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# Effects of the National School Meal Option, Provision 2, on Academic Achievement in Literacy and Mathematics

Suzanne Bailey

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EFFECTS OF THE NATIONAL SCHOOL MEAL OPTIONS, PROVISION 2, ON  
ACADEMIC ACHIEVEMENT IN LITERACY AND MATHEMATICS

by

Suzanne Bailey

Dissertation

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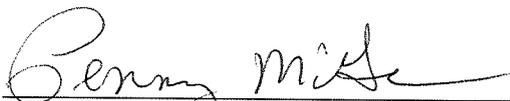
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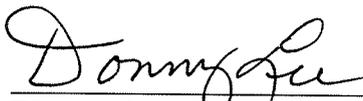
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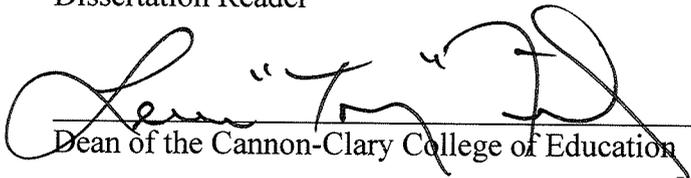
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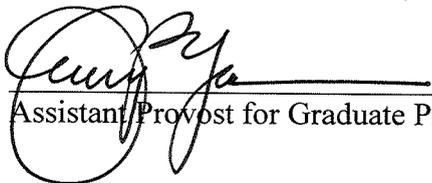
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Dean of the Cannon-Clary College of Education

3/6/14

Date



Assistant Provost for Graduate Programs

3-6-14

Date

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## **ABSTRACT**

by  
Suzanne Bailey  
Harding University  
December 2013

Title: Effects of the National School Meal Option, Provision 2, on Academic Achievement in Literacy and Mathematics (Under the direction of Dr. Michael Wood)

The purpose of this dissertation was to provide research-based information to educational leaders to assist them in making informed decisions relating to the participation in the National School Lunch Special Assistance Provision 2 Meal Option in the state of Arkansas. This study consists of four, rural Arkansas elementary schools that are all at a 70% or higher free-reduced meal status for the qualifying student population. Data were collected from the 2010 ACTAAP test scores from 193 Grade 4 students in literacy and mathematics from the four Arkansas elementary schools. Demographics from the four elementary schools were similar based on free-reduced meal status, race, gender, and overall student population to assist in determining relevancy of the study.

This study used a casual comparative strategy and used a 2 x 2 factorial analysis of variance to analyze the data collected for each of the four hypotheses. The results of the study showed no significant interaction effects between Provision 2 and gender or race on literacy or mathematics. However, the main effects of gender and race on literacy were significant. In addition, the main effect of gender on mathematics was not significant but was significant for race. Therefore, the data indicated that future studies

might investigate more in the area of girls performing better compared to boys in the area of literacy and mathematics for fourth-grade students whether the school participated in Provision 2 or did not participate. In addition, Black students scored higher compared to the White students in both participating Provision 2 schools and non-participating schools for literacy and mathematics. The participating Provision 2 females outscored their peers and the boys from both races in literacy and mathematics.

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## **CHAPTER I**

### **INTRODUCTION**

Adequate nutrition is a prerequisite to all forms of learning (Maslow, 1987). If physiological needs are not being met, esteem needs such as those satisfied by academic learning will not occur. Students that are attending school and are not receiving nutritious meals have difficulty concentrating. They are lethargic and respond slowly to instructions. According to the National School Boards Association (2003), fostering academic achievement is the primary responsibility of schools. Schools can accomplish this task through paying attention to student health and providing a high-quality instructional program. Nevertheless, how are schools fostering the unmet needs of the child's health and well-being? Healthy, well-nourished children are more prepared to learn and have more opportunities that are educational. Students who eat healthy meals are better prepared to learn (Gunderson, 1971). When school systems provide free meals to students, academics increase. Students that are struggling with mathematics and have difficulty reading may be suffering from poor nutrition (Dawson, 2004). Chronic illness and factors such as hunger, physical and emotional abuse can lead to poor school performance (Centers for Disease Control and Prevention, 2011).

According to Maslow (1987), people are motivated to meet their immediate physical needs before any other needs become a necessity or a priority. Poor nutrition impedes academic achievement and success. Anemic students tend to have lower

vocabulary and reading scores. Children who suffer from poor nutrition during the brain's most formative years have lower test scores and less general knowledge (Gordon, 2011). Lowest student achievement scores were from fourth-grade students with the lowest amount of protein in their diets (American School Food Service Association, 1989). Vocabulary fluency is reduced in children that have unmet needs at a physiological level. Such basic needs as air, water, food, and shelter must be met in order for children to be able to feel good about themselves and begin to self-actualize (Maslow, 1987).

Weinreb et al. (2002) reported that hunger continues to be a national problem for children. Encouraging healthy behaviors in students is part of the mission of school systems. Equipping students with the skills and knowledge needed to make healthy choices can increase their ability to learn, reduce absenteeism, and improve physical fitness and mental alertness (Allington, 2007). According to Principal Les Taylor at Wakefield Elementary School in Little Rock, Arkansas, students are hungry when they are at school and tend to worry about their meals, and this affects their performance (Baccam, 2011).

The United States Department of Agriculture (USDA) reported that schools that have a high percentage (70%+) of students that qualify for free and reduced priced meals, can apply for free breakfast and lunches for all students. This policy is referred to as the National Provision 2 Meal Special Assistance Alternative, which is an option that school districts can choose to participate and serve reimbursable school meals to all students at no charge. School districts that have a high poverty of 80-90% find that Provision 2 is feasible due to a large portion of the student population already qualifying for free meals.

This option constitutes a 4-year cycle with lost revenues of uncollected fees recovered through economies of scale and increased participation in the school meal program.

Provision 2 allows for a climate that provides all students equal status within the school environment and the cafeteria (USDA, 2009). Advantages for school districts that decide to choose the Provision 2 option will have reduced paperwork, streamlined meal service, administrative savings and increased participation in the breakfast and lunch programs. Paperwork is reduced because of the district only collects meal applications in the base year (Year 1) of the 4-year cycle. Schools no longer need cashiers, lunch tickets or pin numbers. Moreover, total meal counts are needed for Provision 2. In effect, food personnel can spend more time on food preparation and less time on paperwork items. With all students being able to eat breakfast and lunch at no charge, it follows that student meal participation increases (Food Research & Action Center, 2011).

School systems may also opt to participate in the Co-Pay option. This option allows districts to pay the co-pay for students that qualify for reduced price meals because poverty is an issue, and understanding that families with an income of 131% to 185% of poverty is important to consider in Arkansas reduced-price meal student data (Arkansas Department of Education, 2009). There are students that do not eat meals at school because parents are not able to afford the cost of a school meal. Green Forest Public Schools, a district in northwest Arkansas, found that through serving reduced students meals without charge when the family income is between 131% and 185% of the poverty income level, students can concentrate better on their schoolwork without being hungry. Student charges have been reduced and the amount of uncollected meal charges has declined. More free and reduced meal applications are being returned to the school

system with more families being able to be served food assistance. According to a 2008-2009 report from the USDA, 70-80% of students qualify for free meals in the state of Arkansas.

### **Statement of the Problem**

The purposes of this study were four-fold. First, the purpose of this study was to determine the effects by gender of two schools that participate in the Provision 2 Meal Option versus two schools that do not participate in the meal program on literacy achievement measured by the Arkansas Comprehensive Testing Assessment and Accountability Program for fourth-grade students in four Arkansas public elementary schools. Second, the purpose of this study was to determine the effects by race of two schools that participate in the Provision 2 Meal Option versus two schools that do not participate in the meal program on literacy achievement measured by the Arkansas Comprehensive Testing Assessment and Accountability Program for fourth-grade students in four Arkansas public elementary schools. Third, the purpose of this study was to determine the effects by gender of two schools that participate in the Provision 2 Meal Option versus two schools that do not participate in the meal program on mathematics achievement measured by the Arkansas Comprehensive Testing Assessment and Accountability Program for fourth-grade students in four Arkansas public elementary schools. Fourth, the purpose of this study was to determine the effects by race of two schools that participate in the Provision 2 Meal Option versus two schools that do not participate in the meal program on mathematics achievement measured by the Arkansas Comprehensive Testing Assessment and Accountability Program for fourth-grade students in four Arkansas public elementary schools.

