups of 118 students (Anderson, Stanberry, Blackwell, & Davidson, 2001). Further, extensive school based nutrition

education research studies conducted during the decade of the eighty's showed the impact of general nutrition education programs on behaviors to be minimal (Contento, 1992). A group randomized controlled trial of primary school based interventions to reduce risk factors of obesity found that although the program was successful in producing changes at the school level; the program had little effect on children's behavior other than a modest increase in consumption of vegetables (Sahota, Rudolf, et al, 2001). Finally, a study aimed at increasing nutrition and physical activity behaviors through curriculum found that although the intervention was successful at the school level it did not enhance children's behavior other than a modest increase in fruits (Simons-Morton, et al., 1991).

The literature review above describes contradictory evidence of both positive and negative outcomes related to nutrition curriculum regarding nutrition and physical activity knowledge and behaviors in the school setting. The literature review confirms the necessity to discover if the curriculum within the University of Missouri's Family Nutrition Program is changing nutrition and physical activity knowledge and behaviors in children. Knowledge and behavior change in the present study were captured by utilizing a survey questionnaire.

Literature Review of the School Physical Activity and Nutrition Survey

This research study will utilize a pre & post survey that is called the School Physical Activity and Nutrition (SPAN) questionnaire. The survey will capture knowledge and behavior change in children and potentially be used long-term through the University of Missouri's Family Nutrition Education Program. The questionnaire was designed to access food behaviors, nutrition attitudes and knowledge, and physical activity behaviors among 4th grade students (Kelder, et al., 2009). Contendo, Randell, &

Basch (2002) stated that the effectiveness of educational interventions may depend on the validity and reliability of the evaluation measures. Literature showed that the SPAN questionnaire was developed, pilot tested, and assessed for reproducibility and validity. Researchers found moderate to high levels of reproducibility for physical activity and nutrition in the SPAN 4th grade questionnaire (Kelder, et al., 2009). Similarly, another study found the SPAN questionnaire to show good to excellent reproducibility for behavior questions, physical activity, weight behavior, and food selection. The article further indicated the questionnaire could be administered in an elementary school classroom easily, and could be used to measure nutrition behaviors among 9-10 year old school children (Penkilo, George, Hoelscher, 2008). The researchers further stated that the SPAN survey could provide valuable feedback that could be used to evaluate school based interventions, specifically, to monitor elementary school children's food and physical activity behaviors. One study looked at the validity of the SPAN questionnaire. Thiagarajah, et al. (2008), tested validity of food consumption items from the SPAN questionnaire and found the questionnaire could be administered in the classroom quickly and easily to measure many previous day dietary behaviors of fourth graders. Few questionnaires have published estimates of validity and reproducibility in school aged children (Hoelscher, Day, Kelder & Ward, 2003); however, based on the literature reviewed, the SPAN questionnaire is shown as reproducible and valid for use with school children. The SPAN questionnaire can also be utilized to provide long term research that is a concern according to literature and will be explained below.

Literature review regarding lack of long-term research

Although literature data details justification of a survey approach through research studies that have utilized this method successfully for nutrition and physical activity change; there is minimal long term research noted. One such study by Fahlman, et al. (2008), utilized nutrition curriculum on nutrition knowledge, efficacy expectations, and eating behaviors in school children. The study utilized pre/post assessment using 783 middle school students consisting of 613 intervention students and 170 Control group. After IRB approval, 8 lessons were taught from a convenience sample of volunteers in the intervention schools. Although the results showed the intervention group resulted in significant positive changes in both nutrition knowledge and behaviors in middle school children, it was noted that further research needed to be done to determine long term impact (Fahlman, et al., 2008). Another study showed the effects of a nutrition education program on the dietary behavior and nutrition knowledge of second and third grade students. The study utilized 1,100 students given a pre-test assessment, 8 weekly nutrition education classes, then a post assessment (Powers, Struempler, Guarino & Parmer, 2005). Although the research showed greater improvements in overall dietary behaviors and nutrition knowledge than children in the control group, there was no mention of maintenance of the knowledge and behavior changes in children. A study by McAleese and Rankin (2007) showed the effects of a garden based nutrition education program with 96 school students in a 12 week program found increases in servings of fruit and vegetables but stated that prolonged behavior change could not be implied to the study. One final study, researched 140 fourth grade students, including 69 in the comparison group and 71 in the intervention group that evaluated the impact of nutrition

curriculum on knowledge, attitudes, and behaviors related to nutrition with pre /post and follow-up testing using questionnaires (Devault, et al., 2009). Researchers stated that although both knowledge and behavior change was significant, results supported a broader program implementation and more reinforcement over time.

The present research study is the first of its kind looking at both nutrition and physical activity knowledge and behaviors from an experimental and control group of children within the University of Missouri Extension Family Nutrition Program. Theoretically, the present research could be a pilot for adaption throughout the state with program participants each year. This would involve annual long-term study that would include research on nutrition and physical activity knowledge and behavior changes in children who are participating in the Family Nutrition Program.

Summary

This chapter outlined the purpose of the research study and research questions, the foundational background, a review of contradictory outcomes related to knowledge and behavior change in school children within nutrition education, and the School Physical Activity and Nutrition (SPAN) survey that was utilized within the study. Lastly, an exchange of ideas regarding the lack of long term research regarding knowledge and behavior change in children in a school setting was discussed.

This literature review illuminated the importance of utilizing all three theories to guide and give rationale and framework for the study. Knowledge alone does not lead to behavior change. Behavior change also includes subjective norms, control, and ability to perform the behavior.

It can be established through this literature review that there are inconsistencies surrounding research related to knowledge and behavior change in children. It is clear that nutrition education doesn't guarantee knowledge and/or behavior change in every programming effort. Therefore, research of nutrition education programming is of utmost importance to discover if knowledge and behavior change is successful within children participating in nutrition education curriculum.

Lastly, this chapter gave acquiescence that the School Physical Activity and Nutrition Survey is well researched and is appropriate for use within this study. It has been proven effective to access nutrition and physical activity knowledge and behaviors among school students and can be utilized for long-term research. Chapter 3 will give further insight explaining the design and methodology to collect and analyze data regarding knowledge and behavior change within students.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

The incidence of childhood overweight and obesity in the United States is high and steadily on the rise at an epidemic rate (Department of Health and Human Services, 2007). With this epidemic, come many childhood chronic health conditions, along with psychological issues. (Ebbeling, Pawlak, & Ludwig, 2002; Barlow and Dietz, 2002; Rich, DiMarco, et al., 2005; Braet, et al, 1997; and Strauss, 1999). Childhood nutrition and physical activity patterns can be traced into adulthood, therefore, schools and community organizations have an integral role in the treatment of this childhood obesity epidemic (Powers, et al. 2005; Barlow and Dietz, 2002).

Behaviors such as insufficient physical activity and poor nutrition are acknowledged as primary mechanisms for childhood overweight and obesity. School based programs that combine healthful eating and physical activity education may provide the best opportunity to enhance health and lower chronic disease (Veugelers and Fitzgerald, 2005). Although the University of Missouri Extension's Family Nutrition Program addresses nutrition and physical activity through nutrition education curriculum in the school setting, the university does not know if the curriculum taught is changing knowledge or behaviors in children. By researching the knowledge and behaviors of children receiving nutrition education, the effectiveness and significance of the curriculum effectiveness can be discovered.

The following paragraphs will reveal the background of the study including the research purpose and questions, research design, population and sample, data collection,

instrumentation, data analysis, & the limitations of discovering the nutrition and physical activity knowledge and behaviors of children participating in the University of Missouri Extension's Family Nutrition Education Program.

Research Purpose/Questions

As mentioned above, discovering the knowledge and behaviors of children regarding nutrition and physical activity through nutrition education curriculum is one way to possibly impact the childhood overweight and obesity epidemic. Therefore, the purpose of this study was to survey school children in 4th grade who are participating in the family nutrition program (experimental group) versus school children who are not participating in the program (control group) regarding their knowledge and behavior change related to nutrition and physical activity.

Currently, there is no evaluation of children within the University of Missouri Extension's Family Nutrition Program related to both nutrition and physical activity knowledge and behaviors within control and experimental groups. The lack of research regarding children's knowledge and behavior's with the Family Nutrition Program is problematic and should be conducted in order to reveal possible changes in participants. To discover information regarding knowledge and behaviors, the following research questions were investigated:

1.) What differences exist in knowledge and attitudes regarding nutrition by children who participate in the University of Missouri Extension's Family Nutrition Program compared to the knowledge and attitudes regarding nutrition of children who do not participate in the program?

Hypothesis 1: there will be no difference in knowledge and attitudes regarding nutrition held by participants of the University of Missouri Extension's Family Nutrition Program versus non participants.

2.) What differences exist in nutrition and physical activity behaviors of children who participate in the University of Missouri Extension's Family Nutrition Education program compared to the nutrition and physical activity behaviors of children who do not participate in the program?

Hypothesis 2: there will be no difference in nutrition and physical activity behaviors held by participants of the University of Missouri Extension's Family Nutrition Program versus non participants.

The objective of this research study was to prove that the outcomes of the research questions will not occur by chance. According to Fink (2009), this is accomplished by setting up a strict environment that assumes the mean scores of the two groups will be the same. Utilization of a null-hypothesis proved or disproved this assumption. Therefore, the null hypothesis for this research was that there were no differences between the experimental and control group of student knowledge and behaviors related to nutrition and physical activity.

Research Design

Mertens (2005) explained that quantitative research is rooted in the post-positivist approach for the purpose of developing confidence that a particular knowledge claim about an educational experience is true or false by collecting evidence in the form of objective observations of relevant phenomena. The design of this research study is a quasi-experimental, non-random design, meaning, it is an experimental design that does

not provide full control of variables because it does not randomly assign participants to comparison (Fink, 2009). The researcher studies the effect of the treatment on intact groups rather than being able to randomly assign participants to control or experimental groups (Mertens, 2005). For the present study, convenience sampling of a control group of 4th grade students who did not receive nutrition education were compared to a convenience sampling of an experimental group of 4th grade students who received the nutrition education curriculum. This particular design and approach is due to the need and prerequisite of full cooperation of school administration and use of intact fourth grade student populations utilizing the University of Missouri Extension's Family Nutrition Program.

The research process began with meetings with school administration in both the experimental and control schools to gain consent and accessibility. Discussion and explanation regarding the importance of information gained by the research, research procedures, IRB information, student assent and parental consent, as well as the extent of school involvement was discussed as recommended by Mertens (2005). Students and parents in both the experimental and control groups received information about the study by the researcher with the option to opt out of the study. To increase internal validity, the schools that were used in the study had as many of the same demographics as possible including; public schools similar in size and student population, 50% or greater students received free or reduced lunches, similar requirements for health and physical activity curriculum, and finally, the school must be located in Southeast Missouri. This information was retrieved through the Department of Secondary education (DESE) website as well as through school administration.

The researcher utilized a pre and post survey called the School Physical Activity and Nutrition (SPAN) questionnaire with convenience samples of fourth grade students. The survey will potentially inform the researcher about food behaviors, nutrition attitudes and knowledge, and physical activity behaviors among fourth grade students (Kelder, et al., 2009). The control group received the pre-survey with no nutrition education followed by the post survey, whereas the experimental group received a pre-survey, nutrition education curriculum, followed by the post-survey. This design and approach discovered a difference in the knowledge and behaviors of nutrition and physical activity of children that participate in the University of Missouri's Extension's Family Nutrition Program and answered the research questions above. The following paragraphs will describe in detail the population and sample procedures of the research.

Population and sample

The entire population of fourth grade students in Missouri participating in the Family Nutrition Program in 2010 was 18,074 with 2,262 students participating in the Southeast Region Family Nutrition Program. The accessible population represented the target population, therefore establishing validity of the population pool (Henry, 1990). A timeframe of three months will allow the pre survey, curriculum lessons, and then post survey to be administered to the convenience samples of fourth grade students.

Henry (1990) and Patton (2002) defined convenience sampling as persons chosen to participate in the study because they were readily available. In this study, convenience sampling was chosen due to the current participation and availability of students already a part of the family nutrition program within schools and was used as representative of the entire population served within the program. Fourth grade was chosen because the pre

and post survey has been validated for reproducibility, internal and test/retest reliability and construct reliability within fourth grade students (Fahlman, Dake, McCaughtry, and Martin, 2008; Thiagarajah, Fly, et al, 2008; Hoelscher, Day, Kelder, and Ward, 2003). The researcher acknowledges that generalizability of the study was within the Family Nutrition Program rather than to a broader population. The sample size will be described in the paragraph below.

There are many ideologies related to convenience sampling size. Mertens (2005) stated the sample size is determined by very practical constraints such as how many people are participating in a program based upon student enrollment and program participants. Borg and Gall (1989) stated that for quasi-experimental research, the sample size should be about 15 observations per group. Fink (2009) stated to test the mean of two groups a researcher must have at least 20-30 respondents per group and that larger samples are more accurate estimates of the population mean. Sampling error is greater for small samples and almost negligible for very large samples, therefore sample size is a determinant of probability errors (Lipsey, 1990). To fully ensure validity of parametric testing with negligible errors, the sample size of this research study was approximately 100 fourth grade students chosen to give a valid sample size of 50 students for the experimental group and 50 for the control group. The researcher acknowledges that this sample may differ from the obtained sample size due to non-response, non-participation, inaccessibility, or dropping out of the study (Mertens, 2005). Collection of data and survey instrumentation will be explained below.

Data collection and instrumentation

Pre and post surveys were given to both groups, with the experimental group receiving *Show Me Nutrition* curriculum lessons. Nutrition education will consist of 8 lesson titles from the fourth grade curriculum, "*Choosing Foods for Me*": 1) Serve up Grains, Fruits, and Vegetables, 2) Serve Up Your Milk, Meat and Beans, 3) How Our Bodies Digest Food, 4) What's On a Label, 5) A Closer Look at the Nutrition Facts Panel, 6) Start Your Day With Breakfast, 7) Healthy Choices Eating Out, and 8) A Healthy Body Image (Family Nutrition Education Program, 2011). The experimental group curriculum was taught by a Nutrition Program Associate who teaches in Southeast Missouri. The School Nutrition and Physical Activity (SPAN) survey will consist of 51 questions that were coded and analyzed for data collection. Data collection procedures, instrument discussion, and human subject protections are outlined in the following paragraphs.

Data Collection procedures

Both groups were given the confidential School Nutrition and Physical Activity (SPAN) pre survey instrument at the beginning of the research study with the experimental group receiving 8 lessons. After the 8 lessons, the post survey was given to the experimental as well as the control groups. The pre and post survey consisted of closed questions related to food choices and physical activity and were distributed within the school classroom by the researcher. The School Physical and Nutrition Survey (SPAN) is readily available free of charge, and can be downloaded from the University of Texas School of Public Health website (University of Texas, School of Public Health,

2002). The survey includes a protocol for use in the school setting, student assent, and student demographics such as age, date of birth, ethnic background, and gender.

The SPAN survey will potentially capture knowledge and behavior change in children answering the research questions. The SPAN survey will consist of 51 closed, multiple choice & true/false questions. The first section of the survey asks 22 questions on nutrition behaviors such as "yesterday, how many times did you eat peanuts or peanut butter? The next section asks about nutrition knowledge consisting of 10 questions such as, "which food group is a good source of vitamin C?" The next section asks 12 questions related to nutrition attitudes such as "I am confident that I could eat less fat?" This section also asks true/false questions about attitudes such as, "What you eat can make a difference in your chances of getting heart disease." The final section asks 7 questions related to physical activity knowledge and behaviors such as, "How many times in the last seven days did you exercise or take part in physical activity that made your heart beat fast and made you breathe hard for at least 30 minutes?" Each pre and post survey for the experimental group was coded with 1A, 2A, 3A,& 1B, 2B, 3B and so on, so that each student's pre and post surveys can easily be matched up confidentially. The pre and post surveys for the control group will each be coded with IA IIA, III A, & IB, IIB, IIIB, and so on, again, so that the tests can easily be matched up confidentially with no names being used. The objective of the survey was to gather data about knowledge, attitudes, and behaviors regarding nutrition and physical activity in 4^{th} grade children with as many variables controlled as possible.

Instrumentation

The School Physical Activity and Nutrition (SPAN) Pre and Post survey is the only instrument used in this research. The following paragraphs discuss the validity and reliability and pilot testing of the survey instrument.

Contendo, Randell, and Basch (2002) stated that the effectiveness of educational interventions may depend on the validity and reliability of the evaluation measures. Fink (2009) stated that a valid survey is always reliable. A study of the literature indicated that the SPAN questionnaire was developed, pilot tested, and assessed for reproducibility and validity. Researchers found moderate to high level of reproducibility for physical activity and nutrition in the SPAN 4th grade questionnaire (Kelder, et al., 2009). Similarly, another study found the SPAN questionnaire to show good to excellent reproducibility for behavior questions, physical activity, weight behavior, and food selection. Further, the article indicated the survey could be administered in an elementary school classroom easily, and could be used to measure nutrition behaviors among 9-10 year old school children (Penkilo, George, & Hoelscher, 2008). In addition, the researcher stated that the SPAN survey could provide valuable feedback that could be used to evaluate school based interventions, specifically, to monitor elementary school children's food and physical activity behaviors. One study looked at the validity of the SPAN questionnaire. Thiagarajah, et al. (2008), tested validity of food consumption items from the SPAN questionnaire and found the questionnaire could be administered in the classroom quickly and easily to measure many previous day dietary behaviors of fourth graders. Few questionnaires have published estimates of validity and reproducibility in school aged children (Hoelscher, Day, Kelder & Ward, 2003); however, based on the literature

reviewed, the SPAN questionnaire is shown as reproducible and valid for use with school children.

Pilot testing of the SPAN survey questionnaire was administered prior to the research study with fourth graders looking at content validity, and reactions to the questions as well as time taken to complete the survey. As recommended by Mertens (2005) at the end of each question the pilot test survey will have room for added responses or reactions to questions from participants at a local elementary school similar to the schools that will participate in the research study. As stated by Krosnick, Narayan, and Smith (1996) the researcher will look for question order effect, response order effects, acquiescence, and no opinion filter.

Human subjects' protection

An ethics application for this study was submitted to University of Missouri Institutional Review Board (IRB) for approval. After permission was granted by the Institutional Review Board (IRB), discussion and explanation regarding the importance of information gained by the research, research procedures and information, IRB information, student assent and parental consent, as well as the extent of school involvement was discussed with school administration at both the experimental and control schools. A student assent form was given to each student that will grant permission for their involvement in the study. Participation was voluntary, and students had the option to not participate without penalty. Students who were interested in participating will receive a parental consent letter that the parent will sign giving permission for their child to participate, as well as where to contact the researcher for questions or additional information. The parental consent letters were collected by the

fourth grade teacher and were given to the researcher prior to the study. Once student assent and parental consent are received, the pre survey was given to both groups. Nutrition education taught by the University of Missouri Extension Family Nutrition Program Associate then began for the experimental group. After the lessons, both experimental and control groups received a post survey questionnaire. Data analysis of the survey questionnaires will be explained within the following paragraphs.

Data Analysis

Mertens (2005) and Fink (2009) stated that t-tests for independent samples compared differences between two groups determining the probability that any differences are not due to chance. Field (2009) stated that dependent t-tests were used to look at differences between pairs of scores from the same participants. Further, Mertens, 2005) stated that the chi-square testing was used with nominal data testing the statistical independence of two variables. Chi-squar`e analysis will tell how many students answered a certain way (Fink, 2009) testing if there is a relationship between two categorical variables. Thus, the quantitative data needed to measure knowledge, attitudes, and behaviors between groups comparing the experimental group versus the control group was conducted by using independent t-tests, dependent t-test, and chi-square analysis within the Statistical Package for Social Sciences (SPSS) program. Independent t-tests surveyed responses from the experimental versus control groups. The dependent t-tests was used to compare the same set of student pre and post survey scores to eliminate individual differences between conditions; so that the difference in scores reflect only the effect of the experimental manipulation (Field, 2009). Chi-square analysis was used to compare the frequencies observed in certain categories to the frequencies

expected in those categories assuring the answers were not by chance (Field, 2009). Through the Statistical Package for Social Sciences (SPSS) program, the dependent t-test divided the mean difference between pairs of scores by the standard error of the differences while the independent t- test will look at differences between groups and divide by the standard deviation of difference between groups (Field, 2009). The chi-square analysis utilized nonparametric statistical testing looking at the independence of two or more variables (Mertens, 2005). Statistically significant differences between the experimental and control group of student knowledge and behaviors was tested utilizing a null hypothesis. The null hypothesis suggested that there was no differences between the experimental and control group of student knowledge and behaviors. The null hypothesis will set up a strict environment that proves or disproves the mean scores data analysis between the two groups are the same (Fink, 2009).

