

THE VALUE OF A PEER-LED NUTRITION EDUCATION PROGRAM
FOR SECOND GRADERS ADDRESSING THE
IMPORTANCE OF BREAKFAST

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THE VALUE OF A PEER-LED NUTRITION EDUCATION PROGRAM
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Thesis

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ABSTRACT

Background: The dramatic rise in childhood obesity demands those educating youth strive for novel approaches to address this public health problem. Effective nutrition education for children should provide them the knowledge and skills to maintain lifelong healthy eating patterns. The use of peers in education and learning may provide a unique channel to impact the lifestyle habits of school age children.

Purpose: This pilot study describes and reports on the effectiveness of a peer designed nutrition education program for school age children teaching the importance of eating breakfast, evaluates its ability to increase basic nutrition knowledge and measures its impact upon the peer leaders.

Methods: Forty-two second grade students from three classrooms received nutrition intervention from seven teacher-selected fifth graders. These seven fifth graders were trained as peer leaders to design and administer nutrition lessons and related activities over a series of three classes. Second grade students completed an assessment of knowledge, attitude and behavior pre and post intervention. A process evaluation based upon peer leader feedback, direct classroom observation and teacher interviews were completed.

Results: Mean score of nutrition knowledge increased (3.52 to 3.67) with peer led nutrition intervention, although not significantly ($F=1.086$, $p=0.348$). The program was highly accepted by the peer leaders and classroom teachers involved.

Conclusions: This pilot study demonstrated peer-led nutrition education programs in elementary schools are feasible.

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CHAPTER I

INTRODUCTION

Background

Effective nutrition education with resultant behavioral change remains a nationwide concern as illustrated by our lack of effective intervention for preventable chronic disease and the obesity crisis. In the United States, the Centers for Disease Control and Prevention reported that in the last 20 years the proportion of overweight children has tripled to nearly one of every three children (1). The early and effective education of our youth is critical to provide the knowledge and skills to help children adopt and maintain lifelong healthy eating patterns. The school setting is ideal to reach this audience and delivering this message through peers can strengthen its impact.

The application of peer education has become increasingly popular as a method of health promotion often used within the context of sexual health and substance misuse. Based upon the principal that children are highly influenced by the beliefs and behaviors of their peers, it is suggested that a trained peer leader can be an effective vehicle to disseminate quality information to their peers. As described by Shiner, peer education refers to a range of interventions where the educators and the educated are seen to share something that creates an affinity between them (2). The benefits of this program design is not limited to the targeted audience but also benefits the trained peer leaders.

A recent study published in *Pediatrics* by Stock et al. indicated that the use of a peer-teaching model for health promotion had positive effects for both the younger and older elementary student. The program's content was based on three components of healthy living: being physically active, eating healthy foods, and having a healthy body image. They demonstrated positive changes in health knowledge, health behaviors, and health attitudes in both populations within the traditional classroom setting (3).

To test this peer education model within the context of school-age nutrition education, a student-led program "Breakfast Detectives" was piloted in an urban elementary school. Teacher selected fifth grade leaders acted as peer educators to deliver the message to second graders on the value of breakfast. Leaders participated in an observational breakfast plate waste activity to grasp the importance of breakfast as a link to learning, growing, and playing. The leaders were involved in adapting and implementing a breakfast curriculum to ensure the relevance of its content and their ownership to the program. Adequate training and support was provided by the researcher to the peer-leaders prior to delivering the message to each second grade classroom.

The relevancy of this topic on the value of breakfast supports the current literature findings that routine breakfast consumption leads to more regular eating and exercise patterns, healthful food choices, and consistent calorie intake which may contribute to a healthy body weight.

Description of the Urban Elementary School

The selection of this urban elementary school for the implementation of a peer-led educational model is based on previous involvement of the University Park Alliance and

graduate students from The University of Akron, along with the expressed interest and support from the school principal. The school serves kindergarten through fifth grade with a population of 306 students. The student population is 43% black, 37% white, 12% multiracial, 4% Asian, and 4% Hispanic. The school is 100% economically disadvantaged as compared to the state of Ohio's average of 35% (4). Many of the children at this elementary school are from food insufficient homes and have inadequate life skills related to eating habits, personal care, and social interaction.

Significance of Study

The results of this study provide useful information about the effectiveness of peer-led nutrition education in the elementary school setting and whether this design should be more frequently adopted by educators into the curriculum.

Hypotheses

In this study, the following hypotheses were tested:

1. A peer-designed nutrition education program led by fifth graders will result in a significant increase in knowledge and improvement of attitude of second graders toward good nutrition and the importance of breakfast.
2. Engaging fifth graders in a breakfast analysis project with peer education training will significantly improve student leader knowledge and attitude toward good nutrition and the importance of eating breakfast daily.

Definition of Terms

Breakfast in National Health and Nutrition Examination Survey (NHANES III) is defined as any food or beverage consumed in a meal occasion named by the respondent as breakfast.

School Breakfast Program The school breakfast program is a federally funded program initiated in 1975 to provide a safety net for American children and adolescents at risk for poor nutritional intake secondary to low socioeconomic status, racial, ethnic, and/or linguistic diversity.

Peer is defined as a person who belongs to the same social group as another person or group. The social group may be based on age, sex, sexual orientation, occupation, socio-economic or health status, and other factors (5).

Peer teaching is defined in this review as the process whereby trained and motivated young people undertake an organized educational activity with their peers. The activity is aimed at developing the young people's knowledge, attitudes, beliefs, and skills to enable them to be responsible for and to protect their own health (5).

This behavioral change strategy draws on several well-known behavioral theories.

The *Social Learning Theory* asserts that people learn by observing the behavior of others and that some serve as models capable of eliciting behavior change in certain other individuals (6). This is directly applied in the use of interactive experimental learning activities whereby peer educators can be influential teachers.

The *Theory of Reasoned Action* asserts that a person's perception of the social norm of beliefs that people important to them hold about a particular behavior can influence behavior change (7).

Assumptions

The following assumptions were made with regard to the study.

1. It is assumed that all students participating in the testing understood and truthfully answered the questions.
2. It is assumed that the peer leaders fully participated in all aspects of the study.
3. It is assumed that the involved staff and teachers fully cooperated with the needs of the study.
4. Pre- and post-test results and peer leader outcomes did not reveal the Identification of individual subjects, thus, assuring confidentiality.
5. During the collection of data, in its analysis, and discussion the researcher did Not knowingly incorporate personal beliefs, values, or assumptions.

Limitations of the Study

There are several potential limitations in this study related to its qualitative and quantitative features.

1. The study was conducted in a low income public school in an urban area of Northeastern Ohio and the results may not be generalizable to other population groups or geographical areas.
2. Teacher selection of the fifth grade leaders was not based on randomization.
3. The questionnaire/survey responses were self-reported data and information accuracy is dependent upon the truthfulness and cooperation of the students.
4. The brevity of intervention may limit the long term effectiveness of behavioral change in the second grade population.

CHAPTER II

REVIEW OF LITERATURE

In spite of a noted improvement in the general health status of children in the United States, there is an alarming rate of childhood obesity associated with poor nutrition habits. Some 4.7 million youths between 6 to 17 years of age are overweight or obese placing them at risk for hypertension, respiratory disorders, depression, orthopedic disorders, and Type II diabetes (8, 9). Once established, the treatment of childhood obesity is costly and poorly effective (9, 10). Therefore, the formation of healthy dietary behaviors and attitudes in the school age child is critical to their future well-being.

To effectively meet this challenging public health concern of obesity and unhealthy nutrition behaviors in our youth, the importance of utilizing the school as an opportunistic setting for health education has been widely recognized. The school environment combines the social experience of eating with an opportunity to establish healthy eating habits (10). Nutrition as a topic fits into many subjects within the elementary school curriculum; math, health, and science. But often, little time is available in the curriculum and minimal nutrition training is offered to teachers. One study by Nader et al. defined the mean number of hours spent on nutrition education in the U.S. as 13 per year, as contrasted with a minimum of 50 hours believed to be necessary to impact behavior (11). Fewer than one third of schools provide thorough coverage of nutrition

education related to influencing students' motivation, attitudes and eating behaviors (12). Numerous nutrition education programs for schools have been designed and implemented with mixed results (13).

A current trend in nutrition education program design is toward intervention with a behavioral basis. The novel use of peer-led education is suggested as a unique model applicable in teaching the younger child (3, 14). Various theories of behavioral change are relevant to this peer educational model. The defined objectives are often to reinforce positive behavior, develop a new recommended behavior, or change a risky behavior of the target group. The challenge lies in evaluating the effectiveness of a peer-led nutrition education program on the student, defining the level of impact and outcome on peer-leaders, and determining the feasibility for implementing this style of program into elementary school curriculums.

In order to develop the proper framework for this study this literature review will describe the current trends in children's eating habits, as well as children's knowledge, attitudes, and behaviors related to nutrition and breakfast. In addition, the review will examine the current body of evidence supporting the effects of breakfast habits on the nutritional status, body weight and academic performance of children. Finally, the review will examine the model of peer teaching, its application in the elementary school, and methods to evaluate its effectiveness.

Trends in Children's Eating Habits

Results from a study by Gleason and Sutor, indicated that children 6 to 18 years of age consume too much fat and sodium, and a large proportion of their food energy

comes from added sugars (15). Children's diets were typically adequate in most vitamins and minerals except Vitamin E and A, folate, zinc, and magnesium. However, few children met the USDA recommendations of intake of the five major food groups, including fruit, vegetables, grains, dairy products, and meat and meat substitutes.

Data from the Continuing Survey of Food Intakes by Individuals (CSFII) 1994-96 showed that young children's mean intakes of dietary fiber met the age plus five recommendation of the American Health Foundation. Children five years old and younger had mean fiber intakes of about 11 g per day. However, older children began to fall short of the fiber recommendations: males and females 6 to 11 years old consumed about 14 g and 12 g of fiber per day, respectively; their counterparts 12-19 years old consumed about 17 g (males) and 13 g (females) per day. The rate of breakfast omission of 6 to 13 year olds was 8% to 15% on any given day, including school vacations and weekends (15).

Lytle et al. studied 291 students from Minnesota as they moved from the third to eighth grade to determine the change in eating habits and food choices. Their consumption of breakfast, fruits, vegetables, and milk decreased while soft drink consumption increased. Breakfast consumption dropped from 99% to 85% (14).

Children's Knowledge, Attitudes and Behaviors About Breakfast

Breakfast consumption in the United States has been declining over the past 30 years for all ages. Skipping breakfast is typically more prevalent in girls, children from lower socioeconomic backgrounds, minorities and older children and adolescents (16, 17,

18). Studies by Cohen (19) identified that girls often skip breakfast because they believe it might make them fat and are concerned about gaining weight.

Reddan et al. (20) studied fourth, fifth, and sixth graders regarding their perceived benefits and barriers in relationship to eating breakfast in schools with or without the School Breakfast Program. The majority of students perceived that eating breakfast was beneficial to provide increased energy and improved attention span in school. The most commonly held perception of barriers to eating breakfast was lack of time and lack of hunger in the morning (20, 21).

In a Connecticut survey of teachers' perceptions of the School Breakfast Program (SBP) and reasons for non-participation, 61% of the respondents identified students' late arrival to school as a significant factor (22). Other reasons less frequently identified were that their friends don't eat breakfast and that students dislike food choices.