## **Background**

The National School Lunch Program provides student meals in over 101,000 schools and residential facilities as well as providing nutritional meals to students before school and after school. One of the largest federal funding programs to schools is school nutrition programs. Nutrition programs total more than \$12 billion in both cash and commodity payments. The National School Lunch Program is the second largest nutritional assistance program in the nation after the Food Stamp Program. In 1946, Congress passed the National School Lunch Act to provide federal funding to school lunch programs and improve nutrition for children. This Act has expanded to include free and reduced summer meal programs, breakfast programs, after-school snacks, and milk for those students that qualify to receive them. According to the United States Department of Agriculture (2011a), “in the fiscal year of 2010, 70.9 percent of federal school lunch funds financed school lunches and snacks, while 20.8 percent financed school breakfasts, 8.2 percent financed optional commodities, and less than 1 percent financed school milk programs” (para. 7). The Commodity Donation Program of 1936 was created to support commodities to schools for student meals who could not afford them.

One in five children in 2008 was eligible to receive free school meals, and 1 million children living in poverty do not get a free school meal (O’Brien, 2008). According to a 2008-2009 report from the USDA (2009), 70-80% of students qualify for free meals in the state of Arkansas. Free or reduced price lunch enrollment figures are used by researchers often in determining poverty at the school level and in determining a school’s eligibility for Title I funds. Free or reduced price lunch figures are also used to

determine low-income status of a student subgroup and whether that subgroup is making Adequate Yearly Progress under No Child Left Behind (USDA, 2011b). Wisconsin State Superintendent, Elizabeth Burmaster, (2009) reported that poverty works against children, and in many cases makes learning in school difficult. Families that do not have enough food to eat are more likely to have children who will repeat a grade in school and have low-test scores (Gordon, 2011). In other words, food insecurity weakens scholastic achievement. Normal physical and mental development is affected due to lack of necessary nutrients and stress and insecurity on the body lessens a child's desire to attend school and be successful in class (Health News, 2010). School meals help to reduce hunger, increase the ability to learn and improve overall health in children (Food Research & Action Center, 2011).

One in four children receives hot meals only from school (O'Brien, 2008). Breakfast is the most important meal of the day. Behavior and academic problems exist in students at a higher rate when they do not eat breakfast. Schools that allow students to eat their breakfast in the classroom, otherwise known as *Breakfast in the Classroom* have seen an increase in test scores, fewer visits to the nurse, reduced behavior problems, less tardies and more consistent attendance rates (Baylor University, 2012). According to Murphy and Kleinman (2002), researchers from Massachusetts General Hospital in collaboration with the Project Bread and Boston Public Schools have found a direct relationship between child hunger and the participation in school breakfast, along with an improvement in school attendance, emotional functioning and mathematics grades (Project Bread, 2005). Murphy and Kleinman (2002) reported that after implementing a breakfast program; attendance, tardiness, anxiety, and aggression decreased in students.

Schools that provide all students with a free breakfast have an increase in academic performance (Gordon, 2011). Students that tend to be severely undernourished appear to have increased cognitive function when they participate in the school breakfast program (Taras, 2005). When breakfast programs, lunch programs, and snacks are not enough for some students who receive free and reduced meals, Backpack Programs are available to assist students' meal needs over the weekends and breaks. A backpack is filled with nutritional food items that are child-friendly, non-perishable and filled with vitamins (God's Pantry Food Bank, 2011).

An achievement gap exists between students living in poverty and those that do not. A study by the Annie E. Casey Foundation found that children that are poor and read below grade-level by the time they reach Grade 3 are three times as likely to not complete high school as students who have never lived in poverty (Hernandez, 2011). With the passing of the No Child Left Behind Act of 2001 (2002), stated closing the achievement gap between Hispanic and African American students as compared to their non-Hispanic, White peers has become more focused. This attention has led to more interventions being put in place to identify need areas for these minority students ("Achievement gap," 2011). The United States government has attempted to provide academic and nutritional support to students through programs such as Title I and The National School Lunch Program, which began 60 years ago (Nelson, 2006). According to a national report of test scores from boys and girls in fourth, eighth, and 10th-grades, in 2008, from the Center on Education Policy, females are outperforming males in every state in the nation on standardized reading tests, and in Utah, females are outperforming males in mathematics until high school (Winters, 2010). At every level on standardized tests of reading

comprehension, most boys score lower than girls do in almost every country where tested (Boltz, 2011). The National Center for Education Statistics in 2003 indicated that females performed better than males on standardized achievement tests in the areas of spelling, literacy, writing, and general knowledge. Males tend to show improvement and advancement compared to females after Grade 4 in the areas of mathematics and science (Zembar & Blume, 2011). According to the National Assessment of Educational Progress in 2007, Black fourth graders scored, on average, 27 points lower than Whites on a 0-500 scale. The gap did not change at the eighth-grade level. The Black-White gap in mathematics among fourth graders has narrowed since 1990, Blacks still scored 26 points lower than Whites in 2007 (Jarriels, 2009). According to Fryer and Levitt (2004), Hispanic students do not experience as wide a gap as the Black students when being compared to the White students, because they tend to have lower scores initially and have difficulty with the English language.

### **Hypotheses**

The initial review of the literature suggested that students who receive healthy nutritional meals at school score better on achievement tests. However, for this study, the following null hypotheses were generated.

1. No statistically significant difference will exist by gender for fourth-grade students in four Arkansas public elementary schools who are exposed to two schools that participate in the Provision 2 Meal Option compared to two schools that do not participate in the meal program on literacy achievement measured by the Arkansas Comprehensive Testing Assessment and Accountability Program.

2. No statistically significant difference will exist by race for fourth-grade students in four Arkansas public elementary schools who are exposed to two schools that participate in the Provision 2 Meal Option compared to two schools that do not participate in the meal program on literacy achievement measured by the Arkansas Comprehensive Testing Assessment and Accountability Program.
3. No statistically significant difference will exist by gender for fourth-grade students in four Arkansas public elementary schools who are exposed to two schools that participate in the Provision 2 Meal Option compared to two schools that do not participate in the meal program on mathematics achievement measured by the Arkansas Comprehensive Testing Assessment and Accountability Program.
4. No statistically significant difference will exist by race for fourth-grade students in four Arkansas public elementary schools who are exposed to two schools that participate in the Provision 2 Meal Option compared to two schools that do not participate in the meal program on mathematics achievement measured by the Arkansas Comprehensive Testing Assessment and Accountability Program.

### **Description of Terms**

**Achievement Gap.** Achievement Gap is defined as a matter of race and class. A gap exists across the United States between minority and disadvantaged students and their White counterparts (“Achievement gap,” 2011).

**Backpack Food Program.** God's Food Pantry (2011) defined the Backpack Food Program as a program that provides children with a pack of child-friendly, nutritious food to take home before school dismisses for the weekend or holiday break. It was developed to ensure that every child has access to nutritious food when school is out.

**Base year.** USDA (2009) defined base year as the last school year for which eligibility determinations were made and meal counts by type were taken with all meals served at no charge, or the last year in which a school conducted a streamlined base year period. It is the first year, and is part of the 4-year cycle.

**Breakfast in the Classroom.** Baylor University (2012) defined breakfast in the classroom as students being allowed to have their breakfast meal in the classroom to ensure access for all students to obtain breakfast.

**Commodity Donation Program of 1936.** Gunderson (1971) defined the Commodity Donation Program of 1936 as a program aimed to eliminate price suppressing crop surpluses by distributing excess commodities to schools for meals for students who could not otherwise afford them.

**Co-Pay Option.** Arkansas Department of Education (2009) defined the Co-Pay Option as an option that school districts can chose to participate and pay the reduced co-pay for student meals for those students that qualify for reduced priced meals.

**Economies of Scale.** Food Research and Action Center (2011) defined Economies of Scale as higher meal participation leads to lower per-meal costs.