The data analysis was completed by using two different groups through pre and post survey questionnaires with one group exposed to nutrition education and one without. To determine the effects of the nutrition curriculum (independent variable), a 2 (pretest vs. posttest) X 2 (experimental vs. control) statistical analysis was conducted through a set of questions regarding knowledge, attitudes, and behaviors (dependent variables) about nutrition and physical activity. Each survey question was coded, calibrated, and put in a data set conducted with the SPSS computer program to compare and contrast the statistically significant differences between the experimental and control group outcomes. This data analysis allowed the researcher to answer the research questions by comparison of post survey results between the experimental and control groups to identify change in knowledge and/or behaviors. Also, the data will show

how both groups changed from pre to post survey and if the control and/or experimental group showed differences during the research study. Lastly, the data will allow the pre survey comparison to show the validity of the design ensuring that the groups are equivalent, controlling for individual differences (Fink, 2009).

Data analysis tests of equality was conducted with a significance level of $p = < .05$ to discover if the null hypothesis is rejected or accepted (Fink, 2009). Utilizing a significance level of $p = < .05$ gives confidence and validity that the two groups are significantly different and very unlikely to occur by chance.

Descriptive statistics were used to summarize the demographic data such as age, race, and gender. This information is strictly for demographic information and not part of the research process itself.

Limitations of the Study

Mertens (2005) stated that it is not possible to design and conduct a perfect research study in education and is important to recognize and discuss limitations. Limitations within this research study consisted of non-participation, non-random sampling, generalization, accuracy, validity of self-reporting, the inability to control variables, and lastly, researcher bias.

The first limitation is the fact that the student sample may choose not to participate in the research and/or the parent may not sign the consent form. Therefore, the sample number may be affected. Also, the fact that there was no control of who is present at pre-survey and who might be missing at post survey may also affect number of participants. Some participants may be present for the pre survey and not be present at post survey and vice versa due to illness, change in schools etc.

A second limitation is the issue of convenience sampling. The sample is not random, therefore there may be potential for participant bias. Meaning, if students have been taught previously by the nutrition program assistant with the Family Nutrition Program, they may have a positive or negative bias to the teacher or the program. Also, since the research was a non-random sampling, it was difficult to generalize to all populations other than to the population used.

Generalization to other populations is the third limitation. As Mertens (2005) stated, that the researcher must acknowledge the limitations of the sample and not attempt to generalize the results beyond the given population pool. Therefore, the results of the study will have generalizability of findings only to the family nutrition program as it is a function of the equivalent between the conceptual and operational definitions for the sample. Also, because the researcher was utilizing the *Show Me Nutrition* Curriculum, generalizations to other curriculum settings was inappropriate.

Accuracy of self-reporting from respondents of the survey is the fourth limitation. The sample participants may not give correct and/or honest answers. It is impossible and unethical to isolate all of the sample participants from mixing outside of lessons and sharing ideas and answers, potentially contaminating results. Mertens (2005) stated that the validity of the information is contingent on the honesty of the respondent.

There is no way to know for sure if the answers given on the survey were valid. The respondents may not follow directions on the survey or misinterpret the responses needed giving more than one answer and/or skipping questions. Many students could possibly be uninterested in the survey and/or taking time to complete each question, therefore affecting the validity of the survey responses.

A fifth limitation is the inability to totally control variables. There was many school teachers involved with the job of enhancing and reinforcing the *Show Me Nutrition* curriculum. Meaning, after the nutrition program assistant teaches the curriculum, some teachers may or may not embrace nutrition education and physical activity among their students, therefore, not providing reinforcement of the knowledge and behaviors taught to children. Another variable issue is parental involvement. As children want to try new or healthier foods at home; parents may or may not provide them. Physical Activity may or may not be encouraged or provided in the school or home setting.

The final limitation is that of researcher bias. It is a fact that the researcher is fully committed to the mission of the University of Missouri Extension's Family Nutrition program. The researcher recognizes that she must be aware of this commitment and not allow any biases or skewed attitudes be reflected throughout this research in any way.

Summary

Throughout this chapter was discussion regarding the research within the University of Missouri's Family Nutrition Program detailing the research purpose and questions, research design, population and sample, data collection, instrumentation, human subjects protection, data analysis, and limitations of the study. The main purpose of the study was to discover a difference in the knowledge and behaviors of children who participate in the Family Nutrition Program versus children who do not participate, determining if the program has potential to affect the childhood obesity epidemic.

The design of the study was a post positive, quasi-experimental, non-random design that tested the null hypothesis of no change in knowledge and behaviors between two groups of students. This was accomplished through the use of a survey questionnaire among a convenience sampling of experimental and control groups of fourth grade students. The control group will receive the pre-survey with no nutrition education followed by the post survey, while the experimental group will have the added nutrition education curriculum. Parental assent and student consent was administered prior to the study to both the control and experimental schools after Institutional Review Board approval.

The Statistical Package for Social Sciences (SPSS) program was used to analyze the data through independent and dependent t-tests as well as chi-square analysis. The dependent t-test divided the mean difference between pairs of scores by the standard error of the differences while the independent t- test looked at differences between groups divided by the standard deviation of difference between groups (Field, 2009). Chi-square testing was used to test the statistical independence of two or more variables compared to frequencies that are expected to find out how many students answered a certain way assuring the answers were not by chance (Mertens, 2005). Statistically significant differences between the experimental and control group of student knowledge and behaviors were tested utilizing a null hypothesis.

The limitations within this research study consisted of non-participation, non-random sampling, generalization, accuracy, validity of self-reporting, the inability to control variables, and lastly, researcher bias. Limitations were carefully considered as the research process took place and were reviewed by professors prior to the research.

CHAPTER 4

RESEARCH DATA FINDINGS

Purpose

Discovering the knowledge and behaviors of children regarding nutrition and physical activity through nutrition education is one way to possibly impact the childhood overweight and obesity epidemic. Nutrition education can be defined as "any set of learning experiences designed to facilitate the voluntary adoption of eating and other nutrition-related behaviors conducive to health and well-being" (Contento, Randell, & Basch, 2002, p 3). This definition suggests that behavioral change is the appropriate outcome criteria for evaluating the effectiveness of nutrition education (Contento, Randell, & Basch, 2002). Schools are logical treatment arenas given their unparalleled access to children in terms of time and attention, duration of exposure, and impact on the behavior of children (Pyle, et al., 2006).

Successful school nutrition education programs require a combination of determinants of behavior and an evaluation plan (Hoelscher et al, 2003; Veuglers and Fitzgerald, 2005). Further, Powers, et al. (2005) stated that educators should assess program effectiveness through evaluation. Additionally, Pyle, et.al. (2006) stated, individuals may be more motivated to make changes following intervention programs, thus, researchers need to capture these changes.

Currently, there is no evaluation of both nutrition and physical activity knowledge and behaviors from children within the University of Missouri Extension's Family Nutrition Program within a control and experimental group. Discovering the effectiveness of a nutrition education program through evaluation is very important to deter the

childhood obesity epidemic. Therefore, the purpose of this research study is to discover the nutrition and physical activity knowledge/attitudes, and behaviors of children who participate in the University of Missouri's Family Nutrition Program compared to children who do not participate in the program.

Research Questions

The University of Missouri Extension's Family Nutrition Program does not know if the curriculum taught is changing knowledge and behaviors in children related to nutrition and physical activity. This lack of research is problematic and should be conducted in order to reveal possible changes in participants. To discover information regarding nutrition and physical activity knowledge and behaviors, the following research questions were investigated:

1.) What differences exist in knowledge and attitudes regarding nutrition by children who participate in the University of Missouri Extension's Family Nutrition Program compared to the knowledge and attitudes regarding nutrition of children who do not participate in the program?

Hypothesis 1: there will be no difference in knowledge and attitudes regarding nutrition held by participants of the University of Missouri Extension's Family Nutrition Program versus non participants.

2.) What differences exist in nutrition and physical activity behaviors of children who participate in the University of Missouri Extension's Family Nutrition Education program compared to the nutrition and physical activity behaviors of children who do not participate in the program?

Hypothesis 2: there will be no difference in nutrition and physical activity behaviors held by participants of the University of Missouri Extension's Family Nutrition Program versus non participants.

Research Methods

Mertens (2005) explained that quantitative research is rooted in the post-positivist approach for the purpose of developing confidence that a particular knowledge claim about an educational experience is true or false by collecting evidence in the form of objective observations of relevant phenomena. The design of this research study is a quasi-experimental, non-random design. It is an experimental design that does not provide full control of variables because it does not randomly assign participants to groups (Fink, 2009). The researcher studies the effect of the treatment on intact groups rather than being able to randomly assign participants to control or experimental groups (Mertens, 2005). For the present study, convenience sampling of a control group of 4th grade students who did not receive nutrition education from Jackson North Elementary was compared to a convenience sampling of an experimental group of 4th grade students from Doniphan Elementary who received the nutrition education curriculum. This particular design and approach was due to the need and prerequisite of full cooperation of school administration and use of intact fourth grade student populations utilizing the University of Missouri Extension's Family Nutrition Program.

The research process began with meetings with school administration in both the experimental and control schools to gain consent and accessibility. Discussion and explanation regarding the importance of information gained by the research, research procedures, IRB information, student assent and parental consent, as well as the extent of

school involvement was discussed as recommended by Mertens (2005). Students and parents in both the experimental and control groups received information about the study by the researcher with the option to not participate in the study. To increase internal validity, the schools that were used in the study had as many of the same demographics as possible including; public schools similar in size and student population, 50% or greater students must receive free or reduced lunches, similar requirements for health and physical activity curriculum, and finally, the school must be located in Southeast Missouri. This information was retrieved through the Department of Secondary education (DESE) website as well as through school administration.

The researcher utilized a pre and post survey called the School Physical Activity and Nutrition (SPAN) questionnaire with convenience samples of fourth grade students. The survey informed the researcher about nutrition attitudes and knowledge, and physical activity behaviors among fourth grade students (Kelder, et al., 2009). The control group (Jackson North Elementary) received the pre-survey with no nutrition education followed by the post survey, whereas the experimental group (Doniphan Elementary) received a pre-survey, nutrition education curriculum, followed by the post-survey. This design and approach discovered nutrition knowledge & attitudes about nutrition and physical activity behaviors of children that participate in the University of Missouri Extension's Family Nutrition Program.

Data demographics and analysis

The purpose of the study was to survey 4th grade students participating in the University of Missouri Extension Family Nutrition Program as well as students not participating in the program to discover knowledge, attitude, and behavior change. This

chapter presents results from a total of 184 pre and post surveys. The experimental group (Doniphan Elementary) completed 55 pre surveys and 48 post surveys. The control group (Jackson North Elementary) completed 38 pre surveys and 43 post surveys. There were 108 male participants and 76 female participants from the two schools. Race demographics were Black (1), White (93), Asian (1), American Indian /Alaskan Native (2), other (5), did not answer (1), with some students answering more than one race.

The data gathered from students participating in the survey was measured utilizing the Statistical Package for Social Sciences (SPSS) program with independent and dependent t tests as well as chi square analysis. Questions 1-20 and question 22 were "yesterday" dietary recall questions with the researcher using independent and dependent t tests to determine a difference between schools (treatment versus control) and a difference within students (pre to post survey) from the same school. Question 21 and 23-39 the researcher utilized a chi square analysis to determine data significance. Independent and dependent t-tests were used for survey questions 40-51. The sample size for the analysis varied due to some students that were missing either at pre or post survey and/or may have left questions blank. The following sections describe the results for each research question. The following summary chart outlines the research data analysis:

Research Question	Survey Questions	Data Analysis
1 (Nutrition knowledge)	23-39	Chi-square
1 (Nutrition attitudes)	40-44	Independent/Dep. T- test
2 (Nutrition behaviors)	1-20 & 22	Independent/Dep. T-test
	21	Chi-square

2 (Physical activity behaviors)	45-51	Independent/Dep. T-test

Data Results for Research Question 1

The researcher proposed the following as research question 1. What differences in knowledge and attitudes regarding nutrition held by children who participate in the University of Missouri Extension's Family Nutrition Program compared to the knowledge and attitudes regarding nutrition of children who do not participate in the program? This research question answered knowledge and attitudes of students through survey questions 23-44 utilizing chi square analysis and independent and dependent t-tests. The following is a chart that details the analysis of research question 1 that will be discussed in the following sections:

Research Question	Survey Questions	Data Analysis
1 (Nutrition knowledge)	23-39	Chi Square
1 (Nutrition attitudes)	40-44	Independent/Dep. T test

Nutrition Knowledge

Survey question 23 states, "from which of the food groups should you eat the most servings each day," and was examined for any evidence in support of research question 1 looking at knowledge. A chi-square analysis was conducted to discover if there was a difference between the two groups at pre and post survey with response choices of a.) breads, cereals, rice, pasta; b.) meats, fish, poultry, beans, eggs, nuts; c.) dairy products (milk cheese, yogurt); d.) vegetables, e.) fats & oils, f.) fruit or g.) don't

know. Anything answered except a.) breads, cereals, rice, pasta, was considered incorrect. The results are shown in table 1 below. As an inspection of the table indicates, there was no statistical significance χ^2 (1, N=92) = .208, p >.05 related to correct versus incorrect answers for the question at pre survey. However, there was a statistical significant relationship χ^2 (1, N=91) =.000, $p < .05$ between the number of correct and incorrect answers at post survey within the control group when compared to the experimental group. There was also statistical significance in the totals for both schools χ^2 (1, N=183) = .001, $p = <.05$. The statistical significance suggests that the students who received nutrition lessons (experimental group) got more correct answers and fewer incorrect answers at post survey compared to the control group. The control group students had more incorrect and fewer correct answers for question 23 which is also reflected in the total incorrect and correct responses. This is reflected in Table 1 below.

Table 1

Chi-Square results for knowledge question *"from which food groups should you eat the most servings each day?"*

Pre-Survey	χ^2 (1, N=92) = .208, p >.05		
	Correct	Incorrect	Total
Experimental	11	43	54
Control	4	34	38

Post Survey	χ^2 (1, N=91) = .000, p = <.05		
Experimental	19	29	48
Control	3	40	43
Totals	χ^2 (1, N=183) = .001, p = <.05.		
Experimental	30	72	102
Control	7	74	81

Survey question 24 states, "from which food group should you eat the fewest servings each day," and was evaluated with a chi-square analysis regarding research question 1. The goal was to discover if there was a difference between the two groups at pre and post survey with response choices of a.) breads, cereals, rice, pasta, b.) meats, fish, poultry, beans, eggs, nuts, c.) dairy products (milk cheese, yogurt), d.) vegetables, e.) fats & oils, f.) fruit, or g.) don't know. Any answer except e.) fats & oils, was considered incorrect. The question was examined for any evidence in support of knowledge within research question 1. Results found there was no statistical significance at pre survey χ^2 (1, N= 92) = .334, p = >.05 or post survey χ^2 (1, N= 91) =.757, p = >.05 or total responses χ^2 (1, N 183) = .346, p = > .05 when examining correct versus incorrect answers within the experimental and control groups regarding this question.

Research survey question 25 examined with a chi-square analysis with the knowledge question "how many servings of fruit should you eat each day?" The question

was examined for any evidence in support of research question 1 looking at knowledge. A chi-squared analysis was conducted to discover if there was a difference between the two groups at pre and post survey with response choices of a.) at least 1 ½ cups, b.) at least 3 cups, c.) at least 4 cups, d.) at least 5 cups, e.) don't know. Any answer except a.) at least 1 ½ cups, was considered incorrect. The question was examined for any evidence in support of research question 1 looking at correct knowledge with statistical significance (see table 2 below). Pre survey χ^2 (1, N=91) = .187, p = >.05 and post survey χ^2 (1, N=91) =.078, p = >.05 showed no significance when examining the incorrect and correct responses. However, when looking at the total incorrect and correct responses, χ^2 (1, N=182) = .028, p = <.05 for both pre and post survey results there was statistical significance related to control group responses. The statistical significance suggests that the control group of students at total answered significantly more incorrect answers than expected and less correct answers than expected when compared to experimental group, which is reflected in Table 2 below.

Table 2

Chi-Square results for knowledge question *"how many servings of fruit should you eat each day?"*

Pre-Survey	χ^2 (1, N=91) = .187, *p* = >.05		
	Correct	Incorrect	Total
Experimental	24	29	53

Control	12	26	38
Post Survey	χ^2 (1, N=91) = .078, p = >.05		
Experimental	22	26	48
Control	12	31	43
Totals	χ^2 (1, N=182) = .028, p = <.05		
Experimental	46	55	101
Control	24	57	81

Survey question 26 states, "how many servings of vegetables should you eat each day," was examined for any evidence in support of research question 1 looking at knowledge. A chi-squared analysis was conducted to discover if there was a difference between the two groups at pre and post survey with response choices of a.) at least 2 cups, b.) at least 3 cups; c.) at least 4 cups d.) at least 5 cups, or e.) don't know. Any answer except a.) at least 2 cups, was considered incorrect. There was no statistical significance in the data results at pre survey χ^2 (1, N=92) = .246, p = > .05, post survey χ^2 (1, N=91) = .288, p = > .05, or for the total responses χ^2 (1, N=183) = .116, p = > .05 for correct versus incorrect answers from the experimental or control groups for this question regarding how many servings of vegetables should be eaten each day.

Research survey question 27, "how many servings of meat should you eat each day," was examined for any evidence in support of research question 1. A chi-square analysis was conducted to discover if there was a difference between the two groups at pre and post survey with response choices of a.) at least 2 ounces, b.) at least 3 ounces, c.) at least 4 ounces, d.) at least 5 ounces, or e.) don't know. Any answer except d.) at least 5 ounces, was considered incorrect. There was no pre survey statistical significance χ^2 (1, N=92) = .819, p = >.05 related to correct versus incorrect answers. However, there was post survey statistical significance χ^2 (1, N=91) = .004, p = <.05 between the number of incorrect and correct answers between the two groups. The statistical significance within the control group at post survey suggests that the students answered more than expected incorrectly and less than expected correctly χ^2 (1, N=183) = .021, p = <.05, as reflected at post survey data and total results. This is reflected in Table 3 below.

Table 3

Chi-Square results for knowledge question *"how many servings of meat should you eat each day?"*

Pre-Survey	χ^2 (1, N=92) =.819, *p* = >.05		
	Correct	Incorrect	Total
Experimental	5	49	54
Control	3	35	38

Post Survey	χ^2 (1, N=91) = .004, p = <.05		
Experimental	11	37	48
Control	1	42	43
Totals	χ^2 (1, N=183) = .021, p = <.05		
Experimental	16	86	102
Control	4	77	81

Research survey question 28 was the question, "how many servings of grains (breads, cereal, rolls) should you eat each day," and was examined for any evidence in support of research question 1 considering knowledge. A chi-square analysis was conducted to discover if there was a difference between the two groups at pre and post survey with response choices of a.) at least 3 ounces, b.) at least 4 ounces, c.) at least 5 ounces, d.) at least 8 ounces, or e.) don't know. Any answer except c.) at least 5 ounces, was considered incorrect. There was no statistical significant finding in the data results for correct versus incorrect answers for this question at pre survey, χ^2 (1, N=91) = .226, p = >.05, post survey, χ^2 (1, N=91) = .200, p = >.05, or for the total responses χ^2 (1, N=182) =.147, p = >.05 for the experimental and control groups regarding how many servings of grains should be eaten each day.

Research survey question 29, "which food group is a good source of vitamin C," was examined for any evidence in support of research question 1. A chi-square analysis was conducted to discover if there was a difference between the two groups at pre and post survey with response choices of a.) breads, cereals, rice, pasta; b.) meats, fish, poultry, beans, eggs, nuts; c.) dairy products (milk cheese, yogurt); d.) vegetables, e.) fats & oils, f.) fruit or g.) don't know. Any answer except d.) vegetables, was considered incorrect. The results are shown in Table 4 below. At pre-survey χ^2 (1, N=92) = .064, p= .05 and post survey χ^2 (1, N=91) = .190, p = >.05 there was nothing significant in either group. However, the overall totals found significant results within the control group χ^2 (1, N=183) = .024, p = <.05. The statistical significant results suggest that the control group significantly answered more total correct answers and less total incorrect answers than the experimental group as reflected in the table below.