Tapper et al. studied 2,495 children 9 to 12 years of age regarding their attitudes toward breakfast. Children who did not skip breakfast displayed more positive attitudes than children who skipped breakfast. A positive attitude towards breakfast correlated with an increased consumption of healthy foods for breakfast, i.e., fruit, bread, cereal, milk products and a decreased consumption of unhealthy foods for breakfast, i.e., sweet items, chips (23).

Breakfast Habits Related to Nutritional Status and Body Weight

The School Breakfast Program is required to provide approximately one-fourth of the Recommended Dietary Allowance (RDA) for important nutrients over a period of time (protein, calcium, iron, vitamin A, vitamin C, and calories) and meet the

recommendations of the 1995 “Dietary Guidelines for Americans.” With the provision of this program and its subsequent evaluation further outcomes have been reported related to changes in academic performance, habitual diet, and the nutritional status of children.

Breakfast has a role in improving overall nutritional status and health. Research supports the statement that children who ate breakfast either at home or school improved their overall intake of fiber, vitamins, and minerals (24, 25, 26). Nutrients particularly affected by omitting breakfast were Vitamins A and C, riboflavin, calcium, zinc, and iron. Those children who skipped breakfast did not make up deficits at other meals throughout the rest of the day.

The dietary intake of fiber was significantly higher in breakfast eaters, especially with the inclusion of ready-to-eat cereals. The inclusion of ready-to-eat cereals also demonstrated a positive effect on total micronutrient and macronutrient intake; especially a higher mean daily intake of calcium (27, 28, 29).

Recent research has associated a better body weight status with the consumption of breakfast. An inverse relationship has been found between Body Mass Index (BMI) and breakfast consumption (30, 31). Obese individuals are more likely to skip breakfast or consume less energy at breakfast (31).

In a review of secondary data analysis of the NHANES 1988-1994, Fiore et al. (32) identified factors potentially protective against obesity in the 12-16 year olds with one or two obese parents or those with no obese parents. Eating breakfast everyday or some days was significantly protective against overweight in adolescents with obese parents and proved to be the strongest protective factor in this group.

Breakfast Habits Related to Academic Performance

The impact of eating or omitting breakfast on cognition has been measured for short term and long term consequences with mixed outcomes whether conducted in a research setting or school environment. The most commonly used testing instrument to evaluate the effects of breakfast omission involved association with short-term memory. Children that omitted breakfast demonstrated diminished speed and accuracy on tests of visual and auditory short-term memory, immediate recall, delayed recall, recognition memory, and spatial memory (8, 24, 33, 34). A difficulty in drawing conclusive outcomes involves the variability in study design and size, test methodologies, cognitive outcomes measured, populations studied, and breakfast compositions. The attributes of the breakfast meal as well as the composition, size, and length of overnight fast were often uncontrolled (35).

It has yet to be determined what factors are most contributory to cognitive function. As Pollitt summarized in a recent review, there are two theorized mechanisms for the effects of breakfast to improve cognition. The first is the metabolic changes associated with an extended overnight fast to maintain the availability of fuel and other nutrients to the central nervous system. The second is the long-term effects of breakfast provision to improve nutrient intake and nutritional status which contributes to an improvement in cognition. The separation of socioeconomic or metabolic changes in plasma glucose regulation in the brain has been difficult to distinguish (36).

Breakfast Composition, Size, and Timing

Further debate occurs with the practical implications on the composition of breakfast. The compositional differences in protein and fiber content, glycemic scores, and rate of digestion has been associated with alterations in cognitive performance, particularly on tasks requiring processing of a complex visual display (37). Mahoney et al. (38) demonstrated that boys and girls had enhanced spatial memory and girls showed improved short-term memory with a breakfast of oatmeal as compared to a breakfast of low-fiber high glycemic ready-to-eat cereal.

Effective Nutrition Education Methods for Teaching Children

It is debated whether nutrition education in the school age child should focus on general nutrition education concepts and skills or provide the cognitive, affective, and behavioral skills to enact specific behaviors. To address the elements contributing to effective nutrition education Contento et al. reviewed the outcomes of 43 nutrition education programs in the general school-aged child population. Studies were primarily conducted in the school setting with two basic educational approaches implemented (13)

The earliest approach was to enhance the knowledge, skills, and attitudes needed by children to broadly understand food and nutrition issues to select a diet/food for their general health. The premise of this instructional base used the food grouping approach. Examples of these types of programs were the Nutrition Education and Training (NET) program, Nutrition for Life (NFL) program, and Food Your Choice.

A more recently defined approach that links diet to chronic disease expanded upon the educational goal of nutrition to reduce disease risk as well as enhance health.

Successful outcomes translated into the acquisition of specific behavioral capabilities or cognitive and behavioral skills needed to enact targeted behaviors. The majority of studies using the behavioral approach were directed at heart health and involved reducing fat and salt in the diet and increasing fiber. Examples of these programs include Know Your Body (KYB), Child and Adolescent Trial for Cardiovascular Health (CATCH), The Heart Smart Program, and Gimme Five.

This researcher's review revealed that the general nutrition programs, which tend to be knowledge based, were not highly or consistently effective in eliciting behavioral change. Behavioral changes were noted in 8 of 17 general nutrition education programs. The dietary changes measured were often quite broad in scope and without strict research control. In contrast to this, the behaviorally focused nutrition intervention programs had mixed results with successful behavioral change in 18 of the 23 studies reviewed. Outcome measures were noted by demonstrating the behavioral skill needed to enact the behaviors, behavioral intent, and self-efficacy (13).

Those programs with greatest success were based on the Social Learning Theory (SLT). The Social Learning Theory asserts that people learn by observing the behavior of others and that some serve as role models who are capable of eliciting behavior change in certain other individuals (6). The Social Learning Theory was often blended with concepts from other social and psychological theories such as theory of reasoned action. The Theory of Reasoned Action asserts that a person's perceptions of the social norm or beliefs that people important to them hold about a particular behavior can influence behavior change (5). As Lindsey described, friends seek advice from friends and are also

influenced by the expectations, values, and behaviors of the group to which they belong (39).

The rationale often cited for the success of peer education includes the involvement of a peer who is credible, influential and who has received training to help them fulfill their role. It is unique from other types of education as it is often more opportunistic and spontaneous, it may access a hidden population, and it can be a source of ongoing informal education.

Some research has demonstrated the role of observational learning and modeling. A successfully designed program for elementary students surrounding an experiential-based learning activity and peer-teaching model to improve calcium intake was recently documented (40). The Dairy is Delicious Project teamed 4-H club members with third and fourth grade students to engage in hands-on activities in 45 minute classroom lessons and field trips to dairies. Upon program completion 90% of students were consuming at least three dairy servings each day.

Birch et al. (41) used peer modeling to change children's preference for vegetables. Target children were placed at lunch for four consecutive days next to other children who preferred a different vegetable. By the end of the study the children showed a shift in their vegetable preference which persisted several weeks later.

The child-to-child method of teaching has been a focus of work since 1978 in the Unesco Institute for Education (UIE). Their principles of lifelong education are based upon the role of teacher and learner as interchangeable and not confined to the classroom. Within the context of their educational design are three basic assumptions:

1. Primary education is more effective when closely linked to things that matter to children and their families.
2. Education in and out of school should be linked to establish life long habits.
3. Children have the will, the skill, and the motivation to help educate each other and can be trusted to do so (42).

Further reports defined success in designing inquiry-based projects in contrast to outreach projects (43). Enquiry-based projects enable children to find out more about health issues through observation, investigation, and analysis instead of intervention only.

The potential benefit to the student leaders involved in peer education is well established in terms of positively affecting young peoples skills, confidence, and health behaviors (44, 45). Story et al. (43) reported those students who were peer leaders in the Teens Eating for Energy and Nutrition at School (TEENS) study demonstrated the largest increase in consumption of fruits, vegetables, and low fat foods. Backett-Milburn and Wilson (46) noted peer educators demonstrated increased self confidence and ability to voice their own thoughts and opinions.

Further benefits to the peer leaders include improved self-esteem, enhanced peer relations, and the development of social behaviors within the classroom (45, 47, 48). There is some evidence cited by Turner (45) that peer education may have a more widespread and longer term impact on the target group than other forms of education.

Mellanby recently reviewed the effectiveness of peer-led health education programs concluding that peer-led education was at least as or more effective than adult-led interventions. The most significant drawback was the difficulty in establishing and

maintaining a program. Mellanby suggests utilizing adults to deliver factual information with peer-leaders concentrating on social factors (49).

The early onset of obesity and unhealthy dietary habits in children creates a challenge for nutrition educators. The need for preventative and early nutrition intervention in childhood is imperative in preventing the long-term ramifications of obesity in youth. Therefore, the identification of effective educational approaches to successful long-term behavioral changes in children is important.

CHAPTER III

METHODOLOGY

The purpose of this study was to determine whether peer-led nutrition education is an effective method of teaching elementary school children and to determine the impact of peer training on student leaders. The study design was an intervention program with the evaluation of change in second graders' nutrition knowledge and attitude as it relates to the value of breakfast. The study additionally intended to measure the impact of the peer educational experience on student leaders.

Participants

The study involved a low income, urban public elementary school located in Northeastern Ohio. This research was approved by The University of Akron Institutional Review Board and the Akron Public Schools Research Review Board (Appendices A and B). The school selection was determined by its proximity to and involvement with The University of Akron and the University Park Alliance. Forty-two second grade students from three separate classrooms participated in three 30-minute nutrition education classes led by fifth grade leaders. The selection of the seven fifth grade leaders was based upon fifth grade teacher recommendations.

Parental consent and student assent (Appendix C and D) was obtained by sending the appropriate forms home with the student leaders one week prior to the research study. Forms were collected by the researcher and documentation kept at The University of Akron. Second graders involved in the classroom remained anonymous to the researcher and all information in breakfast consumption was analyzed in aggregate.

Program Design

During the spring semester 2008, second and fifth grade teachers were informed of the study design. A mutually agreed upon sequence of activities was established as illustrated in Appendix I. The researcher met with a fifth grade science teacher identified by the school principal and two second grade teachers to describe the intervention and their assistance with peer leader selection.

Peer Leader Selection

The seven fifth grade leaders were selected based upon previously demonstrated leadership skills for the purpose of serving as peer-educators for the second grade classrooms. An informative meeting was held with the researcher and the proposed fifth grade leaders to review their role as educators, the importance of attendance for participation, and its voluntary nature.

Upon completion of the appropriate informed consent from parents/guardians and letters of assent from students, a leadership training program was initiated the following day during the first class period. A focus group discussion of the leaders' current knowledge, attitude, and behavior regarding breakfast was administered.

Peer Leader Training/Evaluation

Peer leaders received group training by the researcher who is experienced in nutrition education. Centralized trainings were held on four separate occasions at a mutually convenient time for students and teachers during the first or last class period.

The first training meeting with fifth grade leaders fully described the Breakfast Detective Program, expectations of their time commitment, importance of attendance, and their leadership role. The leaders, further referred to as Breakfast Detectives, were provided with an opportunity to explore their own breakfast knowledge, attitude, and behaviors by a series of researcher-led questions.