**Food Stamp Program.** USDA (2011b) defined Food Stamp Program as a means to provide nutrition among low-income families. The Food Stamp Act was passed in 1964 and revised in 1977.

**National School Lunch Program.** USDA (2011b) defined the National School Lunch Program as a federally assisted meal program operating in over 101,000 public and non-profit private schools and residential childcare institutions.

**National School Lunch Act of 1946.** USDA (2011a) defined the National School Lunch Act of 1946 to establish permanently a federally funded school lunch program and improve child nutrition.

**No Child Left Behind Act of 2001.** Arkansas Department of Education (2013a) defined No Child Left Behind Act of 2001 as a reauthorization of the Elementary and Secondary Education Act. The NCLB legislation put in place requirements for public schools in America. It expanded the federal role in education and aimed at improving the education of disadvantaged students. Measures were created to improve student achievement and hold states and schools more accountable for student progress.

**Provision 2.** USDA (2009) defined Provision 2 Meal Option as 4-year cycle participation for schools that serve National School Lunch Program and/or School Breakfast Program meals to all participating children at no charge. Provision 2 offers some reduction of administrative duties in the free and reduced price meal applications and in the determination of household eligibility while eliminating meal counts by type for all but the base year of Provision 2.

**Reduced-Price Eligible Co-Pay.** Arkansas Department of Education (2011b) defined reduced-price eligible co-pay as an option that school districts have if the district decides to cover the co-pay expense for students that qualify for reduced price meals. Districts can now use Arkansas state categorical funding.

**Streamlined Base Year.** USDA (2009) defined streamlined base year as a method for developing claiming percentages (Free, Reduced price and paid), taking meal counts and establishing claims for reimbursement. A streamlined base year is only available when a Provision 2 school has completed at least one standard 4-year cycle, and has applied for, and has been denied, an extension.

**Title I Funding.** Food Research and Action Center (2009) defined Title I Funding as money that is provided to help schools with high percentages of low-income children meet state academic standards. This funding is distributed by school districts to individual schools based on their free and reduced-price percentages.

## **Significance**

### **Research Gaps**

Due to the limited number of school districts that are currently participating in the Provision 2 Meal Option, this gives a limited amount of data to be examined. According to the Arkansas Department of Education Child Nutrition Unit Director, W. Shockey, only 22 school districts in Arkansas currently have chosen to participate in Provision 2 (personal communication, July 20, 2012). School districts must cover the cost of the paying students' lunch and/or breakfast if they participate (USDA, 2009). Small districts struggle with this participation due to other financial obligations and constraints. Elementary schools that have been selected in this study are from the southeast, west, east, and northeast regions of the state of Arkansas.

### **Potential Implication for Practice**

Through researching, investigating, and comparing information on academic achievement from Arkansas elementary schools that participated in the Provision 2 meal

option in 2004 and from the same schools after they participated for five consecutive years in the Provision 2 meal option, school leaders will have data to assist them in making educated and informed decisions. These decisions can be useful in evaluating the effectiveness of the Provision 2 meal option as it relates to student academic achievement. Data will be used and educational leaders will have research-based evidence to use as financial decisions are made and prioritized for meeting the needs of all students. This study can provide statistical data that will distinguish if there is a significant difference in student achievement from schools that participated in Provision 2 and those that do not. The results from the study, if proven significant or not significant, will provide information to school leaders, that are involved in making decisions for students, such as the principals, curriculum directors, food service directors and superintendents. These leaders will have the data to provide support as to whether or not to use district funding to pay for student meals. Results will provide educational information that school leaders can use as they design and decide on curricular schedules for teaching literacy and mathematics. Examining breakfast and lunch schedules and providing more opportunities to meet student hunger needs throughout the school day such as the *Fresh Fruit and Vegetable Arkansas Child Nutrition Grant* and *Breakfast in the Classroom* are two avenues that Arkansas school leaders can take advantage of towards meeting the hunger needs of all students so that students can place more focus on academic learning. School board members will have the data available to assist them in communicating the need to use taxpayer dollars to pay for all students' meals in the school district. The results of this study can have an impact on Arkansas schools as the hunger needs are analyzed to the academic needs of all students.

## **Process to Accomplish**

### **Design**

A quantitative, causal-comparative strategy was used in this 2 X 2 factorial design study. The independent variables for Hypotheses 1 and 3 included participation in the Provision 2 meal program (participation versus non-participation) and gender (male versus female). For Hypotheses 2 and 4, the independent variables included participation in the Provision 2 meal program and race (Black versus White). The dependent variable for Hypotheses 1 and 2 was literacy achievement, and the dependent variable for Hypotheses 3 and 4 was mathematics achievement.

### **Sample**

The study used fourth-grade students from four Arkansas public schools. The schools were chosen based on the criteria including participation in the Provision 2 meal program, school size, ethnicity, teaching methods, program initiatives, Arkansas Comprehensive Testing Assessment and Accountability Program (ACTAAP) test scores, student free/reduced meal participation percentage and other funding sources. School A, a Provision 2 meal option participant for 8 years, had approximately 55% Black students and 41% White students in Grade 4. The percentage for students eligible for free/reduced meals was 99%. Literacy scores from the ACTAAP in 2010 were 71% proficiency or above for combined populations (male/female and Black/White). Mathematics scores from the ACTAAP in 2010 were 58% proficiency or above for combined populations (male/female and Black/White). School B, a non-participant Provision 2 school, had approximately 41% Black students and 52% White students in Grade 4. The percentage of students eligible for free/reduced meals was 76%. Literacy ACTAAP combined

population scores in 2010 were 80% proficiency or above for combined populations (male/female and Black/White). Mathematics ACTAPP scores in 2010 were 84% proficiency or above for combined populations (male/female and Black/White). School C, a Provision 2 meal option participant for 11 years, had approximately 54% Black students and 43% White students in Grade 4. The percentage of students eligible for free/reduced meals was 99%. Literacy ACTAAP scores in 2010 for Grade 4 were 73% proficiency or above for combined population (male/female and Black/White). School D, a non-participant in Provision 2 meal option, had approximately 44% Black students and 52% White students in Grade 4. The percentage of students eligible for free/reduced meals was 78%. Literacy ACTAAP scores in 2010 for Grade 4 were 81% proficiency or above for combined populations (male/female and Black/White). Mathematics ACTAAP scores in 2010 for Grade 4 were 85% proficiency or above for combined populations (male/female and Black/White).

### **Instrumentation**

In the spring of 2012, the students were assessed using the ACTAAP Augmented Benchmark Test. The literature of the Arkansas Department of Education (2011a) asserted the third and eighth-grade Augmented Benchmark Exam contained both norm-referenced (Iowa Test of Basic Skills) and criterion-referenced test items. The reading comprehension subtest scores from the norm-referenced items were used in the analysis for this study. During the fall of 2012, permission to use scores was obtained from schools. Identifiable information was removed, and data were entered into SPSS software.

Scores from the norm-referenced third and eighth-grade reading comprehension subtests were used to measure reading comprehension. The Iowa Test of Basic Skills is a nationally recognized test that allows educators to assess student progress in reading (Arkansas Department of Education, 2011a). The Iowa Reading Comprehension subtest was used to measure students' ability to comprehend reading literary, informational, and functional texts. The students read each selection and then answered a series of questions pertaining to the selection.

According to the Arkansas Department of Education (2013a), the state assessments, including the augmented tests, have been examined and found to be both reliable and valid. They contend the tests have appropriate levels of reliability, validity, and fairness, based on the extensive research supporting both the criterion-referenced and norm-referenced items. They revealed post-equating methods are used to establish uniformity between versions of the test, and a Stratified Alpha method is used to determine reliability. Test designers check each item separately and then combine the items to construct a precise estimate of reliability. Items are weighted accordingly.