Table 4

Chi-Square results for knowledge question *"which food group is a good source of vitamin C?"*

Pre-Survey	χ^2 (1, N=92) =.064, p = >.05		
	Correct	Incorrect	Total
Experimental	18	36	54
Control	20	18	38

Post Survey	χ^2 (1, N=91) = .190, p = >.05		
Experimental	18	30	48
Control	22	21	43
Totals	χ^2 (1, N=183) =.024, p = <.05		
Experimental	36	66	102
Control	42	39	81

Survey question 30, "which food group is a good source of energy," was examined for any evidence in support of research question 1 looking at knowledge. A chi-square analysis was conducted to discover if there was a difference between the two groups at pre and post survey with response choices of a.) breads, cereals, rice, pasta; b.) meats, fish, poultry, beans, eggs, nuts; c.) dairy products (milk cheese, yogurt); d.) vegetables, e.) fats & oils, f.) fruit or g.) don't know. Any answer except a.) breads, cereals, rice, pasta, was considered incorrect. There was no statistically significant finding related to correct versus incorrect answers in the data results for this question at pre survey χ^2 (1, N=92) = .477, p = >.05, post survey χ^2 (1, N=91) =.120, p = >.05, or total responses, χ^2 (1, N=183) = .111, p = >.05 between the experimental and control groups.

Survey question 31, "which food group is a good source of calcium," was examined for any evidence in support of research question 1 looking at knowledge. A chi-square analysis was conducted to discover if there was a difference between the two groups at pre and post survey with response choices of a.) breads, cereals, rice, pasta; b.) meats, fish, poultry, beans, eggs, nuts; c.) dairy products (milk cheese, yogurt); d.) vegetables, e.) fats & oils, f.) fruit or g.) don't know. Any answer except c.) dairy products (milk cheese, yogurt), was considered incorrect. There was no statistical significant finding in the data results for this question at pre survey, χ^2 (1, N= 92) = .690, p = >.05 post survey χ^2 (1, N=91) = .123, p = >.05 or for the total responses χ^2 (1, N=183) = .428, p = >.05 for correct versus incorrect answers for the two groups.

Research survey question 32, "which food group provides protein for muscles," was examined for any evidence in support of research question 1 looking at knowledge. A chi-square analysis was conducted to discover if there was a difference between the two groups at pre and post survey with response choices of a.) breads, cereals, rice, pasta; b.) meats, fish, poultry, beans, eggs, nuts; c.) dairy products (milk cheese, yogurt); d.) vegetables, e.) fats & oils, f.) fruit or g.) don't know. Any answer except b.) meats, fish, poultry, beans, eggs, nuts, was considered incorrect. There was no statistically significant finding in the data results for this question at pre survey, χ^2 (1, N=91) =.530, p = >.05 post survey, χ^2 (1, N=88) = .069, p = >.05, or for total correct χ^2 (1, N=179) = .084, p = >.05 versus incorrect answers between the two groups for this question.

Survey question 33, "what you eat can make a difference in your chances of getting heart disease," was evaluated with a chi-square analysis to discover if there was a difference between the two groups at pre and post survey with response choices of 1.)

true, or 2.) false. True was considered the correct answer for this question. The question was examined for any evidence in support of research question 1 regarding knowledge and found no statistically significant data results at pre survey χ^2 (1, N=91) = .776, p = >.05, post survey χ^2 (1, N=90) = .175, p = >.05 or for total responses χ^2 (1, N=181) = .300, p = >.05 for correct (true) versus incorrect responses (false) for this question for both groups.

Research survey question 34, "what you eat can make a difference in your chances of getting cancer," was examined for any evidence in support of research question 1 looking at knowledge. A chi-square analysis was conducted to discover if there was a difference between the two groups at pre and post survey with response choices of 1.) true, or 2.) false, with true considered the correct answer. Table 5 below shows there was statistical significance found in the data results for this question. At pre-survey χ^2 (1, N=91) = .164, p = >.05 and post survey χ^2 (1, N=90) = .136, p = >.05 there was nothing significant in either the experimental or control groups. However, the overall total χ^2 (1, N=181) =.049, p = <.05 found significant results within the incorrect and correct answers between the experimental and control group. The statistical significance total results of the data suggests that the control group answered incorrectly (false) more than expected and correctly (true) less than expected when compared to the experimental group as reflected below.

Table 5

Chi-Square results for knowledge question *"what you eat can make a difference in your chances of getting cancer?"*

Pre-Survey	χ^2 (1, N=91) = .164, p = >.05		
	Correct	Incorrect	Total
Experimental	19	35	54
Control	8	29	37
Post Survey	χ^2 (1, N=90) = .136, p = >.05		
Experimental	21	27	48
Control	12	30	42
Totals	χ^2 (1, N=181) = .049, p = <.05		
Experimental	40	62	102
Control	20	59	79

Survey question 35, "people who are overweight are more likely to have a higher risk of health problems than people who are not overweight," was examined with a chi-square analysis to discover if there was a difference between the two groups at pre and post survey with response choices of 1.) true, or 2.) false, with the correct answer as true. The question was examined for any evidence in support of research question 1 looking at

knowledge and found no statistically significant data results at pre survey χ^2 (1, N=91)=.655 , p = >.05, post survey χ^2 (1, N=90) = .162, p = >.05 or total responses χ^2 (1, N=181)=.497, p = >.05 from experimental and control groups.

Research survey question 36, "I know how to design a plan for better nutrition if I want to," was examined with a chi-square analysis to discover if there was a difference between the two groups at pre and post survey with response choices of 1.) true or 2.) false. The question was examined for any evidence in support of research question 1 looking at knowledge and found no statistically significant data results at pre χ^2 (1, N=91) = .716, p = >.05, or post survey χ^2 (1, N=90) = .073, p = >.05, or total χ^2 (1, N=181) =.122, p = >.05 when looking at responses between the experimental and control groups.

Survey question 37, "french fries are a highly nutritious food," was examined with a chi-square analysis to discover if there was a difference between the two groups at pre and post survey with response choices of 1.) true, or 2.) false. The answer false was considered the correct answer. The question was examined for any evidence in support of research question 1 looking at knowledge and found no statistically significant data results at pre χ^2 (1, N=91) =.856, p = >.05, or post survey χ^2 (1, N=90) = .971, p = >.05, or total χ^2 (1, N=181) =.852, p = >.05 when looking at correct versus incorrect responses between the experimental and control groups.

Survey question 38, "the word 'lite" on a food package means low fat," was examined with a chi-square analysis to discover if there was a difference between the two groups at pre and post survey with response choices of 1.) true or 2.) false. The answer true was the correct answer for this question. The question was examined for any evidence in support of research question 1 looking at knowledge with no statistically

significant data findings at pre χ^2 (1, N=90) =.944, p = >.05, or post survey χ^2 (1, N=91) =.912, p = >.05, or total χ^2 (1, N=181) =.980, p = >.05 when looking at correct versus incorrect responses between the experimental and control groups.

Survey question 39, "The word 'lean" on a food package means it is fat free," was examined with a chi-square analysis to discover if there was a difference between the two groups at pre and post survey with response choices of 1.) true, or 2.) false, with false the correct answer. The question was examined for any evidence in support of research question 1 looking at knowledge and found no statistically significant data results at pre χ^2 (1, N=90) =.206, p = >.05, or post survey χ^2 (1, N=89) =.566, p = >.05, or total χ^2 (1, N=179) =.289, p = >.05 when looking at correct versus incorrect responses between the experimental and control groups.

Nutrition Attitudes

Survey question 40, "circle the statement below that best describes you," was examined for any evidence in support of research question 1 regarding attitudes. An independent t test was conducted to discover a difference between the experimental and control groups at pre and post survey with response choices of: a) I eat what I like and am not thinking about changing my eating habits, b) I am thinking about changing my eating habits c) I am thinking about changing my eating habits and have made a few changes already d) I have just begun to eat healthy on a regular basis, or e) I have been eating healthy for more than 1 year. Results show no statistically significant results at pre or post survey. At pre survey the mean of the experimental group was (M=3.15, SE=2.11) and the control group mean was (M=3.11, SE=.256). Results between the experimental and control groups did not differ significantly at pretest, t (88) = .129, p = >.05. Post

survey results showed the mean of the experimental group was (M=3.23, SE=.219) and control (M=3.02, SE=.250). Therefore, no significant differences between the experimental and control groups at post survey, *t* (88) =.635, *p* = >.05.

A dependent t test within the experimental group was also conducted for this question at pre survey (M=3.19, SE=.211), and post survey (M=3.26, SE=.219) with no significance t (45) = -.315, *p* = >.05, and within the control group pre survey (M=3.05, SE=.256) and post survey (M=3.02, SE=.250) with no significant results, t (35) = .114, *p* = >.05.

Survey question 41, "I am confident that I could eat more fruits and vegetables," was examined for any evidence in support of research question 1 regarding attitudes. An independent t-test was conducted, to discover a difference between the experimental and control groups at pre and post survey with response choices of 1.) strongly disagree, 2.) disagree, 3.) unsure, 4.) agree, and 5.) strongly agree. Results show no statistically significant results at pre or post survey. At pre survey the mean of the experimental group was (M=3.85, SE=1.55) and the control group mean was (M=4.19, SE=.144). Results between the experimental and control groups did not differ significantly at pre survey, *t* (89) = -1.51, *p* = >.05. Post survey results showed the mean of the experimental group was (M=3.85, SE=.163) and control (M=4.07, SE .177). Therefore, no significant differences between the experimental and control groups at post survey, *t* (89) = -.90, *p* = >.05.

A dependent t test within the experimental group only was also conducted for this question at pre survey (M=3.94, SE=.159), and post survey (M=3.87, SE=.166) with no

significance t (46) = .290, p = >.05, and within the control group pre survey (M=4.17, SE=.146) and post survey (M=3.92, SE=.200) with no significant results, t (35) = 1.33, p= >.05.

Survey question 42, "I am confident that I could eat less fat," was examined for any evidence in support of research question 1 regarding attitudes. The response choices for question 42 were 1.) strongly disagree, 2.) disagree, 3.) unsure, 4.) agree, and 5.) strongly agree. Independent t tests results showed no statistically significant results. Mean at pre survey within the experimental group was (M=3.83, SE=.165) and a control group mean of (M=4.18, SE=.149). Results between the experimental and control groups did not differ significantly at pre survey, t (88) = -1.53, p = >.05. At post survey the mean of the experimental group was (M= 3.77, SE=.179) and mean of the control group was (M=4.16, SE=.188). Therefore, no significant results between the experimental and control groups at post survey, t (89) = -1.51, p = >.05.

A dependent t test within the experimental group only was also conducted for this question at pre survey (M=3.83, SE=.185), and post survey (M=3.74, SE=.185) with no significance t (45) = .359, p = >.05, and within the control group pre survey (M=4.17, SE=.152) and post survey (M=4.19, SE=.198) with no significant results, t (35) = -.172, p = >.05.

Survey question 43, "I am confident that I could drink less soda pop," was examined for any evidence in support of research question 1 regarding attitudes utilizing independent t tests. Response choices were: 1.) strongly disagree, 2.) disagree, 3.) unsure, 4.) agree, and 5.) strongly agree. Results show no statistically significant results. Mean at pre survey of the experimental group was (M=3.31, SE=.210) and a control group mean

of (M=3.62, SE=.233). Results between the experimental and control groups did not differ significantly at pre survey, *t* (89) = -.963, *p* = >.05. At post survey the mean of the experimental group was (M=3.58, SE=.195) and mean of the control group was (M=3.33 SE=.223). Therefore, no significant results between the experimental and control groups at post survey, *t* (89) =.875, *p* = >.05. A dependent t test within the experimental group was also conducted for this question at pre survey (M=3.83, SE=.185), and post survey (M=3.74, SE=.185) with no significance t (45) = .359 , p = >.05, and within the control group pre survey (M=4.17, SE=.152) and post survey (M=4.19, SE=.198) with no significant results, t (35) = -.172, *p* = >.05.

Survey question 44, "I am confident that I could eat healthy at a fast food restaurant," was examined for any evidence in support of research question 1 regarding attitudes. Responses include: 1.) strongly disagree, 2.) disagree, 3.) unsure, 4.) agree, and 5.) strongly agree. Independent t test results showed statistically significant results within the experimental group that had a higher level of agreement with the statement (see table 6 below) at post survey. Mean at pre survey of the experimental group was (M=3.21, SE=.158) and a control group pre survey mean of (M=3.32, SE=.219). The results between the experimental and control groups did not differ significantly at pre survey, *t* (88) = -.444, *p* = >.05. At post survey the mean of the experimental group was (M=3.48, SE=.163) and mean of the control group was (M=3.00 SE=.176). Statistically significant results between the experimental and control groups at post survey, *t* (87) = 2.00, *p* = <.05, showed that the experimental group had a higher level of agreement. Therefore, the statistical significance suggests that the experimental group students at post survey were

more confident that they could eat healthy at a fast food restaurant when compared to the control group students as reflected in the independent t test analysis (table 6) below.

A dependent t test within the experimental group was also conducted for this question at pre survey (M=3.22, SE=.164), and post survey (M=3.52, SE=.167) with no significance t (45) = -1.33, p = >.05, and within the control group pre survey (M=3.39, SE=.216) and post survey (M=3.08, SE=.180) with no significant results, t (35) = 1.12, p = >.05.

Table 6

Independent t-test results for attitude question *"I am confident that I could eat healthy at a fast food restaurant."*

Pre-survey	t (88) = -.444, p = >.05	t	df	p
Experimental group (M=3.21, SE=.158) SD (1.15) N=48 Control group (M=3.32, SE=.219) SD (1.33) N=43		-.444	88	.658
Post-survey	t (87) = 2.00, p = <.05	t	df	p

Experimental group (M=3.48, SE=.163) (SD=1.13) N=48	2.00	87	.049
Control group (M=3.00 SE=.176) (SD=1.15) N=43			

Data Results for Research Question 2

Research question 2 asked if there was a difference in nutrition and physical activity behaviors of children who participate in the University of Missouri Extension's Family Nutrition Education program compared to the nutrition and physical activity behaviors of children who do not participate in the program. The research question looked at students' nutrition and physical activity behaviors. Questions 1-22 investigated nutrition behaviors and questions 45-51 investigated physical activity behaviors utilizing independent t tests to determine a difference between schools (treatment versus control) and dependent (paired samples) t tests to compare results within individual groups. The following is a data analysis summary that will be discussed in the following paragraphs.

Research Question	Survey Questions	Data Analysis
2 (Nutrition behaviors)	1-20 & 22	Independent/Dep. T-test
	21	Chi-square
2 (Physical activity behaviors)	45-51	Independent/Dep. T-test

Nutrition Behaviors

Survey question 1, "yesterday, how many times did you eat hamburger meat, hotdogs, sausage, steak, bacon or ribs," was examined for any evidence in support of

research question 2 regarding behaviors. Answer choices for this question were: none, 1 time, 2 times, or 3 or more times. An independent t test was conducted and found a statistically significant finding at post survey within the experimental group (see table 7 below). The pre survey mean of the experimental group was (M=1.80, SE=.105) and the control group pre survey mean was (M=1.61, SE=.104). The results between the experimental and control groups did not differ significantly at pre survey, t (91) = 1.27, p = >.05. At post survey the mean of the experimental group was (M=2.19, SE=.106) and mean of the control group was (M=1.84, SE=.137). At post survey, data findings showed statistically significant results between the experimental and control groups, t (81.3) = .044, p = <.05. Statistical significant data suggest that the experimental group 'yesterday' had no difference at pre survey, but ate more hamburger meat, hotdogs, sausage, steak, bacon, or ribs at post survey when compared to the control group students. This is reflected in table 7 below.

A dependent t test was also conducted for question 1 with the following results (see table 7.1 below). The pre survey mean within the experimental group at pre survey was (M=1.83, SE=.117) and post survey (M 2.19, SE=.106). The dependent t test analysis showed experimental group pre survey (M=1.83, SE .117) with a statistical significance finding that the experimental group ate more hamburger meat, hotdogs, sausage, steak, bacon, or ribs at post survey (M=2.19, SE=.106); t (47) =.025, p = < .05. There was no statistical significance for this question within the control group at pre survey (M=1.59, SE .106) or post survey (M=1.78, SE=.156); t (36) = -1.12, p >.05.

Therefore, statistical significance suggests that the experimental group of students at pre survey ate more meat when compared to their post survey responses regarding meat intake. This is reflected in table 7.1 below.

Table 7

Independent t-test results for behavior question *"yesterday, how many times did you eat hamburger meat, hotdogs, sausage, steak, bacon or ribs?"*

Pre-survey t (91) = 1.27, p = >.05	*t*	*df*	*p*
Experimental group (M=1.80, SE=.105) SD (.780) N=55	1.27	91	.206
Control group (M=1.61, SE=.104) SD (.639) N=38			
Post-survey t (81.3) = 2.02, p = <.05	***t***	***df***	***p***
Experimental group (M=2.19, SE=.106) (SD= .734) N=48	2.05	89	.044
Control group (M=1.84, SE= .137) (SD=.897) N=43			

Table 7.1

Dependent t-test results for behavior question *"yesterday, how many times did you eat hamburger meat, hotdogs, sausage, steak, bacon or ribs?"*

Experimental group	*t* (47) = -2.31, *p* = < .05	*t*	*df*	*p*
Pre Survey (M=1.83, SE=.117)				
SD (.117) N=48				
Post Survey (M 2.19, SE=.106)		-2.31	47	.025
SD (.106) N=48				

Survey question 2, "Yesterday, how many times did you eat battered or fried chicken, chicken nuggets, chicken fried steak, fried pork chops, or fried fish," was examined for any evidence in support of research question 2 regarding behaviors. Answer choices for this question were: none, 1 time, 2 times, or 3 or more times. An independent t test was conducted and found statistically significant findings at pre survey within the control group (see table 8 below). Results at pre survey revealed the mean of the experimental group was (M=1.29, SE=.067) and the control group pre survey mean was (M=1.66, SE=.109). The results between the experimental and control groups differed significantly at pre survey, *t* (64.2) = -2.88, *p* = <.05. At post survey the mean of the experimental group was (M=1.44, SE=.084) and mean of the control group was (M=1.49

SE=.112). At post survey, data findings showed no statistically significant results between the experimental and control groups, t (89) = -.368, p = >.05. Therefore, the statistical significance shows that the control group ate more battered or fried chicken, chicken nuggets, chicken fried steak, fried pork chops, or fried fish yesterday at pre survey when compared to the experimental group. This is reflected in table 8 below.

A dependent t test within the experimental group was also conducted for this question at pre survey (M=1.31, SE=.074), and post survey (M=1.44, SE=.084) with no significance t (47) = -1.06, p = >.05, and within the control group pre survey (M= 1.62, SE=.105) and post survey (M=1.51, SE=.126) with no significant results, t (36) =.813, p = >.05.

Table 8

Independent t-test results for behavior question *"yesterday, how many times did you eat battered or fried chicken, chicken nuggets, chicken fried steak, fried pork chops, or fried fish?"*

Pre-survey t (64.2) = -2.88, p = <.05	*t*	*df*	*p*
Experimental group (M=1.29, SE=.067) SD (.497) N=55			
Control group (M=1.66 SE=.109)	-2.88	64.2	.005

SD (.669) N=48

Post-survey t (89) = -.368, p = >.05	t	df	p
Experimental group (M=1.44, SE=.084) (SD = 580, N=38)	-.368	89	.714
Control group (M=1.49 SE=.112) (SD = .736, N=43)			

Survey question 3, "Yesterday, how many times did you eat peanuts or peanut butter," was examined for any evidence in support of research question 2 regarding behaviors. Answer choices for this question were: none, 1 time, 2 times, or 3 or more times. An independent t test was conducted and found statistically significant results at pretest within the control group (see table 9 below). Results at pre survey found the mean of the experimental group was (M=1.25, SE= .091) and the control group pre survey mean was (M=1.55, SE=.105). The results between the experimental and control groups differed significantly at pre survey, t (81.8) = -2.15, p = <.05. At post survey the mean of the experimental group was (M=1.44, SE=.119) and mean of the control group was (M=1.30, SE=.118). At post survey, data findings showed no statistically significant results between the experimental and control groups, t (89) = .805, p = >.05. The statistical significance suggests that the control group students ate more peanuts or peanut butter yesterday at pre survey when compared to the experimental group of students. This is reflected in table 9 below.