The second in a series of training meetings reviewed the Plate Waste Analysis Activity. Utilizing a protocol adapted from Dr. Carolyn Berhman's "Garbology" study (50), visual plate waste methods were taught on-site to the fifth grade leaders to look at foods remaining on a plate and assessing the amount eaten. These trained Breakfast Detectives used a Visual Food Monitoring Form (Appendix E) which is a 5-point rating scale for each food item; 5 (ate all), 4 (1/4 remaining), 3 (1/2 remaining), 2 (3/4 remaining), and 1 (ate nothing). The Breakfast Detectives received a lab coat and disposable gloves to wear during this activity. The researcher coordinated all aspects of the study with the school principal, food service manager, morning/breakfast teacher, and janitor.

Upon entering the cafeteria for breakfast service, the second grade students received a colored tag placed on their shirt/jacket which later flagged their identity for selected seating. Subjects remained anonymous. Students proceeded uninstructed through their usual selection process of breakfast foods and were seated together at a previously

chosen table. Upon completing their breakfast, students were instructed to leave all containers and wrappers on their tray and place their tray in a designated area for visual waste analysis. Each Breakfast Detective was assigned different tables. They observed the food selected, remaining, and recorded the information as instructed on the Visual Food Monitoring Form. Completed forms were returned to the researcher for compilation.

The breakfast consumption data were analyzed by the researcher in aggregate using a USDA computerized data base website, www.mypyramidtracker.gov. Comparison was made between average consumed school breakfast for the second graders present with the Recommended Dietary Allowances (RDAs) for children four to eight years of age. Seven key components were analyzed (calories, protein, fat, calcium, vitamin C, iron, and fiber).

During the third training session the researcher presented to the Breakfast Detectives the nutritional results in a bar graph format (Current breakfast intake to Daily requirement). A series of predetermined open-ended questions were utilized by the researcher to lead the discussion. The Breakfast Detectives were instructed that a healthy breakfast should provide 25% of an individual's nutritional needs per day. Following the discussion the researcher randomly assigned three groups of two to three leaders to the three second grade classrooms. The initial lesson planning began with the instruction to focus on three main objectives: eating breakfast gives you energy, eating breakfast helps you learn, and eating breakfast keeps you healthy. The Breakfast Detectives familiarized themselves with available materials and discussed classroom activities.

In a fourth training session the Breakfast Detectives rehearsed hands-on educational activities to deliver the message to second graders about the value of breakfast. Feedback and encouragement from the researcher was provided with a review of the behavioral objectives. The second grader instruction was focused on three basic concepts: 1) children will be able to describe a morning meal as a source of energy for growing, learning, and playing; 2) children will be able to plan a breakfast with food from at least three food groups, and 3) children will be able to identify skipping breakfast as an unhealthy habit.

The subsequent peer-led intervention by the fifth grade leaders was conducted in three different second grade classrooms during normal classroom time. The classroom teacher and researcher were present for the entire classroom intervention.

Three days following the completion of the peer activity the Breakfast Detectives were provided the Leader Evaluation Form for feedback of their experience. This was confidentially conducted by the researcher and summarized in the results.

Second Grade Classroom Testing

Second graders were pre-tested and post-tested on nutrition knowledge, attitude, and behavior. The researcher administered the pretest one week prior to the peer-led breakfast education series as part of their classroom activity. Questions asked on the pre- and post-tests were verbally administered by the researcher. All second grade students were anonymous to the researcher as they were numerically identified by their respective locker number. Upon completion of the peer educational activity, the researcher re-administered the post-test.

Materials

To facilitate hands-on experiences for the second grade students nutrition education materials were purchased in advance through grant support from the University Park Alliance and The University of Akron. Approximately \$200 was spent on educational materials from Nasco Inc. These materials included Nasco Food Clings, Double Food Card Set, Eat Breakfast Poster Set, and My Pyramid handouts. Additional material supplemented by the researcher included lab coats, gloves, nametags, and reward stickers. At the conclusion of this intervention all materials were left on premise for future classroom use.

Data Collection

Quantitative data were collected from the second graders pre- and post-test results. Any child absent at the time of pre-testing or post-testing was eliminated for the analysis of assessment. A paired *t*-test analysis was performed to determine whether hypothesis one could be supported. The testing was categorized according to knowledge, attitude, and behavior related questioning for further exploration of the program's outcome.

Qualitative analysis and reflection was conducted to provide a description of the peer led classroom interventions. The researcher was observational only during the classroom activities. A review of each class intervention was summated by the researcher to encompass the observation of the Breakfast Detectives 1) ability to deliver a clear message, 2) ability to control the classroom, 3) degree of organization, and 4) creativeness of the leader. Further analysis was directed to the observation of each second

grade classroom 1) level of student participation and attentiveness, and 2) degree of interruption or disruption. At the conclusion of the peer-led interventions second grade teachers were asked open-ended questions related to the program's strengths, weaknesses, perceived effectiveness, and future application in their school.

Data to demonstrate if the Breakfast Detectives benefited from the peer educational experience (Hypothesis two) were obtained from the Leader Evaluation Form (Appendix H). The results of the Breakfast Detectives experience were descriptively related to their knowledge and attitude regarding breakfast. They were asked if there had been any sense of increased awareness and/or behavioral change related to eating breakfast or in their selection of food choices. The leaders were asked to describe which experiences were most valuable to them. Their role as leader and educator was explored as to its generalized effect, positively or negatively.

CHAPTER IV

RESULTS

The main purpose of this study was to determine whether peer nutrition education is an effective method of teaching nutrition in the elementary school setting. The results of this study are both descriptive and numerical in representation. The results include a discussion of the process involved in peer leader selection and training as well as classroom observation and leader evaluation. In addition, pre- and post-testing of the second graders who received peer instruction will be summarized.

Testing of Hypothesis I

A peer-designed nutrition education program led by fifth graders will result in a significant increase in knowledge and improvement of attitude of second graders toward good nutrition and the importance of breakfast.

Data Analysis

Second grade students were pre- and post-tested with a knowledge, attitude, and behavior questionnaire. The student responses to the nutrition knowledge questions one, seven, nine, and ten were numerically coded as correct equal to one and incorrect equal to zero. Scores were determined by total number of correct out of four using Excel statistical analysis. Scores from the pre- and post-test were analyzed using a paired

dependent t test, one-tailed, unequal variance, with a 95% significance level ($p < 0.05$) to assess nutrition knowledge acquisition for the group as a whole.

Assessment of Knowledge

A paired t test was conducted to evaluate the hypothesis that the group pre-test score on the nutrition knowledge questions would differ from the post-test score. The mean pre-test score for the group ($n = 42$) was 3.52 and the mean post-test score was 3.67. The difference between pre- and post-test scores was not significant (Table 2).

Pre intervention Results

Nutrition knowledge prior to participating in the intervention was examined between second grade classes. In the total group of 42 second grade students 71% correctly answered all four true/false knowledge-based questions. Ninety three percent correctly answered, "Eating breakfast helps me grow." Eighty-six percent correctly answered, "Eating breakfast gives me energy to run, play, and learn." Ninety-eight percent correctly answered, "Second graders need to get a lot of sleep." Seventy-nine percent correctly identified, "It is not OK to skip breakfast." The mean score on the nutrition knowledge assessment for the group ($n = 42$) was 3.52 out of 4.00.

Post intervention Assessment Results

Students were asked to complete the same nutrition knowledge test after participating in the series of three peer-led nutrition classes. In the same group of 42 second grade students 71% correctly answered all four knowledge-based questions. Ninety percent correctly answered, "Eating breakfast helps me grow." Ninety-eight

percent correctly answered, “Eating breakfast gives me energy to run, play, and learn.”

Ninety-eight percent correctly answered, “Second graders need to get a lot of sleep.”

Seventy-six percent correctly identified, “It is not OK to skip breakfast.” Table 1 summarized these findings.

Table 1.

Percent Correct Answers to Knowledge Questions Pre- and Post-intervention (n = 42)

	Pre-test % correct	Post-test % correct
Eating breakfast will help me grow and be stronger.	92.9	90.5
Eating breakfast gives you energy to run, play and learn.	85.7	97.6
Second graders need to get a lot of sleep.	97.6	97.6
It’s not OK to skip breakfast.	78.6	76.2

The mean score on the nutrition knowledge assessment for the post-test group (n = 42) was 3.67. The average pre- and post-intervention score on the nutrition knowledge questions of each classroom is available in Table 2.

Table 2.

Paired Sample Classroom Analysis Descriptives

Classroom	N	Pre-test Mean	Post-test Mean	Std Deviation	Std Error	t	df	sig
1	13	3.54	3.62	.760	.211	-0.365	12	.721
2	15	3.33	3.53	.561	.145	-1.382	14	.189
3	14	3.71	3.86	.663	.177	-0.806	13	.435
Total	42	3.52	3.67	.647	.100	-1.432	41	.160

The average post-intervention increase in score between classrooms is available in Table 3. The mean increase in score was 0.14. The mean score on the nutrition knowledge test for the group pre- to post-tested and the mean score for each of the three

classes from pre- to post-interventions were all higher after the series of three peer-led interventions. However, none of the pre-post differences were statistically significant.

Table 3.

Analysis of Increased Score Between Classrooms

Classroom	N	Mean	Std Deviation	Std Error	95% Confidence Interval for mean/ Lower bound
1	13	.08	.760	.211	-.38
2	15	.20	.561	.145	-.11
3	14	.14	.663	.177	-.24
Total	42	.14	.647	.100	-.06

Assessment of Attitude

For the purpose of further understanding second grader attitudes toward nutrition, Breakfast, and healthy eating habits additional information was examined with the responses to questions two, three, four, six, 11, 12, 13, and 15. The second graders pre- and post-intervention attitude responses are summated in Table 4.

These second grade responses indicated an appropriate understanding of the importance of breakfast. At pre-intervention 95% identified its importance for growth and 80% indicated an understanding of its role in learning; 5% indicated that breakfast made them sleepy, and no one associated breakfast eating with making them fat. Their post-testing response demonstrated only slight changes in their attitude toward breakfast (Table 4).

The most frequent second grade student responses to reasons why breakfast is skipped were not having time (50%) and being too tired (45%). Student responses to the

greatest influence on their eating habits were their parents (57%), school (36%) and television (7%).

Table 4.

Eating Attitudes (n = 42)

	Pre-test	Pre-test	Post-test	Post-test
Questions	Agree (%)	Disagree (%)	Agree (%)	Disagree (%)
Eating breakfast is important to me	92.9	7.1	95.2	4.8
Watching TV makes me want to eat the foods I see	38.1	61.9	38.1	61.9
If I stay up late I'm too tired to eat breakfast	50.0	50.0	47.6	52.4
I never have time for breakfast	50.0	50.0	45.2	54.8
Eating breakfast will (multiple answers)				
a. make me fat	0.0		9.5	
b. help me grow	95.2		92.9	
c. help me learn	80.1		78.6	
d. make me sleepy	4.8		7.1	
I learn the most about what to eat from(one response)				
a. school	35.7		28.6	
b. TV	7.1		7.1	
c. My friends	0.0		0.0	
d. My parents	57.1		64.3	
If I don't eat breakfast it's because(multiple answers)				
a. I am too tired	45.2		33.3	
b. Not enough time	50.0		50.0	
c. No food in the house I like	11.9		26.2	
d. I don't like school breakfast	4.8		14.3	
If I don't eat breakfast I feel (Likert scale with faces Excellent=5 Good=4 Fair=3 Not Good=2 Bad=1	Avg. score 2.1		Avg. score 2.0	

Assessment of Behavior

For the purpose of discussing second grader behavior in this population, a summary of responses from pre-testing questions five, eight, 14, and 17 follows. Post-testing was not evaluated under the assumption no true behavioral change would be measurable within a two to three week span.