### **Data Analysis**

To address the first and third hypothesis, a 2 x 2 factorial analysis of variance (ANOVA) was conducted using participation in the Provision 2 Meal Special Alternative (participation versus non-participation) and gender (male versus female). To address Hypotheses 2 and 4, the independent variables included participation in the Provision 2 Meal Special Alternative and race (Black versus White). The dependent variable for Hypotheses 1 and 3 was literacy achievement, and the dependent variable for Hypotheses

was mathematics achievement. To test the null hypotheses, the researcher used a two-tailed test with a .05 level of significance

## **CHAPTER II**

### **REVIEW OF RELATED LITERATURE**

It is difficult to educate a child who is not healthy, and difficult to keep a child healthy who is not educated (Pickut, 2011). Student academic performance requires proper nutrition in order for the nerve cells in the brain to function properly. Students that fill their diet with unhealthy food choices may lag behind others in academic skills. Children who eat a diet of highly processed food have lower test scores and more behavior problems than their peers that consume healthier food options. Dr. Arthur Agatston, a cardiologist and creator of the South Beach Diet, presented findings that demonstrated that improving the nutritional quality of school meals increased academic performance of students over a 2-year period as well as lowering their blood pressure and weight. This program is being used in seven states. The program stresses more healthy food choice selections available in the school cafeterias and nutrition is a part of the overall school environment such as assemblies, class activities, and healthy food selections being modeled by the adults (Voiland, 2008).

Healthy school meals include those that are filled with mixed-grains and more milk. Healthy foods consist of unprocessed, unrefined, and nutritious food choices that are loaded with vitamins, minerals, antioxidants, and essential fatty acids. Fresh fruits, greens, green and red peppers, tomatoes, asparagus, yams, barley, beans, salmon, sardines, trout, egg whites, nonfat cottage cheese, shellfish, chicken, and turkey breast are

healthy food options (Roizman, 2013). Celebrity Chef, Jamie Oliver, has introduced healthier school lunches that have improved students' test scores and has reduced the number of days students have been absent from school according to the 2004 Feed Me Better campaign (Williams, 2010). Examples of unhealthy food choices are foods that contain refined sugar, saturated fat, or made from primarily bleached flour such as pretzels, chips, cookies, candy, crackers, white bread, muffins, sweetened boxed cereal, lunch meats, hot dogs, sausage, bacon, ham, butter/margarine, fried foods, jerky, soda pop, doughnuts, pie, cake, fettuccine Alfredo, flavored whole milk, and hydrogenated shortening (Cooper, 2013). Vending machines, à la carte food lines, and school stores have become more common and usually contain junk food or unhealthy food options. Schools offering unhealthy food choices in vending machines, à la carte food lines, school stores, and in fundraising efforts have become popular over the years due to inadequate public funding of school meals. The sale of unhealthy food choices are more popular to students and have afforded school districts funding to assist in many school food service budgets that are in a deficit because of low funding for public schools to operate their food service programs. Parents are also allowed to send treats for birthday parties that are high in sugar and fat such as cookies, cakes, pies, candy, and cupcakes. À la carte food lines are usually made up of student choices such as pizza, French fries, and hamburgers.

In 2003, Arkansas became one of the first states to launch what became a massive experiment in school nutrition, requiring schools to improve nutrition and physical activity policies (Raczynski et al., 2009). Changes included removing soda and junk food from elementary school vending machines. The National School Program also regulates a

subset of competitive foods that are known as foods of minimal nutritional value. These foods provide less than 5% of the recommended daily intake of any of eight specified nutrients per serving, and the National School Lunch Program regulations prohibit their sale in foodservice areas during meal times. Examples include soda, gum, and candy. In 2006, Congress mandated that by 2006 every school participating in federally subsidized food programs establish a wellness policy. The wellness policy would include guidelines for all foods available on school campuses (Lytton, 2010).

### **Effects of Poor Nutrition**

Good nutrition supports academic and social development. Children that do not get adequate nutrients have lower test scores, and their academic achievement is negatively affected. Poor nutrition lowers a student's ability to process information and score well on exams (Acevedo, 2008). In recent decades, the availability of unhealthy foods in school settings has increased dramatically. School meals have difficulty competing with unhealthy foods. Unhealthy foods lower student meal participation and compromise student health. Balancing student health and nutrition with affordability is a pressing concern in today's society (Public Health Law Center, 2012). All children are at risk for poor nutrition regardless of socioeconomic status. In a report titled *The Learning Connection from Action for Healthy Kids*, it stated that poor nutrition in children has a negative impact on student achievement.

By including more fresh fruits, vegetables, whole grains, less sugar and saturated fats in school meals, children have shown a decrease in excitability, and they are more alert and able to focus, according to the Nutritional Resource Foundation. Cafeteria food waste has been cut in half from implementing these changes at Whitefish Central School

in Montana. Test scores have also shown increases. Healthy school meals play a significant role in learning and student development (Saul, 2006). According to Gunderson (1971), students who have healthy meals are more prepared to learn and receive more learning opportunities.

Schools can aid in students being able to receive fresh fruits and vegetables through the Arkansas Department of Education Child Nutrition Unit (Arkansas Department of Education, 2011b). Students in elementary grades can receive a snack each school day of fresh fruits and vegetables. This snack is in addition to school meals, not in place of them. Having this snack gives students another opportunity to receive healthy and nutritious foods while also exposing them to a variety of fruits and vegetables that the students may not normally eat at home. Developing these habits early in life can lead to healthier eating choices in adulthood. For a school to qualify to receive funding, the school must meet several requirements: operate the National School Lunch Program, be an elementary school with a combination of Grades K-8, submit an application for participation that meets all criteria, and have 50% or more of the school's students eligible for free or reduced price meals. To the maximum extent possible, the Arkansas Department of Education Child Nutrition Unit selects schools to receive the funding based on the percentage of free or reduced price students, with priority given to schools with the highest percentages of low-income students. Lifelong healthy behaviors are developed when schools play a key role in the promotion of the health and safety of young people. A positive effect exists on academic performance when schools participate in school health programs (Centers for Disease Control and Prevention, 2011).

Child hunger is a hidden problem in the United States (Brown, 2011). Hungry children are disadvantaged children and have difficulty thriving. They fall behind academically and developmentally. These children have trouble focusing and getting along with others. Complaints such as headaches, stomachaches, and other ailments have been reported often in children that are hungry (Second Harvest, 2011). In 2008, more than 16.6 million children were living in a state of food insecurity and nearly 23% of all people affected nationwide (Second Harvest, 2011). School meals help to reduce hunger, improve students learning and overall health (Food Research & Action Center, 2011). In 2010, 48.8 million Americans were living in a state of “food insecurity,” with 16.2 million being children (Farrell, 2012).

Hungry students learn laboriously if at all. Hunger leads to poor school performance for many children. A child’s basic needs, such as receiving food, must be met before any other needs can be satisfied (Maslow, 1987). Hunger is a national problem for children and a concern to educators and parents (Weinreb et. al., 2002). Nearly two-thirds of children in school lunch programs, and up to 90 % of those in breakfast programs, are from low-income families. Low-income children face many challenges obtaining healthy food outside of school due to poverty and food insecurity. They have limited access to stores with healthy fruits and vegetables, as well as other nutritious food. For many low-income children, school meals are the only source of healthy meals they receive each day (Public Health Law Center, 2012). A child’s desire to attend school is lessened when food availability is scarce at home. This scarcity has a negative impact on a child’s academic achievement at school and creates an environment of stress and insecurity (Marcus, 2010).

Children that have food insecurity at home are more likely to score poorly in overall academic performance. Hungry children have developmental impairments that limit their physical, intellectual, and emotional development. Child hunger is an educational problem. Hungry children feel bad and lack energy to be successful in school. Child hunger is a workforce and job readiness problem. Workers who experienced child hunger are not as prepared physically, mentally, emotionally, or socially to perform well in the workplace. Workers who experienced child hunger obtain lower levels of educational and technical skills. Child hunger is linked to absenteeism in children and adults, which is costly to employers and increases health care costs for families and employers (Cook & Jeng, 2013).

Teachers and administrators from the United States explain that students who receive government assisted food programs demonstrate improved behavior and have higher test scores with increases in school attendance (Pediatrics, 2010). Thorough measuring of the effect that healthy food has on student performance may help administrators, educators, and parents push for healthier food choices for school meals (Barack, 2011).