A dependent t test within the experimental group was also conducted for this question at pre survey (M=1.31, SE=.074.), and post survey (M=1.44, SE=.084) with no significance *t* (47) = -1.06, *p* = >.05. The control group showed results at pre survey (M=1.62, SE=.105 and post survey (M=1.51, SE=.126) with no significant results, *t* (36) = .639, *p* = >.05.

Table 9

Independent t-test results for behavior question *"yesterday, how many times did you eat peanuts or peanut butter?"*

Pre-survey *t* (81.8) = -2.15, *p* = <.05	*t*	*df*	*p*
Experimental group (M= 1.25, SE= .091) (SD = .672) N=55			
Control group (M= 1.55, SE=.105). (SD = .645) N=38	-2.15	81.8	.035
Post-survey *t* (89) = .805, *p* = >.05	***t***	***df***	***p***
Experimental group (M=1.44, SE=.119) (SD =.823) N=48	.805	89	.423
Control group (M=1.30, SE=.118)			

(SD =.773) N=43

Survey question 4, "yesterday, how many times did you eat any kind of cheese, cheese spread or a cheese sauce," was examined for any evidence in support of research question 2 regarding behaviors. Answer choices for this question were: none, 1 time, 2 times, or 3 or more times. An independent t test was conducted and found the following results at pre and post survey. The pre survey mean of the experimental group was (M=1.87, SE=.113) and the control group mean was (M=1.89, SE=.145). The results between the experimental and control groups did not differ significantly at pre survey, t (91) = -.121, p = >.05. At post survey the mean of the experimental group was (M=2.06, SE=.109) and mean of the control group was (M=1.86, SE= .151). At post survey, data findings showed no statistically significant results between the experimental and control groups, t (78.2) = 1.09, p = >.05. Findings show that there were not any statistically significant differences between the experimental and control groups concerning how many times yesterday they ate any kind of cheese.

A dependent t test within the experimental group was also conducted for this question at pre survey (M=1.94, SE=.124), and post survey (M=2.06, SE=.109) with no significance t (47) = -.846, p = >.05. The control group findings showed pre survey means (M=1.92, SE=.147) and post survey means (M=1.78, SE=.156) with no significant results, t (36) = .709, p = >.05.

Survey question 5, "yesterday, how many times did you drink any type of milk," was examined for any evidence in support of research question 2 regarding behaviors.

Answer choices for this question were: none, 1 time, 2 times, or 3 or more times. An independent t test was conducted and found the following results at pre and post survey. The pre survey mean of the experimental group was (M= 2.29, SE=.148) and the control group mean was (M=2.69, SE=.171). The results between the experimental and control groups did not differ significantly at pre survey, t (91) = -1.38, p = >.05. At post survey the mean of the experimental group was (M=2.68, SE=.169) and mean of the control group was (M=2.67, SE=.165). At post survey, data findings showed no statistically significant results between the experimental and control groups, t (89) =.055, p = >.05. Findings show that there were no statistically significant differences between the experimental and control groups at pre or post survey concerning how many times yesterday they drank any kind of milk.

A dependent t test was also conducted for question 5 with the following results There was no statistical significance for this question within the control group pre survey (M=2.62, SE=.175) and post (M=2.62, SE =.183) survey with no significance t (36) =1.00, p = >.05. The pre survey mean within the experimental group at pre survey was (M=2.31, SE=.158) and post survey (M=2.69, SE=.169). The dependent t test analysis suggests statistical significance within the experimental group revealing students drank more milk at post survey t (47) = -2.08, p = < .05 when compared to their pre survey results as reflected in table 10 below.

Table 10

Dependent t-test results for behavior question *"yesterday, how many times did you drink any type of milk?"*

Experimental group t (47) = -2.08, p = < .05	*t*	*df*	*p*
Pre Survey (M=2.31, SE=.158) SD (.158) N=48			
Post Survey (M=2.69, SE=.169) SD (.106) N=48	-2.08	47	.043

Survey question 6, "yesterday, how many times did you eat yogurt or cottage cheese or drink a yogurt drink," was examined for any evidence in support of research question 2 regarding behaviors. Answer choices for this question were: none, 1 time, 2 times, or 3 or more times. An independent t test was conducted and found the following results at pre and post survey. The pre survey mean of the experimental group was (M=1.13, SE=.058) and the control group mean was (M=1.10, SE=.050). The results between the experimental and control groups did not differ significantly at pre survey, t (91) =.269, p = >.05. At post survey the mean of the experimental group was (M=1.10, SE=.082) and mean of the control group was (M=1.30, SE=.097). At post survey, data findings showed no statistically significant results between the experimental and control groups, t (89) = -.415, p = >.05. Findings show that there were no statistically significant

differences between the experimental and control groups at pre or post survey concerning how many times yesterday they ate yogurt or cottage cheese or drank a yogurt drink.

A dependent t test was also conducted for question 6 with the following results (see table 11 below). There was no statistical significance for this question within the experimental group means at pre survey (M=1.13, SE=.057) or post survey (M=1.25, SE.081*); t* (47) -1.23, *p* = >.05. The pre survey mean within the control group at pre survey was (M=1.08, SE=.045) and post survey (M=1.32, SE=.110) with statistical significance at post survey *t* (36) = - 2.31, *p* = < .05. The statistical significance suggests that the control group 'yesterday' ate more yogurt/cottage cheese/or yogurt drink at post survey when compared to their pre survey responses, with no difference within the experimental group. This information is reflected in table 11 below.

Table 11

Dependent t-test results for behavior question, *"yesterday, how many times did you eat yogurt or cottage cheese or drink a yogurt drink?"*

Control group *t* (36) = - 2.31, *p* = < .05	*t*	*df*	*p*
Pre Survey (M=1.08, SE=.045) SD (.277) N=37			
Post Survey (M=1.32, SE=.110) SD (.669) N=37	-2.31	36	.027

Survey question 7, "yesterday, how many times did you eat rice, macaroni, spaghetti, or pasta noodles," was examined for any evidence in support of research question 2 regarding behaviors. Answer choices for this question were: none, 1 time, 2 times, or 3 or more times. An independent t test was conducted and found the following results at pre and post survey. The pre survey mean of the experimental group was (M=1.38, SE =.080) and the control group mean was (M=1.37, SE=.079). The results between the experimental and control groups did not differ significantly at pre survey, *t* (91) =.115, *p* = >.05. At post survey the mean of the experimental group was (M=1.54, SE=.126) and mean of the control group was (M=1.33, SE=.104). At post survey, data findings showed no statistically significant results between the experimental and control groups, *t* (89) =1.31, *p* = >.05. Results found there was no statistically significant difference at pre or post survey between the experimental and control groups concerning how many times yesterday they ate rice, macaroni, spaghetti, or pasta noodles.

A dependent t test was also conducted for this question within the experimental and within the control group with no significant results found. A dependent t test within the experimental group was conducted for this question finding pre survey means (M=1.13, SE=.084), and post survey means (M=1.25, SE=.126), with no significance, t (47) = 1.23, *p* = >.05. The control group means at pre survey (M=1.35, SE=.080) and post survey (M=1.32, SE=.110) with no significant results found, *t* (36) =.197, *p* = >.05.

Survey question 8, "yesterday, how many times did you eat white bread, buns, bagels, tortillas, or rolls," was examined for any evidence in support of research question 2 regarding behaviors. Answer choices for this question were: none, 1 time, 2 times, or 3 or more times. An independent t test was conducted and found the following results at pre

and post survey. The pre survey mean of the experimental group was (M=1.84, SE =.129) and the control group mean was (M=1.92, SE=.148). The results between the experimental and control groups did not differ significantly at pre survey, *t* (91) = -.427, *p* = >.05. At post survey the mean of the experimental group was (M=1.87, SE=.132) and mean of the control group was (M=1.79, SE=.131). At post survey, data findings showed no statistically significant results between the experimental and control groups, *t* (89) =.452, *p* = >.05. Findings show no statistically significant differences between the experimental and control groups at pre or post survey concerning how many times yesterday they ate white bread, buns, bagels, tortillas, or rolls at pre or post survey.

A dependent t test within the experimental group was also conducted for this question at pre survey (M=1.81, SE=1.39), and post survey (M=1.88, SE=.131), with no significance t (47) = -.394, *p* = >.05. The control group pre survey mean (M=1.89, SE=.149) and post survey (M=1.78, SE=.146) showed no significant results, t (36) = .612, *p* = >.05.

Survey question 9,"yesterday, how many times did you eat whole wheat or dark white bread, buns, bagels, tortillas, or rolls," was examined for any evidence in support of research question 2 regarding behaviors. Answer choices for this question were: none, 1 time, 2 times, or 3 or more times. An independent t test was conducted and found the following results at pre and post survey. The pre survey mean of the experimental group was (M=1.47, SE =.097) and the control group mean was (M=1.63, SE=.116). The results between the experimental and control groups did not differ significantly at pre survey, *t* (91) =-1.05, *p* = >.05. At post survey the mean of the experimental group was (M=1.60, SE=106) and mean of the control group was (M= 1.74, SE=.153). At post survey, data

findings showed no statistically significant results between the experimental and control groups, *t* (76.5) = -.752, *p* = >.05. Findings show no statistically significant differences between the experimental and control groups at pre or post survey concerning how many times yesterday they ate whole wheat or dark white bread, buns, bagels, tortillas, or rolls at pre or post survey.

A dependent t test within the experimental group was also conducted for this question at pre survey (M=1.42, SE=.139), and post survey (M=1.60, SE=.131) with no significance t (47) = -1.70, *p* = >.05 noted. The control group pre survey (M=1.59, SE=.149) and post survey (M=1.67, SE=.146) showed no significant results, t (36) = -.475, p = >.05 for this question as well.

Survey question 10, "yesterday, how many times did you eat hot or cold cereal," was examined for any evidence in support of research question 2 regarding behaviors. Answer choices for this question were: none, 1 time, 2 times, or 3 or more times. An independent t test was conducted and found the following results at pre and post survey. The pre survey mean of the experimental group was (M= .44, SE=.085) and the control group mean was (M=1.66, SE=.115). The results between the experimental and control groups did not differ significantly at pre survey, *t* (91) = -1.58, *p* = >.05. At post survey the mean of the experimental group was (M=1.50, SE=.115) and mean of the control group was (M=1.72, SE=.090). At post survey, data findings showed no statistically significant results between the experimental and control groups, *t* (86.0) = -1.51, *p* = >.05. Findings show there was no statistically significant differences between the experimental and control groups at pre or post survey concerning how many times yesterday they ate hot or cold cereal.

A dependent t test within the experimental group was also conducted for this question at pre survey (M=1.42, SE=.093), and post survey (M=1.50, SE=.115) with no significance t (47) = -.551, p = >.05 noted. The control group pre survey mean (M=1.65, SE=.117) and post survey mean (M=1.73, SE=.010) showed no significant results, t (36) = -.723, *p* = >.05.

Survey question 11, "yesterday, how many times did you eat French fries or chips," was examined for any evidence in support of research question 2 regarding behaviors. Answer choices for this question were: none, 1 time, 2 times, or 3 or more times. An independent t test was conducted and found the following results at pre and post survey. The pre survey mean of the experimental group was (M=1.89, SE= .115) and the control group mean was (M=1.89, SE=.163) the results between the experimental and control groups did not differ significantly at pre survey, *t* (91) = -.020, *p* = >.05. At post survey the mean of the experimental group was (M=1.83, SE=.113) and mean of the control group was (M=2.07, SE=.154). At post survey, data findings showed no statistically significant results between the experimental and control groups, *t* (89) = -1.26, *p* = >.05. Findings show there was no statistically significant differences between the experimental and control groups at pre or post survey concerning how many times yesterday students ate French fries or chips.

A dependent t test within the experimental group was also conducted for this question at pre survey (M=1.98, SE=.125), and post survey (M=1.83, SE=.113) with no significance *t* (47) = .926, *p* = >.05 noted. The control group pre survey (M=1.92, SE=.166) and post survey (M=2.08, SE=.171) mean showed no significant results, *t* (36) = - 1.06, *p* = >.05.

Survey question 12, "yesterday, how many times did you eat vegetables," was examined for any evidence in support of research question 2 regarding behaviors. Answer choices for this question were: none, 1 time, 2 times, or 3 or more times. An independent t test was conducted and found the following results at pre and post survey. The pre survey mean of the experimental group was (M=1.96, SE =.149) and the control group mean was (M=2.16, SE=.162). The results between the experimental and control groups did not differ significantly at pre survey, t (91) = -.166, p = >.05. At post survey the mean of the experimental group was (M= 2.12, SE=1.35) and mean of the control group was (M=2.09, SE=.152). At post survey, data findings showed no statistically significant results between the experimental and control groups, t (89) =.188, p = >.05. Findings show there was no statistically significant differences between the experimental and control groups at pre or post survey concerning how many times yesterday students ate vegetables.

A dependent t test within the experimental group was also conducted for this question at pre survey mean (M=2.04, SE=.155), and post survey mean (M=2.13, SE=1.35) with no significance t (47) = -.531, p = >.05 noted. The control group pre survey (M=2.11, SE=.159) and post survey (M=2.00, SE=.164) showed no significant results, t (36) = .662, p = >.05.

Survey question 13, "yesterday, how many times did you eat beans such as pinto beans, baked beans, kidney beans, refried beans, or pork and beans," was examined for any evidence in support of research question 2 regarding behaviors. Answer choices for this question were: none, 1 time, 2 times, or 3 or more times. An independent t test was conducted and found the following results at pre and post survey. The pre survey mean

of the experimental group was (M=1.20, SE=.084) and the control group mean was (M=.108, SE=1.21). The results between the experimental and control groups did not differ significantly at pre survey, *t* (91) = -.078, *p* = >.05. At post survey the mean of the experimental group was (M=1.25, SE= .082) and mean of the control group was (M=1.23, SE=.087). At post survey, data findings showed no statistically significant results between the experimental and control groups, *t* (89) = .146, *p* = >.05. Findings show there was no statistically significant differences between the experimental and control groups at pre or post survey concerning how many times yesterday students ate pinto beans, backed beans, kidney beans, refried beans, or pork and beans.

A dependent t test was also conducted for this question within the experimental and within the control group with no significant results found. A dependent t test within the experimental group was also conducted for this question at pre survey (M=1.23, SE=.091), and post survey (M=1.25, SE=.082.) with no significance *t* (47) =-.172, *p* = >.05, and within the control group pre survey (M=1.22, SE=.111) and post survey (M=1.24, SE=.098) with no significant results, *t* (36) = -.374, *p* = >.05.

Survey question 14, "yesterday, how many times did you fruit," was examined for any evidence in support of research question 2 regarding behaviors. Answer choices for this question were: none, 1 time, 2 times, or 3 or more times. An independent t test was conducted and found the following results at pre and post survey. The pre survey mean of the experimental group was (M=1.82, SE=142) and the control group mean was (M=2.11, SE=.168). Results between the experimental and control groups did not differ significantly at pre survey, *t* (91) = -1.30, *p* = >.05. At post survey the mean of the experimental group was (M =2.23, SE=.134) and mean of the control group was (M

=2.28, SE=.183). At post survey, data findings showed no statistically significant results between the experimental and control groups, *t* (78.8) = -.220, *p* = >.05. Findings show there was no statistically significant differences between the experimental and control groups at pre or post survey concerning how many times yesterday students ate fruit.

A dependent t test was also conducted for question 14 with the following results (see table 12 below). The mean within the experimental group at pre survey was (M=1.79, SE=.140) and post survey (M=2.23, SE=1.34). The dependent t test analysis showed there was a statistical significance within the experimental group showing they ate more at post survey *t* (47) = -2.89, *p* = < .05. There was no statistical significance for this question within the control group pre survey (M=2.11, SE.172) or post survey (M=2.24, SE=.206), *t* (36) = - 6.82, *p* = >.05. The statistical significance suggests that the experimental group 'yesterday' ate more fruit at post survey when compared to their pre survey responses. This result is reflected in table 12 below.

Table 12

Dependent t-test results for behavior question, *"yesterday, how many times did you eat fruit?"*

Experimental group	*t* (47) = -2.89, *p* = < .05	*t*	*df*	*p*
Pre Survey (M=1.79, SE=.140)				
SD (.967) N=48				
Post Survey (M=2.23, SE=1.34)		-2.89	47	.006

SD (.928) N=48

Survey question 15, "yesterday, how many times did you drink fruit juice," was examined for any evidence in support of research question 2 regarding behaviors. Answer choices for this question were: none, 1 time, 2 times, or 3 or more times. An independent t test was conducted and found no statistically significant results at pre or post survey. The pre survey mean of the experimental group was (M=1.67, SE=.125) and the control group mean was (M=1.74, SE=.123). The results between the experimental and control groups did not differ significantly at pre survey, *t* (91) = -.353, p = >.05. At post survey the mean of the experimental group was (M=1.73, SE=.129) and mean of the control group was (M=1.79, SE=.131). At post survey, data findings showed no statistically significant results between the experimental and control groups, *t* (89) = -.334, p = >.05. Findings show there was no statistically significant differences between the experimental and control groups at pre or post survey concerning how many times yesterday students drank fruit juice. A dependent t test was also conducted for this question within the experimental and within the control group with no significant results found.

A dependent t test within the experimental group was also conducted for this question at pre survey (M=1.73, SE=.129), and post survey (M=1.73, SE=.129) with no significance, *t* (47) = 0.00, p = >.05, and within the control group pre survey (M=,1.72 SE=1.26) and post survey (M=1.78, SE=.135) with no significant results, *t* (36) = -.374, p = >.05.

Survey question 16, "yesterday, how many times did you drink any punch, kool-aid, sports drinks, or other fruit-flavored drinks," was examined for any evidence in support of research question 2 regarding behaviors. Answer choices for this question were: none, 1 time, 2 times, or 3 or more times. An independent t test was conducted and found a statistically significant finding at post survey within the experimental group (see table 13 below). The pre survey mean of the experimental group was (M=1.76, SE=.149) and the control group pre survey mean was (M=1.50, SE=.135). The results between the experimental and control groups did not differ significantly at pre survey, t (91) = 1.25, p = >.05. The post survey mean of the experimental group was (M=2.0, SE=.149) and mean of the control group was (M=1.35, SE=.115). Post survey data findings showed statistically significant results between the experimental and control groups, t (85.6) = 3.47, p = <.05. The data showed no significant differences between the experimental and control groups at pre survey. However, statistical significance at post survey suggests the experimental group 'yesterday' drank more punch, kool-aid, sports drinks, or other fruit-flavored drinks when compared to the control group. This is reflected below in table 13.

A dependent t test within the experimental group was also conducted for this question at pre survey (M=1.85, SE=.163), and post survey (M=2.00, SE=.149) with no significance t (47) = -.926, p = >.05, and within the control group pre survey (M=1.49, SE=.138) and post survey (M=1.35, SE=.124) with no significance , t (36) = .961, p = >.05.

Table 13

Independent t-test results for behavior question *"yesterday, how many times did you drink any punch, kool-aid, sports drinks, or other fruit -flavored drinks?"*

Pre-survey *t* (91) = 1.25, *p* = >.05	*t*	*df*	*p*
Experimental group (M=1.76, SE=.149) (SD = 1.10) N=55	1.25	91	.216
Control group (M=1.50, SE=.135) (SD =.830) N=38			
Post-survey *t* (85.6) = 3.47, *p* = <.05	***t***	***df***	***p***
Experimental group (M=2.0, SE= .149) (SD = 1.03) N=48	3.47	85.6	.001
Control group (M= 1.35, SE=.115) (SD = .752) N=33			

Survey question 17, "yesterday, how many times did you drink regular or diet pop, soda, or soft drinks," was examined for any evidence in support of research question 2 regarding behaviors. Answer choices for this question were: none, 1 time, 2 times, or 3

or more times. An independent t test was conducted and found the following results at pre and post survey. The pre survey mean of the experimental group was (M =1.98, SE =.148) and the control group mean was (M =1.84, SE=.162). The results between the experimental and control groups did not differ significantly at pre survey, *t* (91) = .625, *p* = >.05. At post survey the mean of the experimental group was (M=1.83, S =.141) and mean of the control group was (M=1.79, SE=.147), and showed no statistically significant results between the experimental and control groups, *t* (89) =.209, *p* = >.05. Findings show there was no statistically significant differences between the experimental and control groups concerning how many times yesterday students drank regular or diet pop, soda, or soft drinks at pre or post survey.