Table 5.

Pre-testing Behavior Responses (n = 42)

Behavior Responses	Yes (%)	No (%)
I make my own breakfast.	80.9	19.1
I go to bed by 9:00 on school nights.	57.1	42.9
I eat breakfast		
a. 6-7 days/week	59.5	
b. 3-5 days/week	26.2	
c. 1-2 days/week	9.5	
d. 0 days/week	4.8	
How many times/day do you drink milk?		
Never	4.8	
Once	21.4	
Two	14.3	
Three	16.7	
Four	38.1	
>Four		

The responses indicated 81% of second graders make their own breakfast.

This group of seven to nine-year-olds indicated 58% of them are in bed by 9:00 pm on school nights and 42% are up later than 9:00 pm.

Fifty-nine percent of the students eat breakfast six to seven days of the week, 26% eat breakfast three to five days of the week, 10% eat breakfast one to two days/week and 5% never eat breakfast. This question does not differentiate between breakfast

consumption from home or school; therefore, the data should not evaluate success of the school breakfast participation but merely indicate a trend.

Milk consumption patterns were also identified. Thirty-eight percent of the students indicated that they drink milk more than four times per day, 17% drink milk four times per day, 14% drink milk three times per day, 21% drink milk two times per day, 5% drink milk once per day and 5% have no milk consumption.

Second graders were also asked to identify their usual breakfast foods from a list and write in any frequently eaten breakfast foods not listed. The results are listed in order of frequency identified: 71% of students include milk, 69% cereal, 67% pop tarts, 50% eggs, 48% fruit juice, 38% donuts, 31% bananas, 17% pop, and 7% rice. Those foods written in by students were toast, sausage, pancakes, biscuits, bacon, water, apples, cinnamon rolls, and breakfast burritos.

Interpretation of Results

None of the analyses performed demonstrated statistically significant results although the mean score for the group and all three individual classes were higher after the intervention from the Breakfast Detectives. The classroom knowledge score differences could be correlated to observed classroom behaviors. Classroom two had the lowest pre-test mean but demonstrated the greatest increase in knowledge from 3.33 to 3.53 with an increase in score of 0.20. This classroom had the greatest number of disruptive behaviors requiring teacher interjections. Therefore, this was an encouraging finding that the peer-led message may have contributed to the largest increase in knowledge pre- to post-scoring between classrooms although not significant. Classroom

one had a pre-test mean to post-test mean of 3.54 with a modest increase in score of 0.08. This classroom had students that were passive and required encouragement to participate. Classroom three had the highest pre-test mean to post-test mean 3.71 to 3.86 with an increase in score of 0.14. This classroom was highly interactive and engaged in the activities with no disruptive behaviors.

Testing of Hypothesis II

Engaging fifth graders in a breakfast analysis project with peer education training will significantly improve student leader knowledge and attitude toward good nutrition and the importance of breakfast.

A sequencing of activities involved in testing this hypothesis is described in Timeline of Activities, Appendix I. Teacher selection of the leaders was determined by a combination of desirable characteristics; maturity in and out of classroom settings, previous leadership skills, good attendance, and dependability. All seven of the teacher selected leaders were female.

Peer Training

The first training meeting with the fifth grade leaders involved a researcher-led discussion of the current knowledge of the peer leaders, attitudes, and behaviors regarding breakfast and peer characteristics. The peer leader response is formatted in Table 6.

These fifth grade peer leaders showed contrasting breakfast habits to those of the second graders. Forty three percent of the leaders were eating breakfast more than four

days per week compared to 59% of second graders eating breakfast six to seven days per week.

Table 6.

Questions Asked of the Leaders (n = 7)

Question	Yes (%)	No (%)
Do you eat breakfast >4 days/week 2-4 times/week Rarely 0-1 time/week	43 43 14	
If you don't eat breakfast, what are reasons why?	Not enough time; not hungry; my stomach hurts if I eat breakfast; only like it if my mom makes a big breakfast; parents don't let me make my own breakfast.	
What are reasons second graders may not eat breakfast.	Sleep in too late; not enough time; late arrival at school; not organized; not hungry; parents don't encourage or don't want the kids to make a mess.	
Do you participate in SBP >3 times/week?	86	14
Have you participated in other tutoring/leadership roles before?	86	14
What type of teaching methods do you think second graders would enjoy and why?	Children don't want to be lectured to. They have a lot of energy and need fun activities. They are too busy to focus so they need a quick fun message. All leaders agreed second graders would enjoy cheers or rap performance for an activity.	
Is breakfast important? Why?	Breakfast gives energy, helps you learn, stay awake in class. It can help make you smarter.	

A tool used to assist in training the Breakfast Detectives was the inquiry-based plate waste analysis activity. The Breakfast Detectives were involved in a hands-on activity of second grader breakfast consumption to analyze the results for potential nutrition concerns. On the day of the breakfast analysis four out of seven of the leaders arrived early to assist with data collection and the remaining three leaders arrived half way through the breakfast service. Leaders were agreeable to the tasks assigned but lacked initiative and interest in the outcome. The leaders observed the breakfast consumption of 25 second graders given the choice of Pop Tarts, orange juice, and milk. The Visual Food Monitoring Forms were completed by the leaders, returned to the researcher, and analyzed for eight nutrients using Mypyramidtracker. The nutritional results are tabulated for comparison to the Recommended Dietary Allowances (RDA) for school age children (Table 7).

Table 7.

Breakfast Analysis Estimate of Second Graders (n = 25)

Compared to RDA for age		
Nutrient	Breakfast Intake	Daily Recommendation or Acceptable Range *
Calories	248	1345
Protein(g)	4	19
Total Fiber (g)	1	25
Fat (g)	5.9	6.9-9.6
Vitamin A (mcg RAE)	169.6	400
Vitamin C (mg)	24.9	25
Calcium (mg)	56	800
Iron (mg)	1.9	10

During the third leadership training meeting the researcher presented the bar graphs of second grader breakfast consumption and explored with the Breakfast

Detectives a more analytical understanding of the role of breakfast. Students were able to recognize that fiber, calcium, and iron were the key nutrients inadequately consumed in this plate waste analysis. Problem solving exercises explored practical food choices for the children to improve upon. The Breakfast Detectives recognized the gap created for those skipping this meal; however, they pointed out that students may have eaten some food at home that morning in addition to the School Breakfast Program meal.

Following this discussion the Breakfast Detectives discussed plans for teaching the second graders. All leaders requested the first class activity to include an interactive rap or cheer to be rehearsed and performed by the class and requested the researcher provide a reward snack or stickers to use to engage the second graders. The Breakfast Detectives volunteered to meet in their individual peer leader team to rehearse their activities and study their materials.

The fourth and final leadership training meeting provided rehearsal time in front of the group of Breakfast Detectives with time for feedback. All leaders were enthusiastic and engaged in their activity. All seven Breakfast Detectives were in attendance throughout all of the training sessions. They required assistance from the researcher in techniques to use in games involving the cardboard food models.

Observation

The series of three classroom observations is summarized in Appendix F. Some universal problems were noted. Leader characteristics varied widely between groups. Distinguishing features included the degree of self confidence, animation, organization, flexibility, and initiative. Two of the leaders were extremely outgoing, animated, and

able to capture the second graders' attention. Two of the leaders were shy, reserved, and lacked confidence in their delivery of material. Some leaders came without all of their materials or were ill prepared in their flow of activity. In each classroom one of the leaders assumed a more dominate role in the delivery of a message or demonstration of an activity. On occasion leaders were not able to maintain control of the classroom which minimized the actual time spent in the delivery of the message. Over the three classroom sessions the leaders gained confidence in their skills and the classroom behavior improved. Frequency of disruptive behaviors diminished.

Following the completion of the three part series of second grade class instruction all seven Breakfast Detectives provided their feedback about the experience using the Fifth Grade Leader Evaluation instrument (Appendix H). The results are summarized in Table 8.

The peer leader evaluation demonstrated that all participants enjoyed the experience and if given another opportunity would be a peer leader again. Eighty six percent of the leaders felt they became more aware of the importance of good nutrition, ate breakfast more often, became more aware of the effect they have on others, and were confident in talking with others. More than half of the leaders indicated they are making healthier meal and snack choices and learned new skills from participation in the Breakfast Detective peer-leader experience.

When asked to identify the activity least enjoyed, all indicated the Plate Waste Study. Fifty-seven percent of the leaders indicated their most enjoyed activity was working with second graders, 29% selected teaching in the classroom, and 14% selected

all activities. When asked for suggestions on future teaching topics 38% indicated safety, 14% selected teaching about healthy lunch or dinner, and 48% had no response.

Table 8.

Leader Evaluation Summaries (n = 7)

Question	% responding Yes	% responding No
Since helping with this activity: I am more aware of the importance of good nutrition	86	14
Since helping with this activity: I eat breakfast more often	86	14
Since helping with this activity: I am making healthier meal and snack choices	57	43
Since helping with this activity: I am more aware of the effect I can have on others.	86	14
Since helping with this activity: I learned new skills	57	43
Since helping with this activity: I have less confidence in talking with others	14	86
Being a Breakfast Detective was fun	100	0
I would like to do more of these activities	100	0

An informal post-intervention interview with the classroom teachers was conducted with the results summarized in Table 9. The overall consensus from the three second grade teachers were that peer-led teaching was a positive experience. They supported the method of leader selection. They all indicated the leaders needed more training in organization of activities.

Table 9.

Second Grade Teacher Feedback

Question	Teacher Response
Did you feel there is a role for peer led instruction in the elementary school?	100% felt it is beneficial. It is important to pair the right students with the right classroom
How should the selection of leaders be conducted?	100% responded current process appropriate. Fifth grade science teachers.
What was the interventions strength?	The second graders look up to these kids. It is helpful to continue interfacing with the students in positive ways. The same message may be delivered with increased strength
What was the interventions weakness?	100% felt the leaders needed more thought out or planned instruction. They needed more assistance with group organization, more control with activities, and some activities proceeded too slowly for class content.

CHAPTER V

DISCUSSION

The Need for Effective Nutrition Education in Childhood

The dramatic rise in childhood obesity demands that those educating youth strive for novel approaches to address this public health problem. Many cross-sectional studies have reported the correlation between breakfast skipping behavior and increased Body Mass Index (BMI) of children and adolescents (21). Breakfast eating behavior has been viewed as an important lifestyle component that may significantly impact health, similar to time spent in physical activity.

As supported by a recent statement from the American Dietetic Association the school environment combines the social experience of eating with the opportunity to establish healthy eating habits (10). The school setting may allow nutrition educators a unique opportunity to combine traditional educational techniques with a peer-led program design. Research has examined the effectiveness of peer-led and adult-led school health education focused on high risk health behaviors (smoking, substance abuse, and HIV/AIDs prevention). A recent review by Mellanby (49) suggests that peer-led programs can be as effective as traditional adult-led programs; however, it remains challenging to analyze due to methodological differences. There have been limited studies of peer-led teaching to promote healthy lifestyle in a school setting. The purpose of this study was to examine the effects of a peer-led nutrition educational program

designed to teach the importance of breakfast consumption on the knowledge and attitudes of the second graders instructed and the fifth grade peer-leaders trained and involved. The impact of the peer-led nutrition intervention from the perspective of the peer leaders, teachers, and elementary students participating in the program will be discussed.