### **School Meals and History**

The first attempt to set up a school lunch program was established in 1853 by the Children's Aid Society of New York (Hinman, 2011). Hot meals were served to students, but the program did not get much attention from other schools. More than 40 years would pass before another program would begin. In 1894, the Starr Centre Association provided fresh milk and social services to the poorest communities in Philadelphia. The *penny lunch* became known at one school and later expanded into other schools within

Philadelphia. It was not until the book *Poverty* was published in 1904 by Robert Hunter that school lunch programs began to increase in urban school systems and Americans would begin to connect the relationship between hungry students, poverty, and their abilities in school.

Hinman (2011) describes the following early American lunch programs:

- In Milwaukee, the Women's School Alliance of Wisconsin prepared meals for families that lived close to schools.
- In 1908, the Women's Educational and Industrial Union transported hot lunches from a system of centralized kitchens to Boston high schools.
- In 1909, The Cleveland Federation of Women's Clubs served meals to children at the Eagle School.
- In 1910, The Chicago Board of Education gave \$1,200 to start an experimental program of serving hot meals to children in six elementary schools.
- In 1911, New York's lunch program expanded after it found that children in the pilot program gained an average of 10.2 ounces each as compared to 3.4 ounces for other children.
- In 1912, Philadelphia's original program expanded into all high schools and was overseen by the newly created Department of High School Lunches.
- In 1921, Los Angeles opened a program for thirty-one elementary schools, eight intermediate schools, and nine high schools.

Schools in rural areas would take longer due to lacking the funding and space to begin meal programs. These concerns, along with childhood malnutrition, gave way to the

creation of school-provided lunch programs and federal assistance to help school systems provide them to children.

The National School Lunch Program provides aide to children by providing funding for proper nutrition. Guidelines for the program are based upon the annual federal poverty level, and households can seek the assistance needed. Before the start of each school year, applications are sent home to households of students that are registered in Grades K-12. Guidelines must be met for families to qualify for free or reduced price meals. A family's household income is the criterion used to determine a child's free or reduced meal status. The National School Lunch Act of 1946 was created to protect the health and well-being of children with a strong correlation between malnutrition and the health of World War II draftees (Estey & Ciambella, 2011). For some students, the school lunch is the only real meal they get each day (EducationBug.org, 2011).

Providing school meals to children alleviates short-term hunger, creates more student concentration and learning, and provides an incentive for school attendance directly to the child (Caldes & Ahmed, 2004). School meals influence learning and increase test scores (Adrogué & Orlicki, 2009). Meals from school need to be high quality and nutritious so that not only the children benefit but the entire climate, culture, and success of the school can benefit (Saul, 2006).

Shortcomings in the school meal program include placing a burden on the schools instead of the parents. Many options are high in fat and calories, sugar, and sodium. Only some school districts can afford to offer healthier options for the children, and even then, many children still pick the less healthy option. Some schools decide to prepare meals

themselves, which can save money and use fresh produce grown locally from farmers (EducationBug, 2011).

### **Effects of School Meals on Literacy Achievement**

School meals are tied to student performance and behavior. It is within a school system's power to increase the participation of students in eating school meals and the nutritional value of the meals provided by the schools' (David, 2009). After eating more fruits and vegetables and lower calorie levels of fats, students were significantly less likely to fail the literacy assessment test. Academic achievement is adversely affected by poor nutrition and costs school systems millions of dollars each year (Idaho Department of Education Child Nutrition Programs, 2012). Student progress in developing specific mathematical skills, along with literacy, could be predicted by following changes over a time in students' food insecurity. Chronically undernourished children are more prone to irritability, lack ability to concentrate effectively, and attain lower test scores on standardized achievement tests (Stang & Bayerl, 2003). Poor children who come to school hungry are more likely to have lower IQ scores as well as speech and hearing problems (Perry, 2013). Eating breakfast helps students to perform and complete simple tests as determined by Dr. Ernesto Pollitt in a laboratory setting in 1981 (Pollitt, Leibel, & Greenfield, 1981). Children who eat breakfast closer to the start of class time at school perform better on standardized tests than students that eat breakfast at home (Vaisman, Voet, Akivis, & Vakil, 1996). The results of research studies related to literacy tutoring programs suggest a higher success rate for students that receive both free school meals and also one-on-one tutoring such as Reading Recovery, a one-on-one program that

places focus on struggling readers in the lower elementary grades to improve literacy achievement (Rodgers, Gomez-Bellenge, Wang, & Shultz, 2005).

A report from the annual conference of the Royal Economic Society reported increases of four and a half percentage points in English scores and six percentage points in science (Williams, 2010). Browns Mill Elementary School in Lithonia, Georgia, implemented a sugar-free campus and has been enforcing this for nearly a decade. The elementary school bans bake sales, sodas, sweet snacks, and other unhealthy sugar-filled treats on campus. Lunches are served that include low-fat milk, lots of vegetables, and sandwiches on whole wheat bread. Fruit is served in place of cookies and cakes. Schools have reported positive benefits and significant changes. Instead of screaming, swapping snacks, and squealing, the students at Browns Mills eat and drink calmly while listening to jazz music and standardized reading test scores improved by 15% (Chen, 2009).

A preliminary study on school breakfast participation found that schools that had 60% to 79% of students eligible for free and reduced price meals had an increase in meal participation and demonstrated an increase in mathematics and English test scores (Murphy & Kleinman, 2002). According to Murphy et al., (2001) students from schools in Maryland that participate in offering students free breakfast are known as the Maryland Meals for Achievement classroom breakfast program. The program began in 1998 with only six schools. In 2001-2002, the program had increased to ninety schools and students ate at their desks while the teachers were taking attendance and other morning routines. Researchers reported that Maryland School Performance Assessment Program composite index scores improved significantly more in Maryland Meals for Achievement schools than other schools that did not participate with other matched

comparisons. Researchers also noticed similar trends when individual performance data was examined in individual subject areas. The sample size was relatively small and researchers who used a larger group of schools found a greater impact on academics (Murphy et al., 2001).

Poverty has the potential to influence the academic achievement of any student living in impoverished circumstances in negative ways. Poverty plays a huge role in the poor academic outcomes of the disproportional high numbers of African American students who live in low-income housing (Craig, n.d.). Meeting the nutritional needs of children has been difficult for schools due to the economic crisis facing the nation. The economic crisis caused the number of students receiving free or reduced-price lunches nationwide to increase approximately 17% from 2007 to 2011, leading to concern that some school districts may not be able to keep pace with the increased caseload (Dillon, 2011). Racial disparities in child poverty have increased (Public Health Law Center, 2012). Students that live in poverty are more likely to read below grade-level and not complete high school (Hernandez, 2011).

The Black-White Achievement Gap is a term used to refer to the performance disparities that characterize African American and non-Hispanic White students. The Gap was initially recorded in the early 1900s at the time when performance comparisons first began to be reported (Fishback & Baskin, 1991). This Gap includes a *Black-White Test Score Gap* (Jencks & Phillips, 1998). African American students are much less likely than their majority peers to perform at basic competency levels on major exams. An example includes the prevalence of reading below basic levels at Grade 4 is much greater for African American than non-Hispanic White students (Perie, Grigg, & Donahue,

2005). The Black-White Poverty Gap exists. When necessities such as food, shelter, clothing, and medical care are inadequate, a child's health becomes disadvantaged. Learning is difficult, school attendance is decreased (Rooney et al., 2006), and cognitive development is compromised (Bradley & Corwyn, 2002).