A dependent t test within the experimental group was also conducted for this question at pre survey (M=2.08, SE=1.60), and post survey (M=1.83, SE=.141) with no significance *t* (47) = 1.90, *p* = >.05, and within the control group pre survey (M=1.86, SE=.165) and post survey (M=1.81, SE=.163) with no significant results, *t* (36) = .320, *p* = >.05.

Survey question 18, "yesterday, how many times did you eat some type of frozen dessert," was examined for any evidence in support of research question 2 regarding behaviors. Answer choices for this question were: none, 1 time, 2 times, or 3 or more times. Independent t test statistics indicate the pre survey mean of the experimental group was (M=1.71, SE =.121) and the control group mean was (M=1.39, SE=.128). The results between the experimental and control groups did not have significant results at pre survey, *t* (91) =1.74, *p* = >.05. At post survey the mean of the experimental group was (M=1.83, SE=.138) and mean of the control group was (M=1.58, SE=.130). At post

survey, data findings showed no statistically significant results between the experimental and control groups, t (89) = 1.32, p = >.05. Therefore, findings show there was not any statistically significant differences between the experimental and control groups concerning how many times yesterday students had some type of frozen dessert at pre or post survey.

A dependent t test within the experimental group only was also conducted for this question at pre survey (M=1.60, SE=.114), and post survey (M=1.83, SE=.137) with no significance t (47) = -1.80, p = >.05. The control group pre survey mean (M=1.40, SE=.131) and post survey mean (M=1.51, SE=.132) showed no significant results, t (36) = -.681, p = >.05.

Survey question 19, "yesterday, how many times did you eat sweet rolls, doughnuts, cookies, brownies, pies or cake," was examined for any evidence in support of research question 2 regarding behaviors. Answer choices for this question were: none, 1 time, 2 times, or 3 or more times. Independent t test statistics indicate the pre survey mean of the experimental group was (M=1.42, SE=.106) and the control group mean was (M=1.68, SE=.147). The results between the experimental and control groups did not have significant results at pre survey, t (91) = -1.51, p = >.05. At post survey the mean of the experimental group was (M=1.35, SE=.092) and mean of the control group was (M= 1.51, SE=.102). At post survey, data findings showed no statistically significant results between the experimental and control groups, t (89) = -1.15, p = >.05. Findings show there was no statistically significant differences between the experimental and control groups at pre or post survey concerning how many times yesterday students ate sweet rolls, doughnuts, cookies, brownies, pies or cake.

A dependent t test within the experimental group was also conducted for this question at pre survey (M=1.48, SE=.115), and post survey (M=1.35, SE=.092) with no significance t (47) = 1.43, p = >.05, and within the control group pre survey (M=1.70, SE=.149.) and post survey (M=1.54, SE=.113) with no significant results, t (36) = .94, p = >.05.

Survey question 20, "yesterday, how many times did you eat chocolate candy," was examined for any evidence in support of research question 2 regarding behaviors. Answer choices for this question were: none, 1 time, 2 times, or 3 or more times. Independent t test statistics indicate the pre survey mean of the experimental group was (M=1.33, SE=.122) and the control group mean was (M =1.47, SE=.140). The results between the experimental and control groups did not have significant results at pre survey, t (91) = -.783, p = >.05. At post survey the mean of the experimental group was (M=1.54, SE=.123) and mean of the control group was (M=1.53, SE=.150). At post survey, data findings showed no statistically significant results between the experimental and control groups, t (89) = .035 p = >.05. Findings show there was no statistically significant differences between the experimental and control groups at pre or post survey concerning how many times yesterday students ate chocolate candy.

A dependent t test within the experimental group was also conducted for this question at pre survey (M=1.35, SE=.128), and post survey (M=1.54, SE=.122) with no significance t (47) = -1.10, p = >.05. The control group pre survey mean (M=1.49, SE=.143) and post survey mean (M=1.62, SE=.170) showed no significant results, t (36) = -.797, p = >.05.

Research survey question 21, "yesterday, did you eat breakfast," was examined with a chi-square analysis for any evidence regarding research question 2 on behaviors. Results revealed no statistical significance between the two groups. Data at pre survey χ^2 (1, N=54) = .405, p = >.05 and post survey χ^2 (1, N=47) =.622, p = >.05 and total χ^2 (1, N101) = .717, p > .05, which concluded no statistical significance when examining students breakfast behavior between the two groups.

Survey question 22, "yesterday, how many meals did you eat," was examined for any evidence in support of research question 2 regarding behaviors. Answer choices for this question were: a)I didn't have any meals yesterday, b) I had 1 meal yesterday, c) I had 2 meals yesterday, or d) I had 3 or more meals yesterday. Independent t test data statistics indicate significant results (see table 14). The pre survey mean of the experimental group was (M=3.45, SE=.110) and the control group mean was (M=3.74, SE=.091). The results between the experimental and control groups had significant results at pre survey, t (91) = -1.99, p = <.05. At post survey the mean of the experimental group was (M=3.69, SE=.085) and mean of the control group was (M=3.77, SE=.073). At post survey, data findings showed no statistically significant results between the experimental and control groups, t (89) = -.705, p = >.05. Statistical significance suggests that the control group of students ate more meals at pre survey 'yesterday' than the experimental group at pre survey. Table 14 below reflects this information.

A dependent t test was also conducted for survey question 22 with the following results (see table 14.1 below). The pre survey mean within the experimental group at pre survey was (M=3.46, SE=.159) and post survey (M=3.69, SE=.166). The dependent t test analysis showed there was a statistical significance within the experimental group

showing they ate more at post survey *t* (47) = -2.04, p = < .05. There was no statistical significance for this question within the control group pre survey mean (M=3.73, SE=1.46) and post survey mean (M=3.73, SE=.200), t (36) = 1.00, *p* = >.05. The statistical significance suggests that the experimental group at more meals 'yesterday' at post survey when compared to their pre survey responses with no changes noted within the control group. This result is reflected in table 14.1 below.

Table 14

Independent t-test results for behavior question *"yesterday, how many meals did you eat?"*

Pre-survey *t* (91) = -1.99, *p* = <.05	*t*	*df*	*p*
Experimental group (M =3.45, SE =.110) (SD = .812) N=55			
Control group (M =3.74, SE =.091). (SD = .554) N=38	-.199	91	.049

Post-survey *t* (89) = -.705, *p* = >.05	*t*	*df*	*p*
Experimental group (M = 3.69, SE = .085) (SD =.589) N=48	-.705	89	.483

Control group (M = 3.77, SE = .073)

(SD = .480) N=43

Table 14.1

Dependent t-test results for behavior question, *"yesterday, how many meals did you eat?"*

Experimental group	*t* (47) = -2.04, p = < .05	*t*	*df*	*p*
Pre Survey (M=3.46, SE=.159)				
SD (.849) N=48				
Post Survey (M=3.69, SE=.166)		-2.04	47	.047
SD (.589) N=48				

Physical Activity Behaviors

Survey question 45, "on how many of the past 7 days did you exercise or take part in physical activity that made your heart beat fast and made you breathe hard for at least 30 minutes," was examined for any evidence in support of research question 2 regarding behaviors. Answer choices for this question was: 0 days, 1 days, 2 days, 3 days, 4 days, 5 days, 6 days , or 7 days. An independent t test was conducted and showed statistically significant results within the experimental group showing a higher level of physical activity at post survey (see table 15 below) when compared to the control group. The pre survey mean of the experimental group was (M=4.77, SE=.328) and a control group pre survey mean of (M=5.66, SE=2.22). The results between the experimental and control

groups did not differ significantly at pre survey, t (88) = -1.81, p = >.05. At post survey the mean of the experimental group was (M=4.56, SE=.386) and mean of the control group was (M=3.55 SE=.273). At post survey, data findings showed statistically significant results between the experimental and control groups, t (82.2) = 2.15, p = <.05. While there were no significant differences between the experimental and control groups at pre survey, the experimental group at post survey had a higher level of physical activity when compared to the control group. The statistical significance suggests that the experimental group at post survey were more physically active than the control group at post survey. This is reflected in table 15 below.

A dependent t test was also conducted for question 45 with the following results (see table 15.1 below) with statistical significance. The pre survey mean within the experimental group at pre survey was (M=4.84, SE=.354) and post survey (M=4.51, SE=.393) with no statistical significance t (44) = .795, p > .05.The dependent t test analysis showed there was a statistical significance within the control group pre survey (M=5.58. SE=.377) and post survey (M=3.55, SE=299) showing they exercised significantly less at post survey t (35) = 4.93, p = < .05. The statistical significance suggests that the control group of students exercised or took part in physical activity less at post survey, while the experimental group had no significant differences noted from pre to post. This is reflected in table 15.1 below.

Table 15

Independent t-test results for physical activity behavior question, *"On how many of the past 7 days did you exercise or take part in physical activity that made your heart beat fast and made you breathe hard for at least 30 minutes?"*

Pre-survey t (88) = -1.81, p = >.05	t	df	p
Experimental group (M=4.77, SE=.328) SD (2.36) N=52 Control group (M=5.66, SE=2.22). SD (2.22) N=38	-1.81	88	.074
Post-survey t (82.2) = 2.15, p = <.05	t	df	p
Experimental group (M=4.56, SE=.386) (SD=2.67) N=48 Control group (M=3.55, SE=.273) (SD=1.77) N=42	2.15	82.2	.035

Table 15.1

Dependent t-test results for physical activity behavior question, *"On how many of the past 7 days did you exercise or take part in physical activity that made your heart beat fast and made you breathe hard for at least 30 minutes?"*

Control group t (35) = 4.93, p = < .05	t	df	p
Pre Survey (M=5.58. SE=.377)			
SD (2.26) N=36			
Post Survey (M=3.55, SE=299)	4.93	35	.000
SD (1.80) N=36			

Survey question number 46, "last week, on how many days did you go to physical education (PE) or gym classes," was examined for any evidence in support of research question 2 regarding behaviors. Answer choices for this question was: 0 days, 1 days, 2 days, 3 days, 4 days, or 5 days. An independent t test was conducted and showed statistically significant results within the experimental group showing a higher level of physical activity or gym classes at post survey (see table 16 below) when compared to the control group. The pre survey mean of the experimental group was (M=2.29, SE=.170) and a control group pre survey mean of (M=2.63 SE=.179). The results between the experimental and control groups did not differ significantly at pre survey, t (88) = -1.37, p

= >.05. At post survey the mean of the experimental group was (M=2.52 SE=.166) and mean of the control group was (M=2.00 SE=.058). At post survey, data findings showed statistically significant results between the experimental and control groups, *t* (58.10) = 2.97, *p* = <.05. Therefore, the statistically significant suggests that there was no differences concerning how many days the students went to PE or gym class at pre survey. However, at post survey, the experimental group had physical education or gym class more times per week than the control group. This conclusion is reflected in Table 16 below.

A dependent t test was also conducted for question 46 with the following results (see table 16.1 below) with statistical significance. The pre survey mean within the experimental group at pre survey was (M=2.31, SE=.171) and post survey (M=2.56, SE=.176) with no statistical significance *t* (44) =-1.13, *p* = > .05. The dependent t test analysis showed there was a statistical significance within the control group. Pre survey (M=2.65. SE=.183) and post survey (M= 2.03, SE=.061) means showed they went to physical education or gym class significantly less at post survey *t* (36) = 2.96, *p* = < .05. The statistical significant finding suggests that the control group took part in physical activity or gym class less at post survey, while the experimental group and no significant differences noted from pre to post survey. This is reflected in table 16.1 below.

Table 16

Independent t-test results for physical activity behavior question, *"last week, on how many days did you go to physical education (PE) or gym classes?"*

Pre-survey *t* (88) = -1.37, *p* = >.05	*t*	*df*	*p*
Experimental group (M=2.29, SE=.170) SD (1.23) N=52 Control group (M=2.63 SE=.179) SD (1.10) N=38	-1.37	88	.175
Post-survey *t* (58.10) = 2.97, *p* = <.05	*t*	*df*	*p*
Experimental group (M=2.52 SE=.166) (SD=1.15) N=48 Control group (M=2.00 SE=.058) (SD=.378) N=43	2.97	58.10	.004

Table 16.1

Dependent t-test results for physical activity behavior question, *"last week, on how many days did you go to physical education (PE) or gym classes?"*

Control group *t* (36) = 2.96, *p* = < .05	*t*	*df*	*p*
Pre Survey (M= 2.65. SE=.183) SD (1.11) N=37			

Post Survey (M= 2.03, SE=.061) SD (.372) N=37	2.96	36	.005

Survey question 47, "how many hours did you watch TV or video movies away from school," was examined for any evidence in support of research question 2 regarding behaviors. Answer choices for this question was: I didn't watch TV yesterday, 1 hour, 2 hours, 3 hours, 4 hours, 5 hours, or 6 hours or more. An independent t test was conducted and showed statistically significant results within the experimental group at both pre and post survey (see table 17 below) when compared to the control group. The pre survey mean of the experimental group was (M=3.15, SE= 2.71) and a control group pre survey mean of (M= 2.21, SE=.236). The results between the experimental and control groups differed significantly at pre survey, t (88) = 2.63, p = <.05. At post survey the mean of the experimental group was (M= 2.70 SE=.219) and mean of the control group was (M=3.37 SE=.145). At post survey, data findings showed statistically significant results between the experimental and control groups, t (80.1) = -2.53, p = <.05. Therefore, it can be concluded that the experimental group at pre survey had more screen time than the control group, but at post survey had less screen time than the control group.

A dependent t test was also conducted for question 46 with the following results (see table 17.1 below) with statistical significance. The pre survey mean within the experimental group at pre survey was (M=3.16, SE=.295) and post survey (M=2.69, SE=.224) with no statistical significance t (44) = 1.31, p = > .05. The dependent t test analysis showed there was a statistical significance within the control group. Pre survey (M=2.19, SE=.241) and post survey (M=3.32, SE=.160) means showed the control group

watched TV or video movies away from school more at post survey than at pre survey *t* (36) = -4.81, *p* = < .05. This statistically significant dependent t test showed that the control group watched TV or video movies away from school more at post survey, while the experimental group and no significant differences noted from pre to post survey. This result is reflected in table 17.1 below.

Table 17

Independent t-test results for physical activity behavior question, *"Yesterday how many hours did you watch TV or video movies away from school?"*

Pre-survey *t* (88) = 2.63, *p* = <.05	*t*	*df*	*p*
Experimental group (M=3.15, SE= 2.71) SD (1.95) N=52 Control group (M= 2.21, SE=.236). SD (1.45) N=38	2.63	88	.010
Post-survey *t* (80.1) = -2.53, *p* = <.05	***t***	***df***	***p***
Experimental group (M= 2.70 SE=.219) (SD = 1.52) N=48 Control group (M= 3.37 SE=.145).	-2.53	80.1	.013

(SD = .952) N=43

Table 17.1

Dependent t-test results for physical activity behavior question, *"Yesterday how many hours did you watch TV or video movies away from school?"*

Control group t (36) = -4.81, p = < .05	*t*	*df*	*p*
Pre Survey (M=2.19, SE=.241)			
SD (1.47) N=37			
Post Survey (M=3.32, SE=.160)	-4.81	36	.000
SD (.973) N=37			

Survey question 48, "during the past 12 months, on how many sports teams did you play in," was examined in response to research question 2 concerning physical activity behaviors. An independent t-test was conducted, to discover a difference between the experimental and control groups at pre and post survey with response choices of 0 teams, 1 team, 2 teams, or 3 or more teams. Data results showed no statistically significant results at pre or post survey. At pre survey the mean of the experimental group was (M=2.37, SE=.165) and the control group mean was (M=2.32, SE=.142). Results between the experimental and control groups did not differ significantly at pretest, t (88) = .228, p = >.05. Post survey results showed the mean of the experimental group was (M=2.36, SE=.156) and control group (M=2.47, SE.168). Therefore, no significant

differences between the experimental and control groups at post survey, *t* (88) = -.452, *p* = >.05. Results concluded that both experimental and control groups at pre and post survey had no significant differences in how many sports teams they played in within the past 12 months.

A dependent t test within the experimental group was also conducted for this question at pre survey (M=2.39, SE=.139), and post survey (M=2.43, SE=.132) with no significance *t* (43) = -.362, *p* = >.05, and within the control group pre survey (M= 2.30, SE=.149) and post survey (M=2.49, SE=.146) with no significant results, *t* (36) = -1.36, *p* = >.05.

Survey question 49, "how many hours per day do you usually spend on the computer away from school," was examined in response to research question 2 concerning physical activity behaviors. An independent t-test was conducted, to discover a difference between the experimental and control groups at pre and post survey with response choices of: I don't use the computer, 1 hour, 2 hours, 3 hours, 4 hours, 5 hours or 6 or more hours. Data results showed the following results at pre and post survey. At pre survey the mean of the experimental group was (M=2.06, SE=.227) and the control group mean was (M=1.79, SE=.137). Results between the experimental and control groups did not differ significantly at pretest, *t* (80.17) = 1.01, *p* = >.05. Post survey results showed the mean of the experimental group was (M=1.89, SE=.162) and control group (M=2.02, SE=.201). Therefore, no significant differences between the experimental and control groups at post survey, *t* (88) = -.507, *p* = >.05. This determines that both experimental and control groups at pre and post survey had no significant differences in how many hours per day they spent on the computer away from school.

A dependent t test was also conducted for this question within the experimental and within the control group with no significant results found. A dependent t test within the experimental group was also conducted for this question at pre survey (M=2.09, SE=.247), and post survey (M=1.93, SE=.170) with no significance, t (43) =.593, p = >.05, and within the control group pre survey (M=1.78, SE=.140) and post survey (M=2.05, SE=.212) with no significant results, t (36) =-1.15, p = >.05.

Survey question 50, "how many hours per day do you usually spend playing video game like Nintendo®, Sega®, Play station®, Xbox®, Gameboy®, or arcade games away from school," was examined in response to research question 2 concerning physical activity behaviors. An independent t-test was conducted, to discover a difference between the experimental and control groups at pre and post survey with response choices of: I don't play video games, 1 hour, 2 hours, 3 hours, 4 hours, 5 hours or 6 or more hours. Data results showed the following results at pre and post survey. At pre survey the mean of the experimental group was (M= 2.80, SE= .296) and the control group mean was (M=2.61, SE=.296.). Results between the experimental and control groups did not differ significantly at pretest, t (88) = .472, p = >.05. Post survey results showed the mean of the experimental group was (M=2.55, SE=.283) and control group (M=2.70, SE=.275). Therefore, no significant differences between the experimental and control groups at post survey, t (88) = -.364, p = >.05. Results conclude that the experimental and control groups at pre and post survey had no significant differences in how many hours per day they spent on the video games or arcade games away from school.

A dependent t test was also conducted for this question within the experimental and within the control group with no significant results found. A dependent t test within

the experimental group was also conducted for this question at pre survey (M=2.93, SE=.324), and post survey (M=2.61, SE=.298) with no significance, t (43) = 1.68, p = >.05, and within the control group pre survey (M=2.62 SE=3.03.) and post survey (M=2.78, SE=.305) with no significant results, t (36) = -.614, p = >.05.

Survey question 51, "how many hours per day do you usually spend playing video game like Wii ®/WiiFit®/WiiActive®," was examined in response to research question 2 concerning physical activity behaviors. An independent t-test was conducted, to discover a difference between the experimental and control groups at pre and post survey with response choices of: I don't play video games, 1 hour, 2 hours, 3 hours, 4 hours, 5 hours or 6 or more hours. Data results showed no statistically significant results at pre or post survey. At pre survey the mean of the experimental group was (M= 2.53, SE=.248) and the control group mean was (M=2.50, SE=.279). Results between the experimental and control groups did not differ significantly at pretest, t (87) =.078, p = >.05. Post survey results showed the mean of the experimental group was (M=2.47, SE=.245) and control group (M=2.23, SE=.235). Findings show no significant differences between the experimental and control groups at post survey, t (88) = .691, p = >.05. Results concluded that the experimental and control groups at pre and post survey had no significant differences in how many hours per day they spent on the Wii ® video games.