Discussion of Hypothesis I Results

This study of a peer-led nutrition education program for second graders on the importance of breakfast demonstrated an increase in knowledge score although not of statistical significance when compared as a total group or by individual classrooms. There was limited success in demonstrating a significant change in the second grade students' knowledge score. The assessment tool was based on a Likert-type scale of zero to four; therefore, the pretest average of 3.52 as seen in Table 1 demonstrated that the knowledge questions were not new concepts for the second grade students which-created a small margin available for improvement in the post-intervention testing. The questionnaire seen in Appendix G had been reviewed by the second and fifth grade teachers for age and content appropriateness but it had not been previously piloted. Study design improvement could be made by instrument validation and by expanding the number and difficulty of the knowledge-based questions.

Within the context of the four knowledge-based questions, the question demonstrating the greatest improvement pre- to post-testing was "Eating gives you energy to run, play, and learn." The number of correct responses for the pre-test group was 36 with an increase of correct responses to 41 in the post-test group. The Breakfast

Detectives had focused on this message in the content of the rap and cheers demonstrating the possible association between an effective peer-designed activity and increased knowledge. The second graders' response to the question of second graders needing a lot of sleep was unchanged pre- to post-testing with 98% of them correctly identifying its importance. The remaining two questions demonstrated a decrease in one correct response in each question. The correct responses to the statement "It's OK to skip breakfast" changed from 33 correct responses pre-testing to 32 correct responses in post-testing. This was similarly demonstrated in the responses to the statement "Eating breakfast will help me grow and be stronger" from 39 correct in pre-testing to 38 in post-testing.

Second Grade Students' Attitude Results

Ninety-five percent of the students identified the importance of breakfast for growth and 80% indicated an understanding of its role in learning, 5% expressed it made them sleepy, and no one associated breakfast eating with making them fat. This is an age appropriate response that often changes with increasing age and negatively perceived body image problems in adolescence.

The contrast between second graders' attitude and behaviors with breakfast consumption is demonstrated in Table 4 and Table 5 with 93% of students indicating eating breakfast was important to them; however, only 59% of them ate breakfast six to seven days of the week. When breakfast is skipped, 50% indicated it is due to not having enough time, 45% were too tired and 17% responded that they didn't like the food at home or at school. A study by Reddan previously described the most commonly held

perception of a barrier to eating breakfast was lack of time and lack of hunger in the morning (20). This finding continues to indicate the many other barriers to changing breakfast eating behaviors not linked to knowledge about its importance.

Many of the second grader attitudes toward eating habits reflect their cognitive stage. Fifty seven percent of the students indicated they learned most about what to eat from their parents, 36% from their school, 7% from television, and no one responded from their friends. These results reflect the strength of parental influence and illustrate the importance of family involvement with any nutrition intervention program.

Second Grade Students' Behaviors

Research by Haruki examined the factors related to breakfast eating behavior in elementary school children (21). Those children who ate breakfast every day in the previous week went to bed earlier than the children with fewer breakfasts eaten. He suggests the importance of a daily living rhythm, including sleeping behavior for the ability of children to establish better eating habits. Fifty-nine percent of second graders in the current study indicated eating breakfast six to seven days per week correlating with a similar response of 58% indicating they go to bed by 9:00 on school nights.

The gap between knowledge, attitude, and behavior was illustrated at a number of levels. Ninety-eight percent of the second graders identified the benefit of breakfast with 93% responding that eating breakfast was important to them. However, only 59% of them ate breakfast six to seven days of the week, 26% ate breakfast three to five days of the week, 10% ate breakfast one to two days of the week, and 5% never ate breakfast.

As referenced by Lytle, health promotion research suggests that even the best designed, state of the art, theory-based programs are only moderately effective in positively affecting behavior change (14). The theory basis for peer-led education is a blend of the social learning theory and the theory of reasoned action. The program provides a learning environment with objectives to reinforce positive behaviors and develop or recommend new behaviors through the observation of a peer. Based upon this theory the closer the identification between the student and the peer the more likely they are to carry out the desired behavior, providing a key determinant to effective change. Unless a student believes they can produce desired effects by their actions they have little motivation to act in difficult situations. The theory of reasoned action states the intention of a person to adopt a recommended behavior is determined by the individual's subjective belief. Young school-aged children are motivated by the expectations of their respected peer educators.

Second Grade Students' Food Choices

The breakfast consumption patterns indicated by the second graders mirrors that cited in current literature (15, 31). Sixty nine percent of the students indicated they drink milk three or more times per day. Milk and breakfast cereal are the most commonly consumed foods by children at breakfast in the United States (31). The questionnaire did not distinguish breakfast foods from home or school so the frequency of inclusion of pop tarts, juice, and donuts may reflect what is consumed at school breakfast.

Based upon observations and teacher feedback seen in Table 9 these second graders enjoyed and anticipated the involvement of the fifth grade leaders. Indirect

benefits may include the establishment of future relationships and the possibility for continued educational impact by peers.

Discussion of Hypothesis II Results

The results of this study showed that the peer-led intervention and education provided to second graders resulted in improvement of peer-leader knowledge and attitude toward good nutrition and the importance of breakfast. Based upon peer leader evaluation results seen in Table 8, most of the leaders demonstrated an increase in confidence and skills resulting from their participation in Breakfast Detectives. This empowerment as described by Bandura (6) will enhance a person's ability to put a socially learned behavior into practice. All of the leaders indicated that they enjoyed the activity and would participate again, if given another opportunity. Greater than 75% of the leaders became more aware of the importance of good nutrition and are more aware of the effects they can have on others. From this experience more than half of the leaders indicated they are making healthier meal and snack choices and have learned new skills.

These findings are similarly described in a recent review by Turner that through peer leader participation an increase in self esteem, an enhanced sense of self efficacy, an increase in knowledge and skills about health, a development of leadership skills, and the development of planning and presentation skills were demonstrated (44). This secondary gain often demonstrated in peer-led teaching may provide another reason for school curriculums to incorporate it as a teaching method within health education in elementary schools.

Breakfast Detectives Background and Training

The Breakfast Detectives own breakfast consumption behaviors as reported in Table 6 were similar to that described in the literature. Forty three percent of the Breakfast Detectives reported eating breakfast greater than four times per week, 43% two to four times per week, and 14% never to once per week. Their breakfast skipping behavior occurred with greater frequency than that described by the second grade students in this study. Studies have found that older children and adolescents skip breakfast more frequently than do younger children (29, 31). Breakfast skipping prevalence reported in other studies ranged from 21% of eight to nine-year-old children and 42% of 12 to 13-year-old children indicated that they do not eat breakfast every day (54). Four percent of children and adolescents reported habitually skipping breakfast (55). Breakfast skipping is more prevalent in girls and children from lower socioeconomic backgrounds (17). The results from this study did not reveal any discussion from the fifth grade leaders or in the observed second grade classrooms of breakfast skipping associated with dieting or to lose weight as frequently described in the literature (20).

The Breakfast Detectives most frequently cited reason for breakfast skipping behavior was similar to that described by second graders in Table 4 and that reported in the literature (17, 18, 20). Forty-five percent of the second graders responded that they were too tired, 50% reported that they did not have enough time, 12% responded not having food in the house that they like, and 5% responded not liking school breakfast.

Another component of this study dealt with the design and appropriateness of peer leader training for effective outcomes. Literature reports a variety of training methods but

the details of their content are limited. The professional time involved in this study encompassed 12 hours; six hours for peer training, five hours classroom observation time and one hour of teacher/faculty planning. As this was a one-time interventional program, it was difficult to compare to other programs of greater length or with a larger pool of peer leaders. The training component in the TEENS study provided one intensive day of training in contrast to this study's training time spread over a one week period in 45-60 minute sessions (43). The TEENS study offered the advantage of consolidating the professional time more efficiently. The Healthy Buddy study by Stock demonstrated the effectiveness of a 10-month intervention program pairing trained fourth to seventh graders with kindergarten to third graders (3). The trained peers received formal classroom instruction weekly and then proceeded to act as peer educators to the younger students with a variety of techniques; games, art, presentations. This unique design offers the advantage of an ongoing peer training program; however, it demands more professional time for implementation. In a future peer-led program additional training time should be included and allowance for time with peer leaders immediately following the classroom interventions for teacher feedback. If the school setting can accommodate, this may be a more efficient use of professional and student time.

Frequent causes to program failure cited in the literature include lack of appreciation for the complexity of peer education and inadequate training and support of the peer leaders (44). This pilot study illustrated these characteristics through the Second Grade Teacher Feedback (Table 9) and Observations in Appendix I. The Breakfast Detectives were not able to maintain an efficient flow of activities when implementing the rap/cheer and skits. There was observed a loss of class control to stay on task. This

was also reported in the TEENS study (43) when nearly half of the peer leaders indicated difficulty keeping their group on task and 40% expressed difficulty getting their group organized. The peer leaders required more skill training to anticipate classroom discipline issues, methods to control group behaviors, and techniques to improve the flow of student activities.

A peer-led education program will not operate at the same level as that of trained or experienced teachers. By its spontaneous nature its delivery of information may provide a more conducive environment for children to learn. This peer-led program may be more effective if designed to deliver messages in smaller more intimate groups. The use of smaller groups may improve relationship building and provide a more comfortable and safe environment for sharing.

Another challenge for any peer-led training program is anticipating the wide range of classroom differences combined with the inherent personality differences in leaders. It was demonstrated by second grade teacher feedback that some leaders would have been better assigned to different classes.

Breakfast Detective Experience

The improvement in health knowledge, health behaviors, and health attitudes by the Breakfast Detectives was demonstrated by the findings in Table 8 and researcher observations. Eighty-six percent of the leaders indicated they were eating breakfast more often and were more aware of the importance of good nutrition. Fifty-seven percent of the Breakfast Detectives indicated that they gained new skills and were making healthier meal and snack choices. These positive findings are commonly supported in the literature

and support the need for increased use of peer education in the school systems (43, 44, 45, and 46).

This study did not demonstrate any negative consequences from the peer-leader teaching experience. As seen in Table 8 one Breakfast Detective did note they were less confident in talking with others but would still participate in future leader activities. Similar findings were reported by Story in the TEENS study when 80% of the leaders reported the training made them feel more confident to lead the group (43). In future investigations of a peer-led program an added question addressing the adequacy of training and suggestions for improvement would enhance the findings.

It is assumed that an effective peer educator would be seen as more credible than the traditional adult educator because students identify more with those who are closer in age and background. Beneficial characteristics identified for peer-educators are possession of self-confidence, compassion, flexibility, dependability, willingness to learn and mutual respect by their peer group (2).