Meier (2002) observed that the assumption of the Black-White Achievement Gap is really a poverty gap rather than a racial gap. Poverty is a broad societal problem for all Americans. If educators believe that underachievement from the African American population is only due to poverty, then they may feel little responsibility to address the issue. Poverty may only be part of the problem. Poverty alone is an insufficient reason for the Black-White Achievement Gap (Craig, n.d.). National data, collected from the United States Census Bureau, on the percentage of children living in poverty for 18 years and on reading achievement for approximately the same time period, disaggregated by race, shows that in 1992, 46% of African American children lived in poverty compared to 13% of non-Hispanic Whites, a gap of 33% (Perie et al., 2005). In 2004, the poverty gap narrowed from 33% to 23% (34% for African American children and 11% for non-Hispanic Whites in 2004). Between the years of 1992 and 2004, a noticeable difference surfaced in closing the Black-White Achievement Gap. There was a 12% decrease of African American children living in poverty with a 2% decrease for non-Hispanic White children (Craig, n.d.). A report in the New York Times from November of 2010 revealed that fourth-grade Black boys scored 12% proficient in reading compared to a 38% proficiency score in reading among White, fourth-grade boys. Poverty alone does not appear to explain the differences in the scores of the Black boys and the scores of the

White boys. Depending on whether or not they qualify for subsidized school lunches, poor White boys do just as well as Black boys who do not live in poverty (Gabriel, 2010).

### **Effects of School Meals on Mathematics Achievement**

Student progress in developing specific mathematical skills, along with literacy, could be predicted by following changes over a time in students' food insecurity. Murphy et al. (2001) indicated significant mathematics scores were found from students who ate breakfast at school from 133 elementary students from Baltimore and Philadelphia. Researchers noted an increase in reading and mathematics composite percentile scores from students in Minnesota schools that participated in a 3-year study of universal classroom breakfast programs. Students that participate in school breakfast attend 1.5 more days of school per year and achieve 17.5% higher score in mathematics achievement (Roekel, 2013). School lunches have a positive impact on student achievement (Hunger Solutions, 2012). Children who eat healthy lunches are more likely to have better grades. Arthur Agatston, creator of the South Beach Diet, observed the eating habits of nearly 2,000 students. Results were found that included adding more nutritional foods to the lunch menu increased student academic performance, especially in the area of mathematics (Hickman, 2012). Mathematics scores increased greatly among the 1,197 students that participated in the Healthier Options for Public school children obesity prevention program (Voiland, 2008). Food insufficiency in girls has been found to cause a reduction in social skills and lower test scores (Jyoti, Frongillo, & Jones, 2005).

On standardized mathematics and science tests, boys score consistently higher compared to girls after Grade 4 (Zembar & Blume, 2011). Mathematics achievement

gaps could have less to do with innate abilities than with cultural expectations. By the second-grade, a majority of girls and boys tend to accept the stereotype that mathematics is for boys, as indicated by researchers at the University of Washington. Girls are beginning to show evidence of catching up to boys in mathematics and science achievement (Matthiessen, 2012). This indicates that these abilities are not innate. Girls perform better on mathematics achievements tests when they are not aware of negative stereotypes. In addition, they also do better in mathematics in countries where there is a greater level of gender equity (Matthiessen, 2012).

On the National Assessment of Educational Progress, White students scored 58% compared to African American student scores of 24% in 2005 (Perie et al., 2005). Black children living in disadvantaged neighborhoods fall behind one year or more of schooling due to where they live. Richard Gilman, coordinator of psychology and special education for the division of developmental and behavioral pediatrics at Cincinnati Children's Hospital in Ohio, stated that race is a characteristic of Black children falling behind in school, but there are factors other than race that Black children share that are the root causes of poor achievement. Poverty and welfare receipt were two of the factors examined; child nutrition was not specifically studied (Gardner, 2007). Black students that were encouraged to take Advanced Placement or college preparation courses raised their test scores and the dropout rate did not increase. Gains in the area of mathematics were greater for Black students compared to White students who were taking a more demanding mathematics curriculum (Charles & O'Quinn, 2001).

## **Provision 2 Meal Option and Student Achievement**

More than 70% of students qualify for free meals in the state of Arkansas. Children that eat meals at school are exposed to more nutritious diets than students that do not, regardless of income level. A school that makes the decision to participate in Provision 2 must serve National School Lunch Program and/or School Breakfast Program meals to all participating children at no charge for up to four consecutive years. Provision 2 was established in the 1980s and allows schools to reduce administrative burdens in collecting and processing free and reduced meal price applications and in determining household eligibility. It is an option in the federal School Breakfast Program and National School Lunch Program (USDA, 2009).

Provision 2 eliminates meal counts by type for all years of participation, excluding the base Year 1 of Provision 2. A reduction in the cafeteria staff is no longer needing cashiers or personnel to take up lunch tickets or ID cards. Students are able to spend more time eating and less time in the lunch lines (Food Research & Action Center, 2009). During the base year, participating schools conduct business as usual in distributing free and reduced applications, making eligibility determinations, and gathering socioeconomic data. Daily meal counts are still taken and reports are sent for claiming meal reimbursement with federal reimbursement being received by the school based on these counts. All students are served free meals, regardless of eligibility. In Years 2, 3, and 4, the school makes no new eligibility determinations and continues serving students at no cost as long as the school continues to participate in Provision 2. Instead of counting by meal type, total counts of student meals served are recorded; and reimbursement is determined by applying the percentages of free, reduced price, and paid

meals served during the base year to the total meal count for the claiming period in the following years. Meals are reimbursed based at the free, reduced price, and paid rates with federal reimbursement being based on these percentages. The school must make up the difference between meal costs and federal reimbursement because the school is not receiving payment from households who would normally pay reduced or full price for meals (USDA, 2009).

Schools can go back to standard procedures at any time and may request a 4-year extension of Provision 2 if the school's population has remained the same or improved only negligibly. A streamlined base year may be available for schools that have been denied an extension. School leaders and decision-makers must decide if the savings of administrative costs from reducing application burdens, meal counting, and claiming procedures will offset the cost of providing free meals to all students. School leaders will make decisions based on Provision 2 participation and its effects on academic achievement success rates through examining data and test results. Test scores will serve as a resource for predicting a school's success in participating in the Provision 2 Meal Program (USDA, 2009). The comparison study from the Information and Research Unit (2003), indicated that students eligible for free school meals is a predictor of educational achievement and that students eligible for free meals are less likely to academically outperform students who are not eligible for free school meals. According to the study, under-reporting can be a serious issue. Some families that qualify for free meals do not complete the necessary paperwork and send it in to the schools, which results in a reduction of reliability in determining if students that qualify for free meals perform better than students who do not qualify. Provision 2 allows schools to feed children who

are hungry regardless of what their family income may be. Children that come from middle to high-income families are not always assured of getting nutritious and healthy meals or even a good meal (USDA, 2009).

The co-pay meal option is another means to provide free meals to students that qualify for reduced price meals. This option is a cost to the school district because the district must cover the cost of the reduced-paid student meals. The school that chooses to participate in this option receives funding from each meal that is served in this category to help offset the cost to the district. When students eat free of charge, the percentage of eating school meals increases. This option has been shown to reduce meal charges from students that qualify for reduced-price meals due to no longer having to pay for meals (Arkansas Department of Education, 2009).

### **Conclusion**

Academics may be enhanced by eating nutritious meals (Public Health Law Center, 2012). The Healthy-Hunger Free Kids Act of 2010 assists school districts in ensuring that students are receiving healthy and nutritious school food choices and increases access to healthy food for low-income children. “Over 31 million children receive meals through the school lunch program and many children receive most, if not all, of their meals at school” (Child Nutrition Reauthorization Healthy-Hunger Free Kids Act of 2010, 2012, para. 1). More than 100,000 schools in the country out of 123,000, operate school meal programs that serve breakfast and lunch to over 30 million students each day. School meals reduce childhood hunger and obesity and support academic achievement. Through the Healthy Schools Program and the Alliance for a Healthier Generation (2011), school nutrition programs encourage adequate nutrition without

excessive intake, reduce saturated and trans-fats and make room for more fruits, vegetables, whole grains, low-fat dairy and lean protein.

School meals help to reduce hunger, increase a child's ability to learn and improve his overall health (Food Research & Action Center, 2011). Teachers and administrators working with district school leaders create a heightened awareness of the importance of providing healthy and nutritious meals to students. Serving breakfast during the school day gives students a second chance at obtaining something healthy to eat to keep them focused on learning (David, 2013). Educational achievements may be improved through school meals (Barack, 2010). Serving regular, nutritious school meals helps a schools overall academic success and the students well-being (Farrell, 2012).