A dependent t test was also conducted for this question within the experimental and within the control group with no significant results found. A dependent t test within the experimental group was also conducted for this question at pre survey (M=2.60, SE=.288), and post survey (M=2.46, SE=.267) with no significance, t (42) =.453, p =

>.05. The control group pre survey (M=2.46, SE=.288) and post survey (M=2.24, SE=.267) with no significant results, t (36) = .857, p = >.05.

Summary

Throughout this chapter we have discussed the purpose, research questions, methods, data demographics and analysis, and data results. The goal for this research project was to find differences between the experimental group of students who received nutrition curriculum intervention versus a control group of students who did not receive the curriculum intervention. When analyzing the results it was evident that there were differences found within student knowledge and attitudes as well as behaviors related to nutrition and physical activity. Chapter 5 will bring full circle the study with researcher analysis, synthesis, and evaluation of the findings.

CHAPTER 5

RESEARCH FINDINGS AND DISCUSSION

Introduction

The purpose of this research study was to survey students who participated in the University of Missouri's Family Nutrition program as well as students who have not participated in the program, identifying any differences in knowledge, attitudes, and behaviors regarding nutrition and physical activity. This chapter will summarize the study, as well as discuss findings, conclusions, implications, and future research.

Summary of the Study

Behaviors such as insufficient physical activity and poor nutrition are acknowledged as primary mechanisms for childhood overweight and obesity. School based programs that combine healthful eating and physical activity education provide a good opportunity to enhance health and lower chronic disease (Veugelers & Fitzgerald, 2005). Nutrition education can be defined as "any set of learning experiences designed to facilitate the voluntary adoption of eating and other nutrition-related behaviors conducive to health and well-being" (Contento, Randell & Basch, 2002, p 3). This definition suggests that behavioral change is the appropriate outcome criteria for evaluating the effectiveness of nutrition education (Contento, Randell, & Basch, 2002). Schools are logical treatment arenas given their unparalleled access to children in terms of time and attention, duration of exposure, and impact on the behavior of children (Pyle, et al., 2006). A total of 184 students participated in the study. The experimental group (Doniphan Elementary) completed 55 pre surveys and 48 post surveys. The control group

(Jackson North Elementary) completed 38 pre surveys and 43 post surveys. There were 108 male participants and 76 female participants from the two schools. These totals represent research that consisted of a convenience sampling of 4th grade students who participated in the Family Nutrition Program as well as 4th grade students who did not participate in the program.

Henry (1990) and Patton (2002) defined convenience sampling as persons chosen to participate in the study because they were readily available. In this study, convenience sampling was chosen due to the current participation and availability of students already a part of the family nutrition program within schools and were representative of the entire population served within the program. Fourth grade was chosen because the pre and post survey has been validated for reproducibility, internal and test/retest reliability, and construct reliability within fourth grade students (Fahlman, Dake, McCaughtry, and Martin, 2008; Thiagarajah, Fly, et al, 2008; Hoelscher, Day, Kelder, and Ward, 2003). To begin the study, the researcher examined literature to gain knowledge regarding the outcomes of nutrition education related to knowledge and behaviors in children. The literature review illuminated the topic thoroughly and gave insight to the framework and organization of this research study.

Contento, Randell, and Basch (2002) stated that nutrition education is based on the paradigm that knowledge leads to attitude change, which in turn, leads to behavior change. The conceptual framework explaining the sentence above is detailed through the knowledge-attitude-behavior (KAB) model, theory of reasoned action (TRA), and the theory of planned behavior (PB). The three theories together give justification and

relationship between knowledge, attitude, and behavior change informing this research study.

The literature review within student nutrition intervention described contradictory evidence of both positive and negative outcomes related to curriculum regarding nutrition and physical activity knowledge and behaviors in the school setting. The literature review confirmed the necessity to discover the effectiveness of a nutrition education program through evaluation to deter the childhood obesity epidemic. Although the University of Missouri Extension's Family Nutrition Program addresses nutrition and physical activity through nutrition education curriculum in the school setting, the University does not know if the curriculum taught is changing knowledge, attitudes, and/or behaviors in children related to nutrition and physical activity. Knowledge and behavior change in the present study was captured through a survey questionnaire.

Both experimental and control group students answered a 51 question survey called the School Nutrition and Physical Activity (SPAN) survey. The questionnaire was designed to access food behaviors, nutrition attitudes and knowledge, and physical activity behaviors among 4th grade students (Kelder, et al., 2009). The control group received the pre-survey with no nutrition education followed by the post survey, whereas the experimental group received a pre-survey, nutrition education curriculum, followed by the post-survey. The SPAN survey had questions about nutrition knowledge and attitudes, as well as behaviors related to nutrition and physical activity. This design and approach discovered a difference in the knowledge, attitudes, and behaviors related to nutrition and physical activity within children that participate in the University of

Missouri Extension's Family Nutrition Program versus children who do not participate in the program. The following are the 2 research questions answered:

1.) What differences exist in knowledge and attitudes regarding nutrition by children who participate in the University of Missouri Extension's Family Nutrition Program compared to the knowledge and attitudes regarding nutrition of children who do not participate in the program?

Hypothesis 1: there will be no difference in knowledge and attitudes regarding nutrition held by participants of the University of Missouri Extension's Family Nutrition Program versus non participants.

2.) What differences exist in nutrition and physical activity behaviors of children who participate in the University of Missouri Extension's Family Nutrition Education program compared to the nutrition and physical activity behaviors of children who do not participate in the program?

Hypothesis 2: there will be no difference in nutrition and physical activity behaviors held by participants of the University of Missouri Extension's Family Nutrition Program versus non participants.

The null hypothesis stated there will be no differences found between the two groups related to nutrition knowledge and attitudes and /or nutrition and physical activity behaviors within the experimental and control groups. The null hypothesis was rejected based on the findings with conclusions explained below.

Findings

This section will address findings from this research study detailing discussion of the data analysis from the survey questionnaire. The data findings were summarized

through survey responses regarding knowledge, attitudes, and behaviors which answer the research questions stated above.

The data analysis for research question 1 was answered by SPAN survey questions 23-44. Questions 23-39 were nutrition knowledge questions, while 40-44 were nutrition attitude questions. In pursuit of answering research question 1, students in both the experimental and control groups were surveyed with questions regarding knowledge and attitudes about nutrition with results discussed in the following paragraphs.

Survey questions regarding knowledge were answered by survey questions 23-39 with a chi square analysis used. Out of these sixteen survey questions there were 5 with significance: 23, 25, 27, 29, and 34. Students were asked how many food servings a person should eat each day from survey questions 23, 25, 27. Specifically, questions about amounts needed the most from food groups, servings of fruit, and servings of meat. Results showed that the experimental group answered significantly more correct answers for these questions than the control group. Question 29 asked what a good source of vitamin C was. Interestingly, the control group answered more of these questions correctly compared to the experimental group. Question 34 asked a nutrition knowledge question about what a person eats can make a difference in them getting cancer. Again, the experimental group showed significantly more correct answers than the control group.

Nutrition attitudes were researched through survey questions 40-44. Question 44 was the only question with significance illustrated through independent and /or dependent t tests. This question asked students if they felt confident they could eat healthy at fast food restaurants. Data analysis showed that the experimental group at post survey felt more confident they could eat healthy at a fast food restaurant when compared to the

control group. There were no statistically significant results from the dependent t tests for these questions. Next, we turn to outcomes regarding research question 2 looking at nutrition behaviors throughout following paragraphs.

Research question 2 regarding nutrition behaviors was answered through survey questions 1-22. These were "yesterday" questions looking at student food intake behaviors. Survey question 1, 2, 3, 5, 6, 14, 16, 21, & 22 showed statistical significant data through independent and/or dependent t-tests, with no significance noted from survey questions: 4, 7, 8, 9, 10, 11, 12, 13, 15, 17, 18, 19, or 20.

Survey question 1 asked about eating meats (hamburgers, hotdogs, steak, etc) and found statistical significance at post survey within the experimental group when compared to the control group. Data from the dependent t test showed significance within the experimental group revealing they ate more meat at post survey when compared to their pre survey responses.

Survey question 2 regarding fried foods, and survey question 3, looking at peanuts or peanut butter, showed the control group ate more at pre survey than the experimental group for both questions, with no significance at post survey or within dependent t test data analysis. Also, survey question 4 looking at how many times students ate cheese showed no statistical significance with either the independent or dependent t tests.

Survey question 5 looked at how many times yesterday students drank milk and survey question 6 asked how many times they ate yogurt, cottage cheese, and/or yogurt drink and showed no statistical significance between the experimental and/or control groups. However, both revealed significance within the dependent t test. For question 5, the dependent t test indicated there was statistical significance within the experimental

group showing they drank more milk at post survey. Survey question 6 showed significance within the control group showing they ate more yogurt, cottage cheese, yogurt drink at post survey when compared to their pre survey.

There was no statistical significance for questions 7-13, therefore moving on to survey question 14. Survey question 14 asked about fruit intake and revealed no significance between the experimental and control groups, but did show significance within the dependent t test. It showed the experimental group ate significantly more fruit at post survey when compared to their pre survey data. Survey question 15 showed no significant data, however, survey question 16 did show significance.

Survey question 16, asked about intake of punch, kool-aid, sports drinks, or other fruit flavored drinks revealed statistical significance within the experiment group finding they drank more at post survey when compared to the control group. There was no significance for the dependent t tests.

There were no significant findings for questions 17-21, so moving on to survey question 22 asking about how many meals students ate per day. The results between the experimental and control groups showed significance at pre survey with the control group of students eating more meals per day than the experimental group at pre survey. The dependent t test revealed significance also, but this time within the experimental group. The analysis showed the experimental group ate more at post survey when compared to their pre survey responses. We will turn our attention to the final data analysis regarding research question 2 looking at physical activity behaviors through the following survey questions 45-51.

Survey question 45 asked about physical activity behaviors with significant findings with both independent and dependent t test analysis. There were no findings within the pre survey independent t tests; however, data revealed post survey findings showed the experimental group at post survey had a higher level of physical activity when compared to the control group. Also, the dependent t test revealed the control group exercised less at post survey when compared to their pre survey responses.

Survey question 46 asked about physical education or gym classes within the past week. Data revealed statistical significant findings that the experimental group at post survey attended physical education or gym class more when compared to the control group. The dependent test indicated the control group took part in physical education or gym class significantly less at post survey compared to their pre survey responses.

Survey question 47 asked about sedentary activity (watching TV/videos) and found statistical significance. Independent t test data found the experimental group at pre survey had more screen time than the control group, but at post survey had less screen time than the control group. The dependent t test analysis showed the control group watched TV or video movies more at post survey when compared to their pre survey responses.

There were no significant findings for questions 48-51 for either the independent and dependent data analysis. Survey questions 48 asked about sports team with no significant difference between the two groups. Questions 49-51 asked about computer and games such as Nintendo, Play station and Wii with no significant differences found. The following paragraphs will look at conclusions resulting from the survey data findings.

Conclusions

Two research questions have been addressed through this research study regarding nutrition and physical activity differences between the experimental and control groups of children. A pre and post survey questionnaire was utilized to discover nutrition knowledge and attitudes as well as nutrition and physical activity behaviors. The researcher proposed the following as research question 1. What differences exist in the knowledge and attitudes regarding nutrition by children who participate in the University of Missouri Extension's Family Nutrition Program compared to the knowledge and attitudes regarding nutrition of children who do not participate in the program? The following paragraphs will discuss the conclusions found regarding research question 1 related to survey questions 23, 25, 27, 29, and 34.

This research study discovered several areas of nutrition knowledge differences between the experimental and control group through survey questions 23, 25, & 27 looking at pre and post surveys for both groups. There was statistically significance differences found in the areas of: food groups a person should eat the most, amount needed of fruit per day, and meat intake amounts. These significant results were directly related to the nutrition education curriculum lessons taught to the students which resulted in the experimental group answering significantly more correct answers in comparison to the control group. This revealed that the Family Nutrition Education Program is changing knowledge in students who participated in the program.

Survey question 29 asked about a good source of Vitamin C. This nutrition knowledge question had an interesting outcome resulting in the control group answering significantly more correct answers than the experimental group. This outcome was

surprising because the nutrition assistants teach about Vitamin C in both the fruit and vegetable lesson. It could have been the way the survey question answer choice was worded (d. vegetables or fruit) caused confusion. The program assistants teach more about fruits containing good sources of Vitamin C when compared to vegetables. It may have been that the educator didn't stress this enough while teaching that Vitamin C is found in both vegetables and fruits. This is an area that the nutrition assistants can easily monitor as they teach the lessons. Although this research study did find a fair amount of positive nutrition knowledge increase, this finding follows the pattern in the research literature stating that there were negative outcomes to nutrition education in the classroom (Contento, 1992; Frobisher, Jepson, & Maxwell, 2005; Anderson, Stanberry, Blackwell, & Davidson, 2001).

The experimental group had positive significant differences regarding survey question 34 related to the statement that certain foods can reduce a person's risk of cancer. The overall totals of correct and incorrect answers showed the control group answered incorrectly more than expected and correctly less than expected when compared to the experimental group. This is similar to the review of literature regarding nutrition knowledge that showed positive results within the experimental groups versus control group regarding nutrition education (Kandiah & Jones, 2001; Bellman, Barone, Jessen and Arnold, 2009; Powers, Struempler, Guarino and Parmer, 2005; Shariff, Bukhari, Othman, Hasim, et. al, 2008). These results showed positive significant outcomes related to nutrition knowledge within the experimental group; however, there were also questions that had no significant outcomes.

It should be noted that this study found no significant differences between the two groups related to the following nutrition knowledge areas of the survey questionnaire: fewest servings needed per day, servings of vegetables and bread needed per day, good source of energy, good source of calcium, protein, heart disease and intake, overweight and health risks, designing a better nutrition plan, French fries are nutritious, and the meaning of the word 'lite' on a food packages. There were no significant amounts of correct or incorrect answers between the two groups regarding these survey questions, as both groups answered similarly. Some of the survey answers may have been pretty easily predicted due to the nature of the question for both the experimental and control groups regardless of lessons taught. An example might be "french fries are nutritious" is easy to guess the correct answer, just as being overweight and having health risks, etc., is also fairly easy to guess the answer. That may explain why there were no significant differences within some of these questions between the two groups. These results also support the research literature that described no significant results after nutrition intervention regarding nutrition knowledge (Contento, 1992; Frobisher, Jepson, & Maxwell, 2005; Anderson, Stanberry, Blackwell, & Davidson, 2001). Although this question showed no positive outcomes, these results also may give the educator an idea of areas to work on to ensure the students understand fully the knowledge objectives of the lessons.

Nutrition attitudes were answered by survey questions 40-44 through independent and dependent t tests. There was statistical significance found only in survey question 44 within the independent t test analysis. This survey question asked about feeling confident the student could eat healthy at a fast food restaurant. The experimental group had a

higher level of agreement at post survey that they could eat healthy at a fast food restaurant when compared to the control group. This finding supports the research by Fahlman, Dake, McCaughtry, and Martin (2008) that also found nutrition intervention programs helped students make healthy food choices. These results are very important given the large consumption of fast food within students that helps drive the current overweight and obesity issue.

In answering research question 1 we learned there are some differences in the knowledge and attitudes about nutrition within children who participate in the University of Missouri Extension's family nutrition program compared to children who do not participate. These significant differences are areas of: the food group a person should eat the most, amount needed of fruit per day, and meat intake amounts. Students who participated in the program also felt that certain foods could reduce a person's risk of cancer and felt more confident they could eat healthy at a fast food restaurant. Discussion will now turn to research question 2.

The researcher proposed the following as research question 2: What differences exist in nutrition and physical activity behaviors of children who participate in the University of Missouri Extension's Family Nutrition Education Program compared to the nutrition and physical activity behaviors of children who do not participate in the program. The following paragraphs will discuss the conclusions found regarding research question 2.

This research study discovered several nutrition and physical activity behavioral differences through survey questions 1-22 & 45-51. The following paragraphs will discuss the conclusions from these findings.

Nutrition Behaviors

Questions 1-22 addressed nutrition behaviors with the following questions that found significance: 1, 2, 3, 5, 6, 14, 16, & 22. Significant findings for survey questions dealt with the following nutrition behaviors: eating meat, fried foods, peanuts/peanut butter, milk, yogurt/cottage cheese/yogurt drink, fruit, punch, kool-aid, sport or fruit flavored drink, and meals eaten per day. The following paragraphs will be broken down into experimental student significant data conclusions and then control student significant data conclusions.

Experimental Group

The independent t test for survey question 1 indicated that the experimental group ate more meats at post survey when compared to the control group. Also, the dependent t test showed the experimental group ate more meat at post compared to their pre survey responses. Survey question 5 and 14 showed significance within the dependent t test showing the experimental group drank significantly more milk and ate more fruit at post survey when compared to the their pre survey results. This could have been due of course to what parents cook for the children as well as what they were served at school. However, the researcher feels confident that it was related to the classes that were taught, *Serve Up Your Milk, Meat and Beans,* and the lesson, *Serve up Grains, Fruits, and Vegetables.*

Since these results are within the experimental group who had nutrition lessons, the researcher feels confident that the lessons were a factor for this increase in these healthy nutrition behaviors. One final survey question regarding nutrition behaviors with positive significance was question 22 within a dependent t test showing the experimental

group ate more meals yesterday at post survey than at the experimental group pre survey. Again the researcher believes this may have been a direct result of the nutrition lessons taught. All of these results are supportive of the literature that states nutrition curriculum brought about nutrition behavior change (Hoelscher, Kelder, Murray, Cribb, Conroy & Parcel, 2001; Powers, et. al, 2005; Fahlman, Dake, McCaughtry, & Martin, 2008; Bellman, Barone, Jessen, & Arnold, 2009).

One finding with unexpected results was with survey question 16 that found significance within the experimental group revealing they drank more punch, kool aid, sport drinks, or fruit flavored drinks at post survey when compared to the control group. The researcher expected the students would drink less of these types of drinks after the nutrition lessons. However, these results support the literature that showed studies of nutrition interventions that were not effective in children's nutrition behaviors (Devault, et. al, 2005; Frobisher, Jepson, & Maxwell, 2005; Anderson, Stanberry, Blackwell & Davidson, 2001; Contento, 1992).

Control Group

The next area of significance for nutrition behaviors was with survey question 2 concerning eating fried foods and survey question 3 regarding peanuts and peanut butter. The independent t test showed that the control group ate more fried foods as well as peanuts/peanut butter at pre survey when compared to the experimental group. There was nothing significant from the dependent t tests for these questions for either group. The fact that the control groups ate more fried foods may have been because they might have had these foods at school and/or at home the day before. It was interesting to the researcher that the control group ate more fried foods at pre survey but there was no

significance at post survey for either group for either of these questions. The experimental group had no significance noted. Although research has shown a reduced fat intake after curriculum intervention (Hoelscheer, Kelder, Murray, Crib, Conroy, & Parcel, 2001), the researcher feels that the fact that the experimental group did not have a significant amount of increased fat intake at post survey perhaps was a positive result in itself regarding nutrition behaviors.

Survey question 6 showed significance within the control group dependent t test at post survey showing they ate more yogurt/cottage cheese or yogurt drinks when compared to their pre survey responses. The researcher is unsure why this was significant other than the fact that these foods may have been offered to the student more at post survey. Finally, survey question 22, within the independent t tests findings showed the control group ate more meals per day than the experimental group at pre survey. Again, this may have more to do with what was offered to the student at that particular time.

Physical Activity Behaviors

Survey questions 45-51 inquired about physical activity behaviors within students utilizing independent and dependent t test data analysis. There was statistical significance found in 3 out of the 7 survey questions regarding student levels of physical activity, time spent in physical education or gym class, and screen time.

Survey question 45 found some very positive results regarding physical activity levels within the experimental group. Independent t test data found that the experimental group at post survey had a higher level of physical activity when compared to the control group. Also, the dependent t test showed the control group exercised significantly less at post survey when compared to their pre survey results. This finding is very significant to

this research study. It embraces the fact that the curriculum taught made a difference in physical activity behaviors in students. The nutrition assistant teaches a physical activity at each and every lesson. Contrary to the previous research (Simons-Morton, et.al., 1991) that found the curriculum intervention did not enhance children's physical activity behavior, this research finding is supportive of research showing increased physical activity after curriculum intervention (Slawta & DeNeuri, 2009; Gortmaker, et. al.,1999).