Two clearly identified skills for peer-leader effectiveness are motivation and level of development. By allowing fifth grade teachers to select the leaders it was anticipated that individuals with maturity and leadership potential would be chosen, thereby reducing the necessary training time. However, based upon classroom observation, peer leader evaluation, and second grade teacher feedback; there is a need for further instruction and support for the fifth graders to perform effectively as school leaders. This program focused on educational knowledge and teaching objectives without properly supporting the leaders' organizational ability and ability to manage group behaviors. Some leaders lacked maturity and experience speaking in front of groups. An additional improvement

to program design would include an initial assessment tool to evaluate leadership confidence and skills.

Student leadership styles were often reflective of their personality. Their level of confidence was variable. The leaders also displayed various levels of organizational skill requiring some assistance by the researcher. One group was unprepared without the expected materials, and one leader did not show up for a class intervention leaving her partner alone and ill prepared.

The leaders were highly motivated throughout the training but by the last training session verbalized interest in beginning the classroom intervention. With the amount of material required for training it would not be realistic to shorten the sessions; however, it may be feasible to make them more engaging and rewarding for the leaders. Two of the leaders expressed interest in “helping” the second graders, one later commented that it’s nice to get out of other classes to teach, and the majority thought it was fun to be the teacher.

Researcher Observations

A basic similarity observed in all three classrooms included the second graders’ excitement to engage with an older peer. Students treated the peer leaders with respect. The observed second grader behaviors which required teacher intervention were a product of overexcitement, excessive stimulation in activity participation, and lack of attention to leader instructions. Winder described nine common disruptive behavior patterns in second grade peer tutoring classes and observationally noted a reduction in their occurrences over a 16-day period in contrast to traditional direct teaching (53).

Future program planning would provide anticipatory peer-leader training on disciplinary techniques or management of group behaviors. Leaders may have benefited from a role playing activity dealing with both positive and negative classroom behaviors.

A distinct contrast between classrooms was the variability in second graders' self-control and ability to stay on task. In order of ranking disruptive behaviors observed by the researcher, classroom two had continued problems with student interruptions requiring redirecting students to task and repetition of content material. This classroom's behavior improved over the course of the three peer-led interventions. This may have been a product of enhanced leadership skills by the peer-leader or second grader adaptation to the new learning style. Classroom one had very few interruptions to the peer-led interventions but required encouragement to participate. When activities were performed by the second graders, some students refrained from participating. Classroom three had no disruptive behaviors to report in all three interventions. These second graders were eager to participate, stayed on requested tasks, and had minimal interruptions during the classroom intervention.

A major influence on what children can learn is related to their cognitive development. Early primary school children understand food classification and think causally between food and health. Their ability to reason is limited to specific experiences (47). Therefore, the simplistic nature of this nutrition intervention was age appropriate with inclusion of real life experiences, for example skipping breakfast. The second graders already had a significant understanding of the basic need for breakfast consumption as evidenced by their pretest scoring greater than 75% on knowledge based questions. Students had received prior classroom instruction on categorizing foods into

respective food groups so the materials selected for this intervention were not new concepts.

The materials available to peer-leaders were properly administered. The peer-leaders all agreed to use interactive and participative teaching methods instead of the traditional didactic approach often used by teachers. The novel pop culture activities of rap songs and cheers about breakfast consumption further enhanced the learning experience for second graders. By observation most girls enjoyed these activities but boys were reluctant to perform them and some selected not to participate. As all of the peer-leaders were female, future program designs should incorporate both boys and girls as student leaders and should accommodate the specific learning preferences of both genders.

The selected games and activities involved planning a healthy breakfast. All students participated and assisted second graders in performing a skit involving a second grader skipping breakfast. An option not demonstrated by this group of peer leaders often referenced in literature was opportunistic intervention or spontaneous conversation (48). Due to the classroom size of 14-16 students, the activities selected would have flowed more smoothly with a better ratio of one peer to four to six students in small groups as described by other researchers (40).

Teacher Feedback

The teacher plays a vital role in the successful implementation of a peer-led classroom intervention. There is a commitment of time, discipline, and dedication. Peer learning creates a shift of focus from what is being taught to what is being learned. The

teacher therefore becomes an inconspicuous observer and evaluator. All teachers in this study were supportive to the peer-leaders and reported they would enjoy seeing future peer-designed activities. The second grade teachers were comfortable with the process in the selection of the peer leaders. As seen in Table 9, all of the second grade teachers felt the leaders needed more training with classroom activity organization and methods to manage interruptive behaviors. Additional suggestion from the teachers included the avoidance of leaders assigned to classrooms with their siblings, the assignment of stronger leaders into classrooms with more challenging student behaviors, and the avoidance to teaming the peer leaders with their friends.

Study Limitations

There was a dramatic difference between classroom teaching styles and maintenance of discipline. One classroom teacher played quiet background music and no teacher intervention was required for classroom attention to material or leader instruction. A second classroom had constant student disruption requiring continued teacher involvement for behavior management and redirection to material delivered and leader instruction. The third classroom was a more passive and less participative class, and no teacher intervention was needed for behavior management. There was great deal of variability in class participation and student self-control among classrooms. The classroom with the most disruption distracted the leaders hindering their ability to deliver a quality message.

In addition, in the current study the style of peer instruction limited the experience to only a select group of students. In contrast, a study by Stock (3) used a pairing or

“buddy system” to enhance the experience to a greater number of students over a longer period of time. In future school-based peer-led health and wellness programs, the buddy system may be an alternative method to reach a larger audience with a decreased demand for one-on-one training of peer leaders and an increase in the number of students experiencing the peer leader role.

Future Peer-led Programs

Recommendations for future peer-led program design include: 1) revise the leadership training in content and delivery, 2) increase professional support to peer leaders following each classroom intervention, 3) evaluate the selected activities for gender differences, and 4) create smaller group to leader ratios to facilitate a more intimate learning environment. It would have been beneficial for the researcher to have available time with each leader group immediately following each class intervention to provide feedback and encouragement. These modifications may have improved the quality of successive classes and leader confidence. Unfortunately, program logistics did not allow sufficient time between each of the three classes.

The results of this study showed that use of peers in education may provide a unique channel to impact the lifestyle habits of school-age children. Additional comparative research between peer-led and adult-led instruction is recommended.

CHAPTER VI

SUMMARY

Statement of Problem

As outlined in a recent Position Paper of the American Dietetic Association (ADA), Society of Nutrition Education (SNE), and American School Food Service Association (ASFSA), the need for effective strategies to change consumption behaviors of children with a clear message, multiple strategies that reinforce the message, and increase in the intensity and time of content with a theoretical framework is needed in the school environment (51). In today's schools peer teaching is not routinely utilized and often not considered as an effective approach to meeting academic goals. However, recent studies have demonstrated promising results using peer education for high risk health behaviors that currently overlap into diet and health related issues (45). One aspect facing our society is the impact of unhealthy eating habits established in youth and its contribution to the increased incidence in childhood obesity. Breakfast habits may be associated with more healthful body weights in children and adolescents with provided guidance to the most healthful choice (29, 31, 32).

Hypotheses

A nutrition education program for elementary students on the importance of breakfast was developed and implemented with peer led instruction to demonstrate an

increase in basic nutrition knowledge among second graders and improve peer leader knowledge and attitude toward good nutrition and the importance of eating breakfast daily. Following statistical analysis, the students nutrition knowledge demonstrated an increase in score although not significantly when compared as a total group or by classroom. It was clearly demonstrated that the program was a positive experience for all peer leaders, second graders, and teachers involved.

Implications and Future Study

There is a need for novel nutrition intervention approaches for our youth. This study demonstrated a peer-led program that was successfully implemented into the elementary school setting with positive feedback from teachers and students. As this was a pilot study of limited size and demographics, an increased size and broadened population base is recommended to study overall effectiveness and applicability. Additional studies should include a control group led by a classroom teacher to compare teacher-led nutrition interventions with peer-led intervention.

Future investigation on the long-term effects of the peer educators would be beneficial. This uniquely trained group of student leaders has the potential to reinforce learning through ongoing positive contact with their peers. A method to incorporate these trained peer leaders in future activities may be beneficial for the ongoing encouragement, mentoring, and motivation of students throughout the school year.

REFERENCES

1. Hedley AA, Ogden CL, Johnson CL, Carroll MD, Curtin LR, Flegal KM. Overweight and obesity among US children, adolescents, and adults. *JAMA*. 1999-2002; 291:2847-2850.
2. Shiner M. Defining peer education. *J Adolesc*. 1999;22:555-566.
3. Stock S, Miranda C, Evans S, Plessis S, Ridley J, Yeh S, Chanoline J. Healthy buddies: a novel, peer-led health promotion program for the prevention of obesity and eating disorders in children in elementary school. *Pediatrics*. 2007;120:1059-1068.
4. Ohio Department of Education. 2006-2007. [www.ode.state.oh.us/report card](http://www.ode.state.oh.us/reportcard). Accessed April 8, 2008.
5. Training of Trainers Manual. Youth Peer Education Toolkit. 2005. United Nations Population Fund and Youth Peer Education Network (Y-PEER). New York, NY.
6. Bandura A. Self efficacy in changing societies. Cambridge University Press. 2008. pgs 202-232.
7. Fishbein M, Ajzen I. Belief, attitude, intention and behavior: An introduction to theory and research. Reading, MA: Addison-Wesley. 1975. pgs 22-54.
8. Alaimo K, Olson C, Frongillo E. Food insufficiency and American school-aged children's cognitive, academic, and psychosocial development. *Pediatrics*. 2001;108:44-53.
9. Stevens J, Cornell D, Story M, French S, Levin S, Becenti A, Gittelsohn J, Going S, Reid R. Development of a questionnaire to assess knowledge, attitudes, and behaviors in American Indian children. *Am J Clin Nutr*. 1999;69(Suppl):773S-781S.
10. Position of the American Dietetic Association: Local support for nutrition integrity in schools. *J Am Diet Assoc*. 2006;106:122-133.
11. Nader PR, Sellers DE, Johnson CC, Perry CL, Stone EJ, Cook KC, Babchuk MS, Luepker RV. The effect of adult participation in a school-based family intervention to improve children's diet and physical activity: The Child and Adolescent Trial for Cardiovascular Health. *Prev Med*. 1996;25:455-464.

12. Celebuski C, Farris E, Carpenter J. Nutrition Education in Public Elementary and Secondary Schools. National Center For Education Statistics Statistical Analysis Report. Washington DC: US Dept of Education. Office of Education Research and Improvement. NCES. 96-852; July 1996:1-57.
13. Contento L, Balch G, Bronner Y. The effectiveness of nutrition education and implications for nutrition education policy, programs and research: a review of research. *J Nutr Educ*. 1995:284-318.
14. Lytle LA, Seifert S, Greenstein J, McGovern P. How do children's eating patterns and food choices change over time? Results from a cohort study. *Am J Health Promot*. 2000;14(4):222-28.
15. Gleason P, Suitor C. Children's diets in the mid-1990s: Dietary intake and its relationship with school meal participation. U.S. Department of Agriculture, Food and Nutrition Service, Office of Analysis, Nutrition and Evaluation. Alexandria, VA: 2001. Available at: <http://www.fns.usda.gov/oane>. Accessed April 7, 2008.
16. Haines PS, Guilkey DK, Popkin BM. Trends in breakfast consumption of US adults between 1965 and 1991. *J Am Diet Assoc*. 1996; 96:464-470.
17. Siega-Riz AM, Popkin BM, Carson T. Trends in breakfast consumption for children in the United States from 1965 to 1991. *Am J Clin Nutr*. 1998;67:(Suppl)48S-56S.
18. Butcher-Powell LM, Bordi P, Borja M, Cranage D, Cole C. Factors affecting breakfast intake in children. *Topics in Clin Nutr*. 2003;18(2):130-135.
19. Cohen B, Evers S, Manske S, Bercovitz K, Edward HG. Smoking, physical activity and breakfast consumption among secondary school students in a southwestern Ontario community. *Can J Public Health*. 2006;94:41-44.
20. Reddan J, Wahlstrom K, Reicks M. Children's perceived benefits and barriers in relation to eating breakfast in schools with or without Universal School Breakfast. *J Nutr Educ Behav*. 2002;34(1):47-52
21. Haruki T, Kawabata T. Factors related to breakfast eating behavior among elementary school children. *Nippon Kosho Eisei Zasshi*. 2005; 52(3):235-245.
22. Teachers perceptions of the school breakfast program 2003 survey, February 2004. Available at www.endhungerct.org. Accessed April 10, 2008
23. Tapper K, Murphy S, Lynch R, Clark R, Moore GF, Moore L. Development of a scale to measure 9-11 year-olds' attitudes towards breakfast. *Eur J of Clin Nutr*. 2007. online pub march.