## **CHAPTER III**

### **METHODOLOGY**

Findings from research on the relationship between nutrition and student performance suggested that providing students with free meals as well as healthy school meals have positive effects on students. Free and healthy meals at school increase standardized test scores, reduce absenteeism, reduce nurse visits, and allow students to be more able to concentrate on learning rather than being hungry (Acevedo, 2008; Marcus, 2010; Murphy & Kleinman, 2002; Murphy et al. 2001; Saul, 2006; Stang & Bayerl, 2003; Weinreb et al. 2002). Research indicated that providing students with a nutritional breakfast and lunch affects academic achievement in a positive manner. However, school districts that choose to participate in optional meal programs such as Provision 2 are charged with the increased costs of providing free meals to all students (USDA, 2009). Decisions must be made by administrators, school board members, and other educational leaders to determine priorities and budgetary matters in efforts to provide free meals to all students. Results provided educational information that school leaders can use as they design and decide on curricular schedules for teaching literacy and mathematics, and as leaders examine breakfast and lunch schedules to provide more opportunities to meet student hunger needs during the school day. The results of this study can have an impact on Arkansas schools as the hunger needs are analyzed to the academic needs of all students (Barack, 2011).

The initial review of the literature suggested that students who receive healthy nutritional meals at school score better on achievement tests. However, for this study, the following null hypotheses were generated.

1. No statistically significant difference will exist by gender for fourth-grade students in four Arkansas public elementary schools who are exposed to two schools that participate in the Provision 2 Meal Option compared to two schools that do not participate in the meal program on literacy achievement measured by the Arkansas Comprehensive Testing Assessment and Accountability Program.
2. No statistically significant difference will exist by race for fourth-grade students in four Arkansas public elementary schools who are exposed to two schools that participate in the Provision 2 Meal Option compared to two schools that do not participate in the meal program on literacy achievement measured by the Arkansas Comprehensive Testing Assessment and Accountability Program.
3. No statistically significant difference will exist by gender for fourth-grade students in four Arkansas public elementary schools who are exposed to two schools that participate in the Provision 2 Meal Option compared to two schools that do not participate in the meal program on mathematics achievement measured by the Arkansas Comprehensive Testing Assessment and Accountability Program.
4. No statistically significant difference will exist by race for fourth-grade students in four Arkansas public elementary schools who are exposed to two

schools that participate in the Provision 2 Meal Option compared to two schools that do not participate in the meal program on mathematics achievement measured by the Arkansas Comprehensive Testing Assessment and Accountability Program.

The goals of this chapter are to describe the research design of this study, explain the subjects and the sample selection, define the instrumentation and data collection, describe the analytical methods used, and identify any limitations of the study.

### **Research Design**

A quantitative, causal-comparative approach was used in this 2 x 2 factorial between-group design study to determine if participation in the Provision 2 meal option was significant to Arkansas school districts based on the academic and nutritional needs of the student population. The independent variables for Hypotheses 1 and 3 included participation in the Provision 2 meal program (participation versus non-participation) and gender (male versus female). For Hypotheses 2 and 4, the independent variables included participation in the Provision 2 meal program and race (Black versus White). The dependent variable for Hypotheses 1 and 2 was literacy achievement, and the dependent variable for Hypotheses 3 and 4 was mathematics achievement. This study used fourth-grade ACTAAP literacy and mathematics test scores from the 2010 school year results from four Arkansas public elementary schools with similar demographical designs.

Gay (1996) described that a causal-comparative study attempts to determine the cause, or reason, for pre-existing differences in groups of individuals. The random sample is selected from two already-existing populations and the cause is not

manipulated. This approach was selected for use in this study based on the appropriateness for determining results using statistical data.

### **Sample**

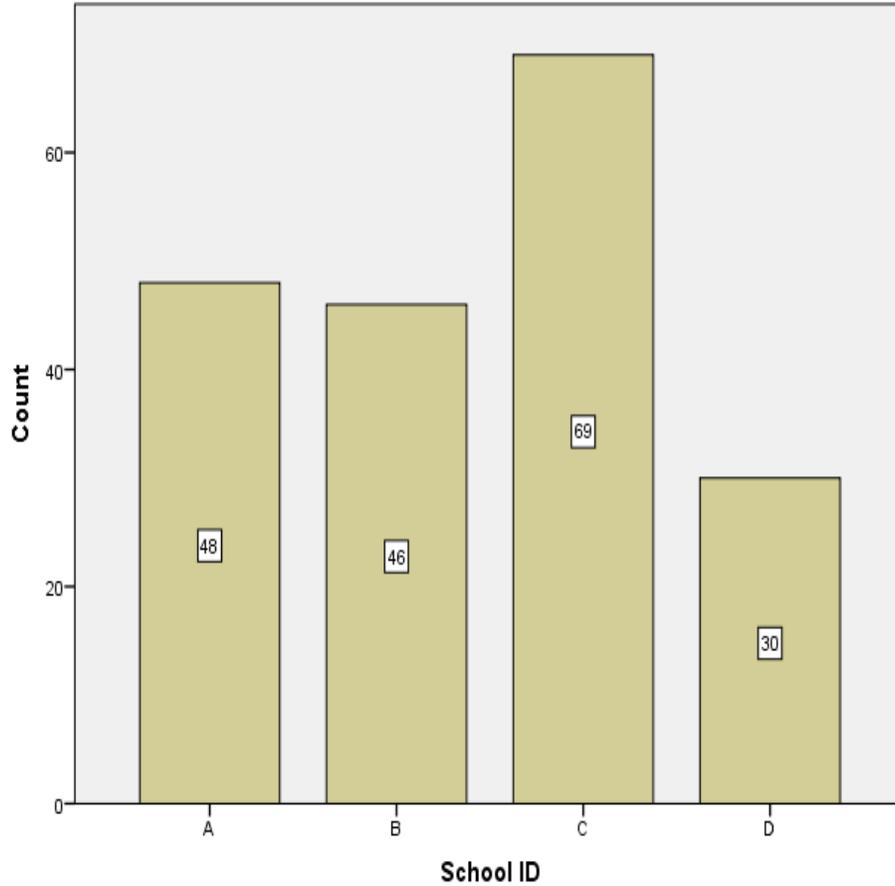
The study used fourth-grade students from four Arkansas public elementary schools. The schools were chosen based on the criteria including participation in the Provision 2 meal program, school size, ethnicity, Arkansas Comprehensive Testing Assessment and Accountability Program (ACTAAP) test scores, student free/reduced meal participation percentage and Title I program participation. Table 1 shows the percentage of Black Grade 4 students, White Grade 4 students, and the percentage of students eligible for free or reduced-price meals and proficiency scores from the 2010 ACTAAP in literacy and mathematics for combined populations (male/female and Black/White). School A was a Provision 2 meal option participant for 8 years. School B was a non-participant Provision 2 school. School C was a Provision 2 meal option participant for 11 years. School D was a non-participant in Provision 2 meal option (SchoolDigger, 2013). The four Arkansas elementary schools were all Title I schools.

Table 1

*Demographics about the Four Schools in this Study*

Variable	Schools			
	A	B	C	D
Black Students	55%	41%	54%	44%
White Students	41%	52%	43%	52%
Free/Reduced	99%	76%	99%	80%
Literacy Prof.	71%	80%	73%	81%
Mathematics Prof.	58%	84%	88%	85%

Figure 1 provides a visual of the number of students in the fourth-grade at each of the four elementary schools that took the ACTAAP test in 2010. School C had the most number of students taking the exam, and school D had the fewest number of students. Schools A and B had similar numbers of students taking the ACTAAP exam in 2010.



*Figure 1.* Student count in each of the four schools in this study.

Figure 2 presents a visual of the number of male and female students that were non-participants in Provision 2 and the number of male and female students that were participants in Provision 2. The student count was comparable in non-participant schools and participant schools.