Survey question 46 found significance in both the independent and dependent t tests. The independent t test data found that the experimental group went to physical education or gym class more times per week at post survey when compared to the control group. The researcher was quite pleased to see statistical significance within the experimental group. When a school is committed to both nutrition and physical education classes, students are receiving lessons that will make a difference in their health and well-being (Hoelscher, Kelder, Murray, Cribb, Conroy, & Parcel, 2001). The dependent t test showed the control group took part in physical education or gym less times per week at post survey when compared to their pre survey results. This data result, in all reality, may have been that the school altered the physical activity schedule between the pre and post survey for the control group and perhaps they could not attend the class. It also may have been that the experimental schools were more committed to the classes.

Lastly, survey question 47 showed significance from the independent t test that resulted in the experimental group at pre survey having more screen time than the control group, but at post survey had less screen time than the control group. Basically the experimental group had more screen time at pre survey, but after the nutrition curriculum lessons, had less screen time. This finding is very solid and supports the literature

research for physical activity behavior change in students (Ramirez, Castillo-Martinez, Castaneda, et. al, 2010; Gortmaker, Cheung, Peterson, Chomitz, et. al., 1999). The dependent t test results showed the control group had more screen time at post compared their pre survey results. This showed that without curriculum intervention, there is a strong possibility that screen time may increase. Survey questions 48 asked about sports teams with no significant differences between the two groups.

Questions 49-51 asked about computer time and computer games such as Nintendo, Play station and Wii with no significant differences found in either the independent or dependent t tests. This may be an area to improve upon when teaching lessons related to healthy physical activity amounts.

In summary, the researcher can reject the null hypothesis that there would be no differences between the two groups regarding nutrition and physical activity knowledge and behaviors. The researcher found differences in the nutrition knowledge and attitudes as well as nutrition and physical activity behavioirs within children who are participating in the University of Missouri Extension's Family Nutrition Program. Specifically in the areas of: food group a person should eat the most, amount of fruit needed per day, and meat intake amounts, certain foods can reduce a person's risk of cancer, and confidence they could eat healthy at a fast food restaurant. When looking at nutrition behaviors, dependent t tests concluded that students participating in the Family Nutrition Program ate more meat at post, drank more milk at post, ate more fruit at post, and ate more meals per day at post survey. Finally, there were differences found regarding physical activity behaviors within the students participating in the Family Nutrition Program revealing

they had a higher level of physical activity, went to physical education or gym class more often, and had less screen time after intervention.

Through this study the researcher found several areas of improvement for the curriculum and/or teaching regarding nutrition knowledge as follows: vitamin c, fewest servings of food needed per day, servings of vegetables and bread needed per day, food sources of energy, food sources of calcium and protein, heart disease and intake, overweight and health risks, designing a better nutrition plan, french fries as nutritious, and the meaning of the word 'lite' on a food packages. Areas for improvement within nutrition behaviors include: intake of fruit punch, kool aid, sport or fruit flavored drinks. Lastly, physical activity behaviors related to computer and video game time should be considered for curriculum behavioral objective revisions. The following section will discuss implications of the research study.

Implications

There are implications gleaned from this research survey that include curriculum development and updates as well as more parental involvement incorporated in the lessons. These implications will be discussed throughout the following paragraphs.

As mentioned in the prior paragraph there are areas of improvement for the curriculum that were found within this research. Information should be added and/or highlighted in the curriculum to be sure that nutrition knowledge and behavioral objectives are being met. Specifically, in the areas of foods group servings needed per day, food sources of energy, vitamin c, calcium, and protein as well as information regarding heart disease, and overweight health risks, nutrition plans, and food labeling.

One last idea for curriculum improvement would be computer and video game time. Adding more lessons to include these areas in detail including training with the nutrition program assistants to be sure they are understanding lesson plans and objectives, and finally, developing new core activities for the lessons to include these areas.

Another area of concern is that of parental/caregiver involvement. As we know, parents/caregivers are primary food providers and preparers within the home for children. Many of our survey questions had to do with food behavior selections that the child may or may not had a choice in preparation and purchasing. No matter how much we educate, it the parent doesn't purchase and/or cook healthy foods the child will not have proper nutrition. Family Nutrition Program educators currently give parental newsletters for every child to take home, but perhaps additional recipes provided might be added to each lesson to encourage more parental involvement. Possibly involve the classroom teacher to see that the parent actually gets the newsletter and recipe by having the child bring back a signature that the parent received and read the newsletter. By reaching the parent, as well as the classroom, we could further ensure knowledge, attitude, and behavior changes for the child.

Future research

Through this study, the researcher has learned there are differences in children who participate in the Family Nutrition Education Program in the areas of knowledge, attitudes, and behaviors regarding nutrition and physical activity. The researcher also learned through this research there are other areas that could be investigated further that will be discussed below.

Future research for this study might involve utilizing more than 1 experimental school and more than 1 control school. It would have been interesting to see if the results were typical in other areas throughout the Southeast region and/or throughout the state of Missouri. This would be attainable since the University of Missouri Extension's Family Extension Program is in most every county in the state, but not in every school in in every county of the state. Therefore, having an experimental and control group would be possible. Also, it would be interesting to see if the students remembered the information taught at a later time. For example, would students remember the nutrition education over a period of a whole school year rather than within a 3 month time-frame? This could be completed by providing the pre survey at the beginning of the school year, teaching monthly or bi monthly lessons, followed up with a post survey toward the end of the school year. Another thought regarding future research would be to involve parents in the education.

Parents and/or caregivers purchase and prepare meals for their children. There were many of the 'yesterday' nutrition behavior survey questions that the student had very little control over. For example, the 'yesterday' questions regarding the foods they ate. Many times the students have no control of what is offered to them at home, which affects their food choices and behaviors. Therefore, involving the parents in the nutrition education may enhance healthy choices provided to the children at home. It would be interesting to see if there was a difference in students' attitudes and / or food intake behaviors when parents had nutrition education given to them. The education for parents might be in the form of the newsletters that we already provide enhanced and followed up

with recipes and perhaps a nutrition education family night for parents of children in the study.

Although the research surveyed physical activity behaviors it did not survey physical activity knowledge and attitudes. As we know from the theoretical background of behavior change, knowledge affects attitudes and the theory of reasoned action and planned behavior offers the awareness that intention to perform the behavior through attitudes is one way of affecting behavior change (Godin & Kok; 1996; Ickes & Sharma, 2011; Romano & Netland, 2008; Redding, et al., 2000; Fishbein, 2008; Sheppard, Hartwick & Warshaw, 1988; Hunt & Gross, 2009). The curriculum offered has information about the importance of exercise in every lesson, however, we need to capture the knowledge and attitudes students have about physical activity to be sure that we are getting the knowledge objectives to the student that will cause behavior change.

One last thought about this research is the capability that it can be completed every year with a new group of students. It could also be expanded to survey junior high and high school students to see if the information received as a young student made a difference as they grew older regarding knowledge, attitudes and behavior change. The School Nutrition and Physical Activity (SPAN) questionnaire has an 8th and an 11th grade version that could be given to older students to discover long-term research (University of Texas, School of Public Health, 2002). This ability to see long-term information regarding knowledge, attitudes, and behaviors would be excellent for sustainability of the program. This long term research would show justification for keeping the program funded based on the knowledge and behavior change within children participating in the program not only in the 4th grade, but throughout their

childhood. With these long term research opportunities this research, we could be assured that this curriculum is making a difference in the overweight and obesity epidemic in children.

Summary

It is clear that nutrition education doesn't guarantee knowledge and/or behavior change in every programming effort. Therefore, research of nutrition education programming is of utmost importance to discover if knowledge and behavior change is successful within children participating in nutrition education curriculum. This research project evaluated nutrition and physical activity knowledge and behaviors from children participating in the University of Missouri Extension's Family Nutrition Program versus children not participating in the program. Discovering the effectiveness of a nutrition education program through evaluation is very important to deter the childhood obesity epidemic. Through this study the researcher discovered several findings related to knowledge, attitudes, and behaviors regarding nutrition and physical activity.

Findings from the research revealed differences in the nutrition knowledge and attitudes within children who are participating in the University of Missouri Extension's Family Nutrition Program. Specifically in the areas of: food group a person should eat from the most, amount of fruit needed per day, and meat intake amounts, knowledge that certain foods can reduce a person's risk of cancer, and confidence they could eat healthy at a fast food restaurant. When looking at nutrition behaviors, dependent t tests concluded that students participating in the Family Nutrition Program ate more meat at post survey, drank more milk at post, ate more fruit at post, and ate more meals per day at post survey. Finally, there were differences found regarding physical activity behaviors

within the students participating in the Family Nutrition Education Program revealing they had higher levels of physical activity, went to physical education or gym class more often, and had less screen time after nutrition curriculum intervention.

Through these findings the researcher concluded that the University of Missouri's Family Nutrition Education Program is making a difference in the lives of children in the areas of nutrition and physical activity. Also, through the research findings, we now know some areas that we must improve upon for curriculum revision and/or training regarding nutrition knowledge as follows: fewest servings of food needed per day, servings of vegetables and bread needed per day, food sources of energy, food sources of vitamin c, calcium, and protein, heart disease and intake, overweight and health risks, confidence to design a better nutrition plan, french fries and nutrition, and the meaning of the word 'lite' on a food packages. Areas for improvement within nutrition behaviors include: intake of fruit punch, kool-aid, sport or fruit flavored drinks. Areas within physical activity behaviors include: computer and video game time.

It is the researchers hope that this study will inform everyone involved in the University of Missouri's Family Nutrition Program to avert the childhood obesity epidemic. Only through knowledge can true behavior change happen. Through this research we discovered that nutrition education made a difference in children and is a tool for positive behavior change that can ultimately transform communities. Therefore it is very important that educational programming continue and be recognized as critical to help reduce the childhood obesity epidemic.

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APPENDIX A

PILOT SURVEY - SCHOOL PHYSICAL ACTIVITY AND NUTRITION SURVEY

SPAN

PILOT SURVEY INSTRUMENT
Student Nutrition knowledge, Attitudes, and Behaviors
Grade 4

Please write BELOW each question for comments on clarity and understanding.

1.) School: _____

2.) Grade: _____

3.) Gender: _____ Male _____ Female

4.) Race:

____ Black or African American ____ Asia

____ White ____ American Indian or Alaska Native

____ Native Hawaiian or Other Pacific Islander ____ Other

5). Ethnicity:

____ Hispanic or Latino ____ Not Hispanic or Latino ____ Other

6). Age: _____

Comments:

Nutrition

PART A: PLEASE MAKE COMMENTS ABOUT YOUR *UNDERSTANDING* OF EACH QUESTION. IF THE QUESTION IS NOT CLEAR TO YOU; OR IF YOU DO NOT UNDERSTAND THE QUESTION, PLEASE STATE WHY IN THE *COMMENTS* BELOW EACH QUESTION.

1. Yesterday, how many times did you eat hamburger meat, hot dogs, sausage, steak, bacon or ribs?

none **1 time** **2 times** **3 or more times**

Comments:

2. Yesterday, how many times did you eat battered or fried chicken, chicken nuggets, chicken fried steak, fried pork chops or fried fish?

none **1 time** **2 times** **3 or more times**

Comments:

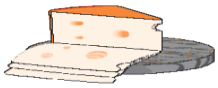
3. Yesterday, how many times did you eat peanuts or peanut butter?

none **1 time** **2 times** **3 or more times**

Comments:

4. Yesterday, how many times did you eat any kind of cheese, cheese spread or a cheese sauce? Include cheese on pizza or in dishes such as tacos, enchiladas, lasagna, sandwiches, cheeseburgers or macaroni and cheese.



none **1 time** **2 times** **3 or more times**

Comments:

5. Yesterday, how many times did you drink any kind of milk? Include chocolate or other flavored milk, milk on cereal, and drinks made with milk.

none **1 time** **2 times** **3 or more times**

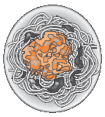
Comments:

6. Yesterday, how many times did you eat yogurt or cottage cheese or drink a yogurt drink? Do not count frozen yogurt.

none **1 time** **2 times** **3 or more times**

Comments:

7. Yesterday, how many times did you eat rice, macaroni, spaghetti or pasta noodles?

none **1 time** **2 times** **3 or more times**

Comments:

8. Yesterday, how many times did you eat any *white* bread, buns, bagels, tortillas or rolls?



none **1 time** **2 times** **3 or more times**

Comments:

9. Yesterday, how many times did you eat *whole wheat or dark white* bread, buns, bagels, tortillas or rolls?

none **1 time** **2 times** **3 or more times**

Comments:

10. Yesterday, how many times did you eat hot or cold cereal?

none **1 time** **2 times** **3 or more times**

Comments:

11. Yesterday, how many times did you eat French Fries or chips? Include potato chips, tortilla chips, Cheetos, corn chips or other snack chips.


none **1 time** **2 times** **3 or more times**

Comments:

12. Yesterday, how many times did you eat vegetables? Include all cooked and uncooked vegetables; salads; and boiled, baked or mashed potatoes. Do not include French fries or chips.

none **1 time** **2 times** **3 or more times**

Comments:

13. Yesterday, how many times did you eat beans such as pinto beans, baked beans, kidney beans, refried beans, or pork and beans? *Do not count* green beans.

none **1 time** **2 times** **3 or more times**

Comments:

14. Yesterday, how many times did you eat fruit? *Do not count juice*.

none **1 time** **2 times** **3 or more times**

Comments:

15. Yesterday, how many times did you drink fruit juice? Fruit juice is a 100% juice like orange juice, apple juice or grape juice. *Do not count* punch, Kool-Aid, sports drinks, and other fruit flavored drinks.

none **1 time** **2 times** **3 or more times**

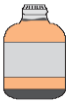
Comments:

16. Yesterday, how many times did you drink any punch, Kool-Aid, sports drinks, or other fruit-flavored drinks? *Do not count* fruit juice.

none **1 time** **2 times** **3 or more times**

Comments:

17. Yesterday, how many times did you drink any regular or diet pop, soda or soft drinks?

none **1 time** **2 times** **3 or more times**

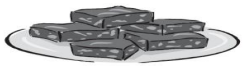
Comments:

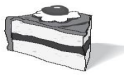
18. Yesterday, how many times did you eat some type of frozen dessert? A *frozen dessert* is a cold, sweet food like ice crème, frozen yogurt, an ice crème bar, or a Popsicle.


none **1 time** **2 times** **3 or more times**

Comments:

19. Yesterday, how many times did you eat sweet rolls, doughnuts, cookies, brownies, pies or cake?



None **1 time** **2 times** **3 or more times**

Comments:

20. Yesterday, how many times did you eat chocolate candy? *Do not count* brownies or chocolate cookies.

none **1 time** **2 times** **3 or more times**

Comments:

21. Yesterday, did you eat Breakfast? _____YES _____NO

Comments:

22. Yesterday, how many meals did you eat?

a. I didn't have **ANY** meals yesterday

b. I had **1** meal yesterday

c. I had **2** meals yesterday

d. I had **3** or more meals yesterday

Comments:

Use your knowledge of the My Pyramid/My Plate to answer the following questions:

23. From which food group ***should*** you eat the ***most*** servings each day?

a. Breads, cereal, rice, pasta	b. Meats, fish, poultry, beans, eggs, nuts	c. Dairy products (milk, cheese, yogurt)
d. Vegetables	e. Fats & oils	f. Fruit
g. Don't know		

Comments:

24. From which food group ***should*** you eat the ***fewest*** servings each day?

a. Breads, cereal, rice, pasta	b. Meats, fish, poultry, beans, eggs, nuts	c. Dairy products (milk, cheese, yogurt)
d. Vegetables	e. Fats & oils	f. Fruit
g. Don't know		

Comments:

25. How many servings of fruits ***should*** you eat each day?

At least 1 ½ cups	At least 3 cups	At least 4 cups	At least 5 cups	Don't know

Comments:

26. How many servings of vegetables ***should*** you eat each day?

At least 2 cups	At least 3 cups	At least 4 cups	At least 5 cups	Don't know

Comments:

27. How many servings of meat ***should*** you eat each day?

At least 2 ounces	At least 3 ounces	At least 4 ounces	At least 5.0 ounces	Don't know

Comments:

28. How many servings of grains (breads, cereal, rolls) ***should*** you eat each day?

At least 3 ounces	At least 4 ounces	At least 5 ounces	At least 8 ounces	Don't know

Comments:

29. Which food group is a good source of vitamin C?

a. Breads, cereal, rice, pasta
b. Meats, fish, poultry, beans, eggs, nuts
c. Dairy products (milk, cheese, yogurt)
d. Vegetables or fruit
e. Fats & oils
f. Don't know

Comments:

30. Which food group is a good source of energy?

a. Breads, cereal, rice, pasta
b. Meats, fish, poultry, beans, eggs, nuts
c. Dairy products (milk, cheese, yogurt)
d. Vegetables
e. Fats & oils
f. Fruit
g. Don't know

Comments:

31. Which food group is a good source of calcium?

a. Breads, cereal, rice, pasta
b. Meats, fish, poultry, beans, eggs, nuts
c. Dairy products (milk, cheese, yogurt)
d. Vegetables
e. Fats & oils
f. Fruit
g. Don't know

Comments:

32. Which food group provides protein for muscles?

a. Breads, cereal, rice, pasta
b. Meats, fish, poultry, beans, eggs, nuts
c. Dairy products (milk, cheese, yogurt)
d. Vegetables
e. Fats & oils
f. Fruit
g. Don't know

Comments:

PART B: Please answer the following questions as honestly as you can. There are no right or wrong answers, simply answer each question honestly. Please circle the most appropriate response.

33. What you eat can make a difference in your chances of getting heart disease.
true false

34. What you eat can make a difference in your chances of getting cancer.
true false

35. People who are overweight are more likely to have a higher risk of health problems than people who are not overweight.
true false

36. I know how to design a plan for better nutrition if I want to
true false

37. French fries are a "highly nutritious" food
true false

38. The word "lite" on a food package means low fat
true false

39. The word "lean" on a food package means that food is fat free
true false

Comments on questions 33-39?:

40. Circle the statement below that BEST describes you:

a. I eat what I like and am not thinking about changing my eating habits

b. I am thinking about changing my eating habits

c. I am thinking about changing my eating habits and have made a few changes already

d. I have just begun to eat healthy on a regular basis

e. I have been eating healthy for more than 1 year

Comments:

PART C: Please answer the following questions as honestly as you can. There are no right or wrong answers, simply answer each question honestly. Please circle the most appropriate response.

41. I am confident that I could eat more fruits and vegetables.

1	2	3	4	5
strongly disagree	disagree	unsure	agree	strongly agree

Comments:

42. I am confident that I could eat less fat.

1	2	3	4	5
strongly disagree	disagree	unsure	agr	strongly agree

Comments:

43. I am confident that I could drink less soda pop.

1	2	3	4	5
strongly disagree	disagree	unsure	agree	strongly agree

Comments:

44. I am confident that I could eat healthy at a fast food restaurant?

1	2	3	4	5
strongly disagree	disagree	unsure	agree	strongly agree

Comments:

PART D: Please answer the following questions as honestly as you can. There are no right or wrong answers, simply answer each question honestly. Please circle the most appropriate response

45. On how many of the past 7 days did you exercise or take part in physical activity that made your heart beat fast and made you breathe hard for ***at least 30 minutes***? (For example: basketball, soccer, running or jogging, fast dancing, swimming laps, tennis, fast bicycling, or similar aerobic activities.

0 days	3days	6 days
1 days	4 days	7 days
2 days	5 days	

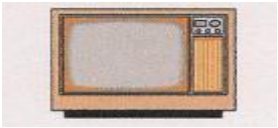
Comments:

46. Last week, on how many days did you go to physical education (PE) or gym classes?

0 days	2 days	4 days
1 days	3 days	5 days

Comments:

47. Yesterday, how many hours did you watch TV or video movies away from school?



I didn't watch TV yesterday	2 hours	4 hours
1 hour	3 hours	5 hours
6 hours or more		

Comments:

48. During the past 12 months, on how many sports teams did you play?

Sports teams include soccer, basketball, baseball, softball, swimming, gymnastics, cheerleading, wrestling, track, football, dance, tennis, and volleyball teams.