24. Affenito S. Breakfast: a missed opportunity. *J Am Diet Assoc.* 2007;107(4):565-569.
25. Wilson NC, Parnell WR, Wohlers M, Shirley PM. Eating breakfast and its impact on children's daily diet. *Nutr Diet.* 2006; 63:15-20.
26. Kelder S, Hoelscher DM, Barroso CS, Walker JL, Cribb P, Hu S. The CATCH Kids Club: a pilot after-school study for improving elementary students' nutrition and physical activity. *Publ Health Nutr.* 2005; 8(2):133-140.
27. Friedman BJ, Hurd-Crixell SL. Nutrient intake of children eating school breakfast. *J Am Diet Assoc.* 1999;99:219-221.
28. Crepinsek MK, Singh A, Bernstein LS, McLaughlin JE. Dietary effects of universal-free school breakfast: Findings from the evaluation of the school breakfast program pilot project. *J Am Diet Assoc.* 2006;106:1976-1803.
29. Nicklas TA, Morales M, Linares A, Yang SJ, Baranowski T, De Moor C, Berenson G. Children's meal patterns have changed over a 21-year period: The Bogalusa Heart Study. *J Am Diet Assoc.* 2004;104:753-761.
30. Cho S, Dietrich M, Brown CJP, Clark CA, Block G. The effect of breakfast type on total daily energy intake and body mass index: Results from the Third National Health and Nutrition Examination Survey (NHANES III). *J Am Col Nutr.* 2003;22(4):296-302.
31. Rampersaud GC, Pereira MA, Girard BL, Adams J, Metz J. Breakfast habits, nutritional status, body weight, and academic performance in children and adolescents. *J Am Diet Assoc.* 2005;105:743-760.
32. Fiore H, Travis S, Whalen A, Auinger P, Ryan S. Potentially protective factors associated with healthful body mass index in adolescents with obese and nonobese parents: a secondary data analysis of the third national health and nutrition examination survey, 1988-1994. *J Am Diet Assoc.* 2006; 106:55-64.
33. Kleinman RE, Hall S, Green H, Korzec-Ramirez D, Patton K, Pagano ME, Murphy JM. Diet, breakfast, and academic performance in children. *Ann Nutr Metab.* 2002;46 S 1:24-30.
34. Wesnes KA, Pincock C, Richardson D, Helm G, Hails S. Breakfast reduces declines in attention and memory over the morning in schoolchildren. *Appetite.* 2003;41:329-331
35. Murphy JM, Pagano ME, Nachmani J, Sperling P, Kane S, Kleinman RE. The relationship of school breakfast to psychosocial and academic functioning: cross-sectional and longitudinal observation in an inner-city school sample. *Arch Pediatr Adolesc Med.* 1998;152(9):899-907.


36. Pollitt E, Mathews R. Breakfast and cognition: an integrative summary. *Am J Clin Nutr*. 1998;67(suppl):S804-S813.
37. Vaisman N, Voet H, Akivis A, Vakil E. Effect of breakfast timing in the cognitive functions of elementary school students. *Arch Pediatr Adolesc Med*. 1996;150:1089-1092.
38. Mahoney CR, Taylor HA, Kanarek RB, Samuel P. Effect of breakfast composition on cognitive processes in elementary school children. *Physiol Behav*. 2005;85(5):635-645.
39. Lindsey, BJ. Peer education: view point and critique. *J Am College Health*. 1997; 45:187-189.
40. Savoie K. Experiential-based learning and peer teaching boost elementary students' calcium intake. *J Extension*. 2006. Available at: <http://www.joe.org/joe/2006december/iw4.shtml>. Accessed March 10, 2008.
41. Birch LL. Effects of peer models' food choices and eating behaviors on preschoolers' food preferences. *Child Dev*. 1980;51:489-496.
42. Hawes H. Child-to-child: another path to learning. UIE Monograph 13. Hamburg, Germany. 1988.
43. Story M, Lytle A, Birnbaum S, Perry C. Peer-led, school-based nutrition education for young adolescents: feasibility and process evaluation of the TEENS Study. *J School Health*. 2002;72:121-127.
44. Walker SA, Avis M. Common reasons why peer education fails. *J Adolesc*. 1999; 22:573-577.
45. Turner G. Peer support and young people's health. *J Adolesc* 1999; 22:567-575.
46. Backett-Milburn K, Wilson S. Understanding peer education: insights from a process evaluation. *Health Education Research*. 2000;15:85-96.
47. Lytle LA, Perry CL. Applying research and theory in program planning: an example from a nutrition education intervention. *Health Promotion Practice*. 2001;2:68-80.
48. Anliker JA, Drake LT, Pacholski J, Little W. Impacts of a multilayered nutrition education program: teenagers teaching children. Soc for Nutrition Education. 1993;25:140-143.
49. Mellanby A, Rees J, Tripp J. Peer-led and adult-led school health education: a critical review of available comparative research. *Health Education Research*. 2000;15:533-545.

50. Waggoner S. Garbology study in fulfillment of Honors requirements for anthropological research methods taught by Dr Carolyn Behrman, Associate Professor of Anthropology, University of Akron. Spring 2007.
51. Position of the American Dietetic Association, Society for Nutrition Education, and American School Food Service Association-Nutrition Services: An essential component of comprehensive school health programs. *J Am Diet Assoc.* 2003;103:505-514.
52. Chen S, Sekine M, Hamanishi S, Wang H, Gaina A, Yamagani T and Kagamimari S. Lifestyles and health-related quality of life in Japanese school children: a cross-sectional study. *Prev Med.* 2005;40:668-678.
53. Winder L. The relationship between peer tutoring and disruptive behavior of second grade students. Tempe, Az:Joint Annual Conference of the Rocky Mountain Educational Research Association and the Arizona Educational Research Organization.; 1990. ERIC Document Reproduction Service ED326314. Accessed 02/16/2009.
54. Healthy Kids-Child Health Center for Disease Control and Prevention. Available at <http://www.cdc.gov/od/oc/childhealth/>. Accessed 01/08/2008.
55. Berkey CS, Rockett HR, Gillman MW, Field AE, Colditz GA. Longitudinal study of skipping breakfast and weight change in adolescents. *Int J Obes Relat Metab Disord.* 2003;27:1258-1266.

APPENDICES

APPENDIX A

UNIVERSITY OF AKRON INSTITUTIONAL REVIEW BOARD APPROVAL



November 28, 2007

Bette Klein
13114 Snowville Road
Brecksville, Ohio 44141

Ms. Klein:

Your protocol entitled "*Impacts of a Peer-Led Nutrition Intervention Project for Second Graders*" was determined to be exempt from IRB review on November 27, 2007. The IRB application number assigned to this project is 20071128. The protocol represents minimal risk to subjects and matches the following federal categories for exemption:

☒ **Exemption 1** - Research conducted in established or commonly accepted educational settings, involving normal educational practices.

☒ **Exemption 2** - Research involving the use of educational tests, survey procedures, interview procedures, or observation of public behavior.

☐ **Exemption 3** - Research involving the use of educational tests, survey procedures, interview procedures, or observation of public behavior not exempt under category 2, but subjects are elected or appointed public officials or candidates for public office.

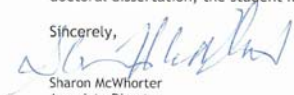
☐ **Exemption 4** - Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens.

☐ **Exemption 5** - Research and demonstration projects conducted by or subject to the approval of department or agency heads, and which are designed to study, evaluate, or otherwise examine public programs or benefits.

☐ **Exemption 6** - Taste and food quality evaluation and consumer acceptance studies.

Annual continuation applications are not required for exempt projects. If you make changes to the study's design or procedures that increase the risk to subjects or include activities that do not fall within the approved exemption category, please contact the IRB to discuss whether or not a new application must be submitted. Any such changes or modifications must be reviewed and approved by the IRB prior to implementation.

Please retain this letter for your files. If the research is being conducted for a master's thesis or doctoral dissertation, the student must file a copy of this letter with the thesis or dissertation.

Sincerely,

Sharon McWhorter
Associate Director

☒ Approved consent forms attached

Cc: Deborah Marino, Advisor
Rosalie Hall, IRB Chair

Office of Research Services and Sponsored Programs
Akron, OH 44325-2102
330-972-7666 • 330-972-6281 Fax

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APPENDIX B

AKRON PUBLIC SCHOOLS RESEARCH COMMITTEE APPROVAL



Administration Building ▼ 70 N. Broadway ▼ Akron, Ohio 44308
(330) 761-1661 Fax (330) 761-3225 Fax (330) 761-3223

December 18, 2007

Bette Klein, RD, LD
13114 Snowville Rd.,
Brecksville, Ohio 44141

Dear Ms. Klein:

Of those who responded, the Akron Public Schools' (APS) Research Proposal Review Committee has granted approval to conduct a research project entitled: **"Impacts of a Peer-Led Nutrition Intervention Project for Second Graders"** at Mason Elementary School. Approval is given with stipulations:

The Research Committee's stipulations are:

- Parent Consent letters are required.
- Students must volunteer to participate.
- Disclaimer on all pages of the questionnaires (Pre and Post) concerning APS.
- Questionnaire should not be completed during instruction time.
- Information obtained without any new or additional programming on the part of our Information Services Department.
- All state, federal and Akron Public School guidelines are to be followed.
- **No identification of participants, school, the Akron Public School system, or other identifiable information revealed in any report or publication resulting from this research project.**
- Upon completion of the project, a copy of the study/research results must be provided to the Department of Testing, Research and Evaluation, Akron Public Schools, Administration Bldg., Room 101, 70 N. Broadway, Akron, OH 44308 as well as to the principal of Mason Elementary School.

Please present a copy of this letter of approval to the building principal as you begin your research.

If you need additional information, please do not hesitate to contact me at 761-2817.

We appreciate your interest and involvement with the Akron Public Schools.

Sincerely,

Ellen Goggins, Ph.D., Director
Testing, Research and Evaluation

EG:pka

Cc: Patricia Agble, Bernie Burchett, John Dawson, Debra Foulk, Connie Hathorn, Sue Long, Mary Outley-Kelly, and Stephanie Churn (Mason).