***Do not include* PE classes**.

0 teams	1 team	2 teams	3 or more teams

Comments:

49. How many hours ***per day*** do you ***usually*** spend on the computer away from school?

(Time on the computer includes time spent surfing the Internet and instant messaging or playing games.)

I don't use the computer	2 hours	4 hours
1 hour	3 hours	5 hours
6 hours or more		

Comments:

50. How many hours ***per day*** do you ***usually*** spend playing video games like Nintendo®, Sega®, PlayStation®, Xbox®, GameBoy® or arcade games away from school?

I don't play video games	2 hours	4 hours
1 hour	3 hours	5 hours
6 hours or more		

Comments:

51. How many hours ***per day*** do you ***usually*** spend playing video games like Wii®/WiiFit®/WiiActive®?

I don't play video games	2 hours	4 hours
1 hour	3 hours	5 hours
6 hours or more		

Comments:

APPENDIX B

SCHOOL PHYSICAL ACTIVITY AND NUTRITION SURVEY (SPAN)

PRE-SURVEY AND POST-SURVEY

SPAN

FAMILY NUTRITION PROGRAM SURVEY INSTRUMENT

PRE SURVEY

Student Nutrition knowledge, Attitudes, and Behaviors

Grade 4

1.) School: _____

2.) Grade: _____

3.) Gender: _____ Male _____ Female

4.) Race:

____ Black or African American ____ Asian

____ White ____ American Indian or Alaska Native

____ Native Hawaiian or Other Pacific Islander ____ Other

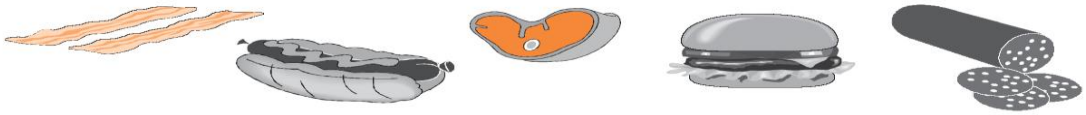
5). Ethnicity: ____ Hispanic or Latino ____ Not Hispanic or Latino ____ Other

6). Age: _____

Nutrition

PART A: Please answer the following questions as honestly as you can. There are no right or wrong answers, simply answer each question honestly. Please circle the most appropriate response.

1. Yesterday, how many times did you eat hamburger meat, hot dogs, sausage, steak, bacon or ribs?



none **1 time** **2 times** **3 or more times**

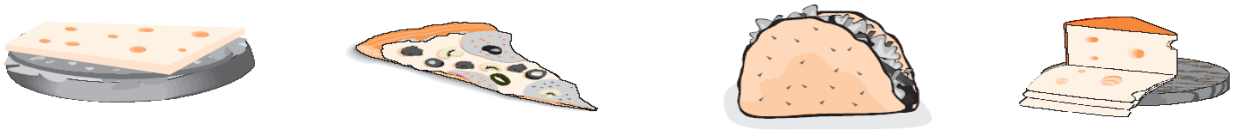
2. Yesterday, how many times did you eat battered or fried chicken, chicken nuggets, chicken fried steak, fried pork chops or fried fish?

none **1 time** **2 times** **3 or more times**

3. Yesterday, how many times did you eat peanuts or peanut butter?

none **1 time** **2 times** **3 or more times**

4. Yesterday, how many times did you eat any kind of cheese, cheese spread or a cheese sauce? Include cheese on pizza or in dishes such as tacos, enchiladas, lasagna, sandwiches, cheeseburgers or macaroni and cheese.



none **1 time** **2 times** **3 or more times**

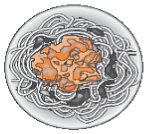
5. Yesterday, how many times did you drink any kind of milk? Include chocolate or other flavored milk, milk on cereal, and drinks made with milk.

none **1 time** **2 times** **3 or more times**

6. Yesterday, how many times did you eat yogurt or cottage cheese or drink a yogurt drink? Do not count frozen yogurt.

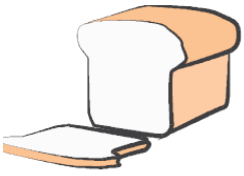
none **1 time** **2 times** **3 or more times**

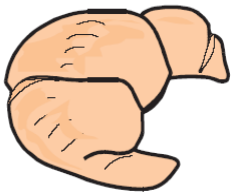
7. Yesterday, how many times did you eat rice, macaroni, spaghetti or pasta noodles?



none **1 time** **2 times** **3 or more times**

8. Yesterday, how many times did you eat any *white* bread, buns, bagels, tortillas or rolls?





none **1 time** **2 times** **3 or more times**

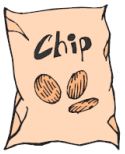
9. Yesterday, how many times did you eat *whole wheat or dark white* bread, buns, bagels, tortillas or rolls?

None **1 time** **2 times** **3 or more times**

10. Yesterday, how many times did you eat hot or cold cereal?

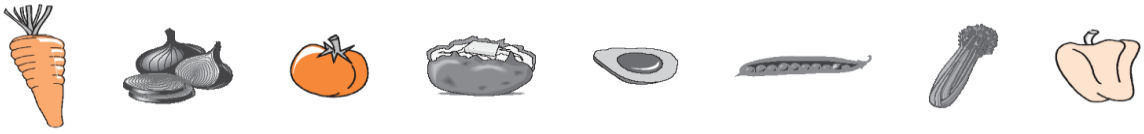
None **1 time** **2 times** **3 or more times**

11. Yesterday, how many times did you eat French Fries or chips? Include potato chips, tortilla chips, Cheetos, corn chips or other snack chips.

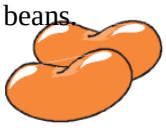
None **1 time** **2 times** **3 or more times**

12. Yesterday, how many times did you eat vegetables? Include all cooked and uncooked vegetables; salads; and boiled, baked or mashed potatoes. Do not include French fries or chips.



none **1 time** **2 times** **3 or more times**

13. Yesterday, how many times did you eat beans such as pinto beans, baked beans, kidney beans, refried beans, or pork and beans? *Do not count* green beans.

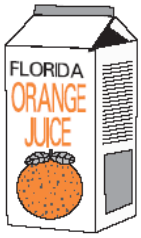


none **1 time** **2 times** **3 or more times**

14. Yesterday, how many times did you eat fruit? ***Do not count juice*.**

none **1 time** **2 times** **3 or more times**

15. Yesterday, how many times did you drink fruit juice? Fruit juice is a 100% juice like orange juice, apple juice or grape juice. *Do not count* punch, Kool-Aid, sports drinks, and other fruit flavored drinks.



none **1 time** **2 times** **3 or more times**

16. Yesterday, how many times did you drink any punch, Kool-Aid, sports drinks, or other fruit-flavored drinks? *Do not count* fruit juice.

None **1 time** **2 times** **3 or more times**

17. Yesterday, how many times did you drink any regular or diet pop, soda or soft drinks?

None **1 time** **2 times** **3 or more times**

18. Yesterday, how many times did you eat some type of frozen dessert? A *frozen dessert* is a cold, sweet food like ice crème, frozen yogurt, an ice crème bar, or a Popsicle.

none **1 time** **2 times** **3 or more times**

19. Yesterday, how many times did you eat sweet rolls, doughnuts, cookies, brownies, pies cake?




none **1 time** **2 times** **3 or more times**

20. Yesterday, how many times did you eat chocolate candy? *Do not count* brownies or chocolate cookies.

None **1 time** **2 times** **3 or more times**

21. Yesterday, did you eat Breakfast?

_____YES _____NO

22. Yesterday, how many meals did you eat?

a. I didn't have **ANY** meals yesterday

b. I had **1** meal yesterday

c. I had **2** meals yesterday

d. I had **3** or more meals yesterday

Use your knowledge of the My Pyramid/My Plate to answer the following questions:

23. From which food group ***should*** you eat the ***most*** servings each day?

a. Breads, cereal, rice, pasta

b. Meats, fish, poultry, beans, eggs, nuts

c. Dairy products (milk, cheese, yogurt)

d. Vegetables

e. Fats & oils

f. Fruit

g. Don't know

24. From which food group ***should*** you eat the ***fewest*** servings each day?

a. Breads, cereal, rice, pasta	b. Meats, fish, poultry, beans, eggs, nuts	c. Dairy products (milk, cheese, yogurt)
d. Vegetables	e. Fats & oils	f. Fruit
g. Don't know		

25. How many servings of fruits ***should*** you eat each day?

At least 1 ½ cups	At least 3 cups	At least 4 cups	At least 5 cups	Don't know

26. How many servings of vegetables ***should*** you eat each day?

At least 2 cups	At least 3 cups	At least 4 cups	At least 5 cups	Don't know

27. How many servings of meat ***should*** you eat each day?

At least 2 ounces	At least 3 ounces	At least 4 ounces	At least 5.0 ounces	Don't know

28. How many servings of grains (breads, cereal, rolls) ***should*** you eat each day?

At least 3 ounces	At least 4 ounces	At least 5 ounces	At least 8 ounces	Don't know

29. Which food group is a good source of vitamin C?

a. Breads, cereal, rice, pasta	b. Meats, fish, poultry, beans, eggs, nuts	c. Dairy products (milk, cheese, yogurt)
d. Vegetables or fruit	e. Fats & oils	f. Don't know

30. Which food group is a good source of energy?

a. Breads, cereal, rice, pasta	b. Meats, fish, poultry, beans, eggs, nuts	c. Dairy products (milk, cheese, yogurt)
d. Vegetables	e. Fats & oils	f. Fruit
g. Don't know		

31. Which food group is a good source of calcium?

a. Breads, cereal, rice, pasta	b. Meats, fish, poultry, beans, eggs, nuts	c. Dairy products (milk, cheese, yogurt)
d. Vegetables	e. Fats & oils	f. Fruit
g. Don't know		

32. Which food group provides protein for muscles?

a. Breads, cereal, rice, pasta	b. Meats, fish, poultry, beans, eggs, nuts	c. Dairy products (milk, cheese, yogurt)
d. Vegetables	e. Fats & oils	f. Fruit
g. Don't know		

PART B: Please answer the following questions as honestly as you can. There are no right or wrong answers, simply answer each question honestly. Please circle the most appropriate response.

33. What you eat can make a difference in your chances of getting heart disease.
true false

34. What you eat can make a difference in your chances of getting cancer.
true false

35. People who are overweight are more likely to have a higher risk of health problems than people who are not overweight.
true false

36. I know how to design a plan for better nutrition if I want to
true false

37. French fries are a "highly nutritious" food
true false

38. The word “lite” on a food package means low fat

true false

39. The word “lean” on a food package means that food is fat free

true false

40. Circle the statement below that BEST describes you:

a. I eat what I like and am not thinking about changing my eating habits

b. I am thinking about changing my eating habits

c. I am thinking about changing my eating habits and have made a few changes already

d. I have just begun to eat healthy on a regular basis

e. I have been eating healthy for more than 1 year

PART C: Please answer the following questions as honestly as you can. There are no right or wrong answers, simply answer each question honestly. Please circle the most appropriate response.

41. I am confident that I could eat more fruits and vegetables.

1	2	3	4	5
strongly disagree	disagree	unsure	agree	strongly agree

42. I am confident that I could eat less fat.

1	2	3	4	5
strongly disagree	disagree	unsure	agree	strongly agree

43. I am confident that I could drink less soda pop.

1	2	3	4	5
strongly disagree	disagree	unsure	agree	strongly agree

44. I am confident that I could eat healthy at a fast food restaurant?

1	2	3	4	5
strongly disagree	disagree	unsure	agree	strongly agree

PART D: Please answer the following questions as honestly as you can. There are no right or wrong answers, simply answer each question honestly. Please circle the most appropriate response.

45. On how many of the past 7 days did you exercise or take part in physical activity that made your heart beat fast and made you breathe hard for ***at least 30 minutes***? (For example: basketball, soccer, running or jogging, fast dancing, swimming laps, tennis, fast bicycling, or similar aerobic activities).

0 days	2 days	4 days
1 days	3 days	5 days
6 days	7 days	

46. Last week, on how many days did you go to physical education (PE) or gym classes?

0 days	2 days	4 days
1 days	3 days	5 days

47. Yesterday, how many hours did you watch TV or video movies away from school?

I didn't watch TV yesterday	2 hours	4 hours
1 hour	3 hours	5 hours
6 hours or more		

48. During the past 12 months, on how many sports teams did you play?

Sports teams include soccer, basketball, baseball, softball, swimming, gymnastics, cheerleading, wrestling, track, football, dance, tennis, and volleyball teams.

Do not include **PE classes**. 

0 teams 1 team 2 teams

3 or more teams

49. How many hours ***per day*** do you ***usually*** spend on the computer away from school? (Time on the computer includes time spent surfing the Internet and instant messaging or Playing games.)

I don't use the computer 2 hours 4 hours

1 hour 3 hours 5 hours

6 hours or more

50. How many hours ***per day*** do you ***usually*** spend playing video games like Nintendo®, Sega®, PlayStation®, Xbox®, GameBoy® or arcade games away from school?

I don't play video games 2 hours 4 hours

1 hour 3 hours 5 hours

6 hours or more

51. How many hours ***per day*** do you ***usually*** spend playing video games like Wii®/WiiFit®/WiiActive®?

I don't play video games 2 hours 4 hours
1 hour 3 hours 5 hours

6 hours or more

APPENDIX C

INFORMED PARENTAL CONSENT

Dear Parents:

I am asking consent for your child to participate in a survey that will be given during school hours. The purpose of the study is to discover the knowledge and behaviors of children participating in the University of Missouri Extension's Family Nutrition Education Program compared the children not participating in the program.

The research would be conducted with 4th graders through a confidential pre and post survey developed in cooperation with university state specialists within the program along with the approval of local school administrators. The survey will consist of questions pertaining to the two focus areas of nutrition and physical activity.

There will not be any potential risks or discomforts associated with the survey which should take about 30-40 minutes to complete. The results of the survey will be strictly confidential with no names or identities involved in the process. Participation is strictly voluntary with no payment or bonus points for participation. There will be no penalty for any student not wishing to participate.

The potential benefits of the research will help University of Missouri Extension learn if the curriculum taught by the University of Missouri's Family Nutrition Education Program enhances children's knowledge and behaviors regarding nutrition and physical activity. The research could possibly show validity within the Family Nutrition Education Program as well as the potential to illustrate and confirm to state and federal funders the benefits of the program to Missouri's children. I thank you in advance.

If you have questions, comments, or would like to view the survey, you may contact me at the University of Missouri Extension Family Nutrition Program, at 573-614-7110 or 573-359-0923 or email address morganlj@missouri.edu

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Please complete the bottom portion of this letter and return it to your school ASAP.

Student's Name_____

Parent's signature_____

My child can participate in this survey: _____YES _____NO (over→)

Sincerely,

Linda Morgan

Linda Morgan, Nutrition Specialist

University of Missouri Extension – Family Nutrition Program

Additionally, this research study has been approved by the University of Missouri Campus Institutional Review Board (CIRB), which is a committee responsible to protect participants from harm. You may contact the CIRB if you have any questions about your rights, concerns, complaints or comments. You can contact the CIRB directly by telephone or email to voice any concerns, questions, input or complaints about the research study.

Campus Institutional Review Board
483 McReynolds Hall
Columbia, MO 65211
(573) 882-9585
Email: umcresearchcirb@missouri.edu
Website: http://www.research.missouri.edu/cirb/index.htm

APPENDIX D

INFORMED STUDENT ASSENT

Dear Students,

I will be conducting a pre and post survey in your classroom to understand more about knowledge and behavior change in children. The purpose of the study is to discover the knowledge and behavior change in nutrition and physical activity within students who are participating in the University of Missouri's Family Nutrition Program compared to children who are not participating in the program.

I do not see any potential risks or discomforts associated with the survey which should take about 30-40 minutes to complete. The results of the survey will be strictly confidential with no names involved in the process. Participation is strictly voluntary with no payment or bonus points for participation. There will be no penalty for any student not wishing to participate. If you would like to participate please fill out the information below. Thank you.

Sincerely,
Linda Morgan
Linda Morgan, Nutrition Specialist
University of Missouri Extension
Family Nutrition Program

Please complete the information below and return it to homeroom teacher as soon as possible.

Student Name (Printed):_____

I wish to participate in this survey: _____YES _____NO

Student Signature: _____

APPENDIX E

IRB APPROVAL LETTER

Campus Institutional Review Board
University of Missouri-Columbia

485 McReynolds Hall
Columbia, MO 65211-1150
PHONE: (573) 882-9585
FAX: (573) 884-0663

December 16, 2011

Principal Investigator: Britt Rankin, Jo
Department: Human Environmental Sci Ext

Your Annual Exempt Research Certification to project entitled *The University of Missouri Family Nutrition Program* was reviewed and approved by the MU Campus Institutional Review Board according to terms and conditions described below:

IRB Project Number	00-07-382
Funding Source	Missouri Department of Social Services (MDSS)
Initial Application Approval Date	August 23, 2000
Approval Date of this Review	December 16, 2011
IRB Expiration Date	February 01, 2013
Level of Review	Exempt
Project Status	Active - Open to Enrollment
Regulation	45 CFR 46.101b(1)
Risk Level	Minimal Risk

The principal investigator (PI) is responsible for all aspects and conduct of this study. The PI must comply with the following conditions of the approval:

1. No subjects may be involved in any study procedure prior to the IRB approval date or after the expiration date.
2. All unanticipated problems, serious adverse events, and deviations must be reported to the IRB within 5 days.
3. All modifications must be IRB approved by submitting the Exempt Amendment prior to implementation unless they are intended to reduce risk.
4. All recruitment materials and methods must be approved by the IRB prior to being used.
5. The Annual Exempt Certification Form must be submitted to the IRB for review and approval at least 30 days prior to the project expiration date.
6. Maintain all research records for a period of seven years from the project completion date.
7. Utilize the IRB stamped document informing subjects of the research and other approved research documents located within the document storage section of eIRB.

If you have any questions, please contact the Campus IRB at 573-882-9585 or umcresearchcirb@missouri.edu.

Thank you,

Charles Borduin, PhD
Campus IRB Chair

VITA

Linda J. Morgan was born in Dexter, a small town in Stoddard County, MO She spent all her life in the Essex, MO area until she headed to a small, private, work study college in Southwest, MO. Since she came from a single parent family where money was hard to come by, this seemed like a good choice as students could work to pay for their tuition. She knew there were two things that she had always excelled at, and that was work and school, so it seemed like a good fit. She spent the next four years attending classes while working on campus 15-20 hours per week and off campus 20-30 hours per week.

Linda received her Bachelor's Degree from the College of the Ozarks in the field of Family and Consumer Sciences with an emphasis in Nutrition. After completing the degree, she started a position with the Springfield Greene County Health Department as a Nutritionist I, working with low income families, teaching them about nutrition. After working there for 7 years, she decided to move back home to Southeast MO. She got a position with the Butler County Health Department and worked there for 8 years. She started out as a Health Educator and then moved up the ranks to Nutritionist III, then to WIC Program Coordinator. It was while at this job that she discovered her love for nutrition education and decided to go back to school to get her master's degree in nutrition, so that she could expand her knowledge base and teach a wider variety of audiences.

Linda received her Master's Degree from Southeast Missouri State University in Human Environmental Sciences with an emphasis in Nutrition and currently holds the

position of Southeast Region Nutrition Specialist & Family Nutrition Education Program Coordinator for the University of Missouri Extension.

It was while marketing the Family Nutrition Education Program to a local school principal that she wondered why there were no research studies directly from children that looked at their knowledge and behavior changes related to both nutrition and physical activity. The program evaluated teacher observations but not any evaluations focusing on both nutrition and physical activity directly from children. Linda thought that if she ever decided to get her doctorate that she was going to get this evaluation information directly from the children. In 2009 she got her chance and enrolled in the Educational Leadership and Policy Analysis Doctorate Program through the University of Missouri and Southeast Missouri State University. She is currently at the end of her doctorate program in education and is hoping that this research in the Family Nutrition Program will help pave the way for the program to include research from students on a yearly basis throughout the state. The current research will be included in the Family Nutrition Program Annual Report to help promote the program to legislators and funders at the state and national level. Linda is so excited to be able to complete a doctorate program that has made a difference not only within herself as an educator and supervisor, but within the lives of many children who will participate in the program for many years to come.