APPENDIX C

PARENTAL CONSENT FORM



School of Family and Consumer Sciences
Akron, OH 44325-6103
(330) 972-7721 Office
(330) 972-4934 Fax Kids Teaching Kids About Breakfast

- 1) Your child is one of seven fifth grade students selected by their teachers as a good role model and leader to participate in a research project being conducted by Bette Klein a graduate student in the Department of Family and Consumer Science at The University of Akron.
- 2) The study is designed to learn more about ways to teach children about eating healthy.
- 3) Your child will be required to come to school by 7:45 am for up to 5 times during the months of January and February. Your child will be asked to help evaluate the typical foods second graders eat for breakfast. They will also be asked to help teach a class to second graders on the importance of breakfast.
- 4) They will be provided with training at all stages of the project.
- 5) By participating in this study your child may learn more about their own nutrition and develop stronger leadership skills.
- 6) By giving your permission your child may still decide not to participate, as this is totally voluntary. Your child will be given their own form for permission. Your child can also change their mind later and want to stop.
- 7) All information gathered will be kept confidential in a secure location and only the researcher will have access to the information. Your child will not be individually identified in any written material.
- 8) If you have any questions about this study, you may call Bette Klein at 330-256-0048. This project has been reviewed and approved by The University of Akron Institutional Review Board. If you have any questions about your rights as a research participant, you may call the IRB at (330) 972-7666.
- 9) Signing your name at the bottom means that you permit your child to be in this study. You will be given a copy of this form to keep.

Parent/Legal Guardian Signature

Parent/Legal Guardian Signature

Name of Child

Date

* This is a voluntary project and the findings from this study in no way represent the philosophy of the school district.

The University of Akron is an Equal Education and Employment Institution

APPENDIX D

STUDENT CONSENT FORM



School of Family and Consumer Sciences

Akron, OH 44325-6103

330-972-7721 Office

330-972-4934 Fax

Kids Teaching Kids About Breakfast

1. My name is Bette Klein. I am a graduate student in the Department of Family and Consumer Science at The University of Akron.
2. I am asking you to take part in a research study because I am trying to learn more about ways to teach children about eating healthy
3. If you agree to be in this study it will require you to come to school by 7:45 am 4 or 5 times during the months of January and February. You will be asked to help evaluate the typical foods second graders eat for breakfast. You will also be asked to help teach a class on the importance of breakfast to a second grade class.
4. You will be provided with training at all stages of the project by myself and other students at the University of Akron.
5. Please talk this over with your parents before you decide whether or not to participate. I will also ask your parents to give their permission for you to take part in this study. But even if your parents say "yes" you can still decide not to do this.
6. If you don't want to be in this study, you don't have to participate. Remember, being in this study is up to you and no one will be upset if you don't want to participate or even if you change your mind later and want to stop.
7. You can ask any questions that you have about the study. If you have a question later that you didn't think of now, you can call me at 330-256-0048.
8. Signing your name at the bottom means that you agree to be in this study. You will be given a copy of this form to keep.

Name of Subject

Age

Signature

Date

The University of Akron is an Equal Education and Employment Institution

APPENDIX E

VISUAL FOOD MONITORING FORM

Date: _____

Evaluator: _____

Key for indicating amount of food eaten:

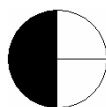
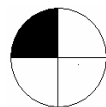
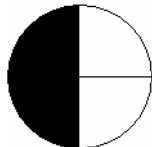
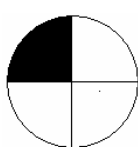
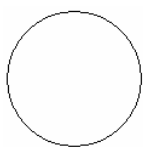
Ate All

$\frac{3}{4}$ Eaten

$\frac{1}{2}$ Eaten

$\frac{1}{4}$ Eaten

None Eaten



VALUE

5

4

3

2

1

Pop Tart

4 ounces Orange Juice

8 ounces 2% Milk

Pop Tart

4 ounces Orange Juice

8 ounces 2% Milk

APPENDIX F

OPEN-ENDED QUESTIONS FOR LEADERS EXPLORING

THE ROLE OF BREAKFAST

1. How does the intake seen on the bar graph compare to the daily needs for calories, protein, fat, calcium, Vitamin C, iron and fiber?
Are there any gaps in a nutrient?
What food is a good source of this nutrient?
Is there any nutrient that looks excessive?
2. What if breakfast is skipped?
Explore the detective's association with energy, attentiveness in school, hunger and emotions.
3. If breakfast is skipped how can they meet their needs?
Explore if detectives correlate the loss of intake with over eating later.
4. What are common reasons why breakfast is not eaten?
Too tired/not enough time/don't like foods offered/already ate at home/feel too fat already/not important
5. Why is breakfast important?
Explore relationship with energy, growth, learning,

APPENDIX G

PRE-AND POST-TESTING OF SECOND GRADERS

Second Grade

Pre/Post Test

Assigned Number _____

Boy ____ **Girl** _____

Date _____

Pre and Post Testing

To be read out loud by the teacher.

The following is a list of statements related to nutrition and breakfast. For each statement, circle yes if you agree or No if you don't agree.

Yes No 1) Eating breakfast will help me grow and be stronger.

Yes No 2) Eating breakfast is important to me

Yes No 3) Watching TV makes me want to eat the foods I see.

Yes No 4) If I stay up late I'm too tired to eat breakfast.

Yes No 5) I make my own breakfast.

Yes No 6) I never have time for breakfast.

Yes No 7) Eating breakfast gives you energy to run, play and learn.

Yes No 8) I go to bed by 9:00 on school nights

Yes No 9) Second graders need to get a lot of sleep..

Yes No 10) It's OK to skip breakfast

11) If I don't eat breakfast I feel _____ (circle the face below)



12) Eating breakfast will _____ (circle all that apply)

- a. Make me fat
- b. Help me grow
- c. Help me learn
- d. Make me sleepy

13) I learn the MOST about what to eat from _____. (Circle one choice)

School TV My friends My parents

14) I eat breakfast. (Circle one answer)

- a. 6-7 days/week
- b. 3-5 days/week
- c. 1-2 days/week
- d. 0 days/week

15) If I don't eat breakfast it is because. (Circle any that apply)

I am too tired
 Not enough time
 No food in the house I like
 I don't like school breakfast

16) My usual breakfast foods are. (Circle all that apply)

Pop tarts	Cereal	Rice
Fruit Juice	Milk	Banana
Eggs	Donut	Pop
Other food please list _____		

17) How many times per day do you drink milk

None One Two Three Four More

APPENDIX H

FIFTH GRADE LEADER EVALUATION FORM

Thank you for your support and the enthusiasm you have given to this project. Your thoughts and ideas are important. Please complete this report as you are able. Circle the response that best represents your feelings

Since helping with this activity:

I am more aware of the importance of good nutrition.	YES	NO
I eat breakfast more often.	YES	NO
I am making healthier meal and snack choices.	YES	NO
I am more aware of the effect I can have on others.	YES	NO
I learned new skills	YES	NO
I have less confidence in talking with others	YES	NO
Being a Breakfast Detective was fun.	YES	NO
I would like to do more of these activities	YES	NO

What I enjoyed most about being a Breakfast Detective. Check all that apply. Circle your favorite activity.

The plate waste study

Working with the second graders

Teaching in the classroom

What I enjoyed least about being a Breakfast Detective. Check all that apply. Circle your least favorite activity.

The plate waste study

Working with the second graders Teaching in the classroom

Please share any future ideas for teaching second graders_____

APPENDIX I
TIMELINE OF ACTIVITIES

5/2/2008: Met with teacher selected leaders, provided with permission forms

5/5/2008: Permission forms returned

5/6/2008: First leadership training meeting

5/9/2008: Second leadership training meeting

5/12/2008: Plate Waste Study (Breakfast)

5/16/2008: Third leadership training meeting/breakfast analysis results shared
Pretesting of second grader classrooms

5/19/2008: Leaders rehearsed class activities

5/20/2008: Classroom Intervention: Lesson 1

5/21/2008: Classroom Intervention: Lesson 2

5/22/2008: Classroom Intervention: Lesson 3

5/26/2008: Post testing of second grader classrooms
Leader feedback, presentation of certificates
Second grade teacher comments

APPENDIX J

CLASSROOM OBSERVATIONS

Class Intervention 1

Main Objective: The second graders will identify the reasons why eating breakfast is important.

Two topics emphasized were to include eating breakfast gives you the energy to run, jump, play and learn and skipping breakfast may make you feel tired and grumpy.

Action Plan:

1.) Questions for the second graders; Did you eat breakfast? Those children who ate breakfast give examples. Those who did not eat breakfast explore why. Discuss what makes up a good breakfast and why.

2.) Develop a rap or cheer to be performed by small groups of second graders.

Classroom 1 The leaders initially quiet, uncertain how to get class interactive.

Classroom very attentive and interested in leader content. Small groups worked well.

Boys in class did not appear comfortable with rap performance. Girls loved performing.

Classroom 2 The leaders gave a clear message and were organized for the class

however they were not able to control the classroom behavior without continued teacher involvement. Second grade students were very participative however the level of

disruption overshadowed the leaders attempt to deliver their message. The class had a

large number of students with behavior problems. Total loss of control when given rap or

cheer activity. One leader was extremely outgoing with self assurance the second was quiet and needed support when performing independently.

Classroom 3 Very controlled classroom, quiet throughout. No interruptions without handraising. Organized themselves quickly into small groups. Rap performance not as comfortable for boys to perform. The group of 3 leaders stood and talked between themselves instead of better class interaction. One leader more distracted and not as effective in presenting information.

Class Intervention 2

Main objective: The second graders will be able to identify 3 healthy food choices for breakfast from different food groups

Topics emphasized. Food guide pyramid review, include a variety of foods to provide beneficial nutrients(calcium, Vit C, fiber, iron)

Action Plan: Given a stack of nasco food cards, create a healthy breakfast on a paper plate and discuss with your class or group

Classroom 1 Students very engaged in use of food cards. Enjoyed sharing with the class their healthy breakfast and were very accurate on proper categorization of foods into appropriate group and nutrients contained in foods.

Classroom 2 Improvement noted in leader forcefulness and student self control. Students needed a lot of guidance recognizing foods to be placed in appropriate food groupings. Leaders provided positive feedback to students with stickers.

Classroom 3 Very disciplined class behavior. Students displayed organized flow when selected to plan healthy breakfast and share with class. No interruptions and 100% class

attention.. Leaders lacked good planning between themselves. Uncertain roles, missing some expected materials.

Class Intervention 3

Main Objective: The second graders will be able to identify 2 ways to improve their breakfast habits. (Eating regularly- including SBP and including a variety of food groups)

Topics emphasized. Overall review of previous lessons; Why is breakfast important, what does it provide, what are good examples of a healthy breakfast

Activity: Skit; Students role play skipping breakfast and contrast to a day they eat breakfast.

Classroom 1 One leader not in attendance and did not notify other leader. Disrupted initial flow and researcher participated to preserve the content of the lesson.

Classroom 2 The skit took too long and the small groups became too disruptive. The leaders had difficulty controlling the rest of the class when each group presented.

Concerned was not an effective learning environment.

Classroom 3 Leaders not well prepared for activity. Skit was drawn out in students small group. Leaders added a chart for students to complete regarding breakfast.