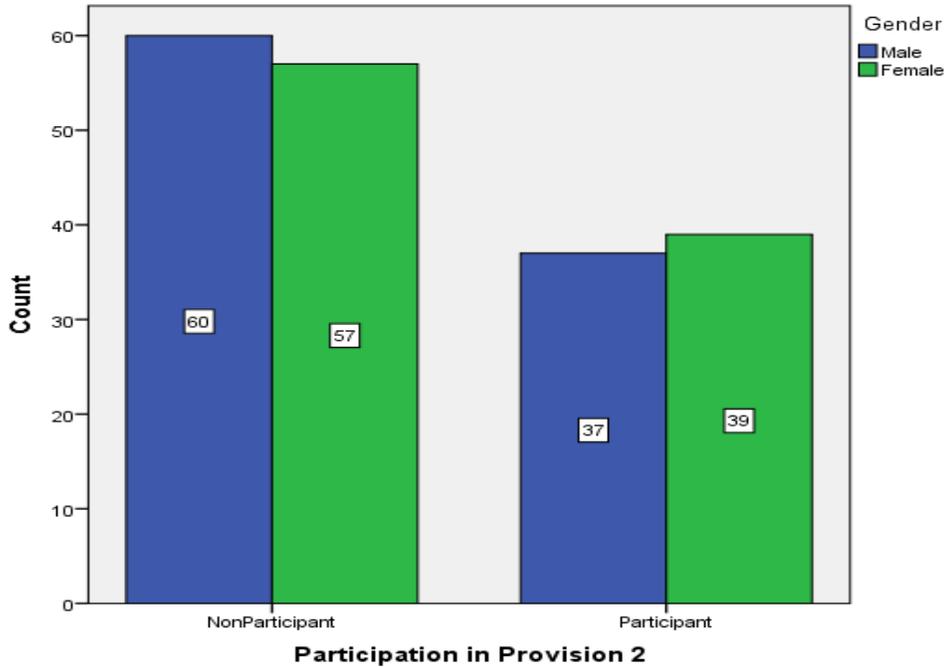


Figure 2. Student count of participants and non-participants in Provision 2 by gender.

Figure 3 provides a visual for the number of fourth-grade students that were non-participants in Provision 2 and the number of students that participated in Provision 2 from the four elementary schools in 2010 according to Race.

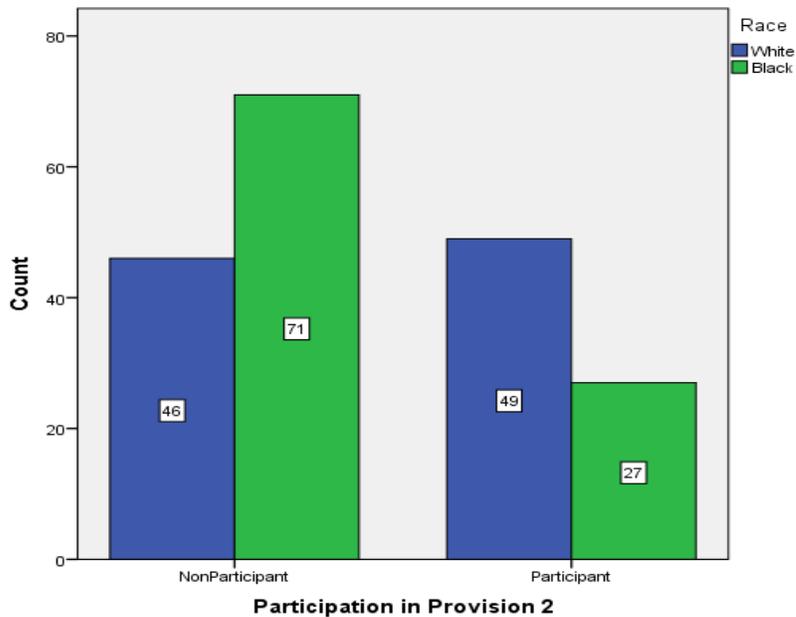


Figure 3. Student count of participants and non-participants in Provision 2 by race.

School districts must cover the cost of the paying students' lunch and/or breakfast if they participated. Small districts struggled with this participation due to other financial obligations and constraints. National School Lunch Act funding provided support in funding this cost to the district and saved operating costs to the districts. National School Lunch Act funding was designed to provide support such as resources, materials, supplies, as well as other educational support opportunities for at-risk students to be better prepared academically to compete with other students that were at-risk academically (USDA, 2009).

Little research information exists on the Provision 2 Meal Option in Arkansas and the academic success or failure of students from districts that chose to participate. This has caused districts, especially those that have financial constraints, to possibly not consider this option to be a top priority due to the limited amount of research regarding Provision 2 that is available to school district leaders that are in charge of making financial as well as academic decisions. Educating all parties involved regarding the importance of student nutrition, health, and well-being has to become a priority and funding has to be put aside at school districts for this expenditure. Without the appropriate communication and researched knowledge being given to leaders, parents, school board members, and other community members, participation in Provision 2 Meal Option has been low in Arkansas due to limited knowledge and an awareness of how this option provided free meals for breakfast and lunch to all students.

### **Instrumentation**

The literacy and mathematics performance levels determined by the Arkansas Augmented Benchmark Examinations in the spring of 2010 were used in this study to

compare two elementary schools that participated in Provision 2 and two elementary schools that did not participate in Provision 2. Students were assessed using the ACTAAP Augmented Benchmark Test. The ACTAAP is made up of criterion-referenced test and norm-referenced test components that include the Augmented Benchmark Examinations for Grades 3-8 and The Iowa Tests for Grades 1, 2 and 9. Both exams focus on identifying students who may be in need of remediation efforts in mathematics and English language arts curricula for Grades 3-8 (Arkansas Department of Education, 2013a).

The Arkansas Department of Education recognized the Arkansas Augmented Benchmark Examinations as reliable and valid. The exams were determined to have technically sound levels of reliability, validity, and fairness. Uniformity was established among raw scores on different test forms. Linking items were used to compare one test version to another test of the ACTAAP. Accuracy rates were .89 or above for all grades in both literacy and mathematics. A Stratified Alpha method was used to determine reliability. Each item was checked separately and then combined with other items to accomplish a precise estimate of reliability. Items were weighted accordingly (Arkansas Department of Education, 2011a).

The results of this ACTAAP assessment are used to determine adequate yearly progress as mandated by the No Child Left Behind Act (“Adequate Yearly Progress,” 2011). Students in Grades 3 through 8 are given approximately 2.5 hours daily to complete the 4-day test. The test items in both literacy and mathematics include multiple-choice and open response questions. There are four levels of student performance on these criterion-referenced exams that include *advanced*, *proficient*, *basic*, and *below*

*basic*. The Arkansas Department of Education (2013a) describes the student levels of achievement as follows:

- a) **Advanced:** Students demonstrate superior performance beyond proficiency on grade-level performance. These students can apply established reading, writing, and mathematics skills to solve complex problems and complete demanding tasks on their own. Insightful connections are able to be made by these students that are abstract and concrete. These students can provide explanations and arguments that are well-supported.
- b) **Proficient:** Students demonstrate academic performance that is solid for the grade tested and are well-prepared for the next grade-level. The students are able to solve problems, complete tasks, and have the knowledge to use established reading, writing, and mathematics skills on their own. Students can explain connections and bring ideas together.
- c) **Basic:** Students demonstrate substantial skills in reading, writing, and mathematics. These students are only able to apply these skills partially.
- d) **Below Basic:** Students are not able to demonstrate sufficient mastering of skills in reading, writing, and mathematics.

### **Data Collection**

After IRB approval on April 19, 2013, the researcher obtained permission to use the four elementary schools' data from the school district superintendent of each chosen school district. ACTAAP test scores from schooldigger.com (2013) and the Arkansas Department of Education (2013b) Data Basecamp. Schooldigger.com (2013) not only

gave ACTAAP test scores, but it also provided other pertinent data to the researcher such as demographics, ethnicity, gender, and free/reduced meal percentage. Data information and other information such as Title I, program initiatives, special funding and any special circumstances from the school year of 2010 were asked of the educational leaders from the four Arkansas public elementary schools. The four elementary schools were chosen based on similar demographics of free/reduced meal status of the student population, race, and overall student population. Once all of this information was gathered and collected, test results from the Arkansas Department of Education (2013b) Data Basecamp were provided. Information from each group, gender (male versus female) and participation (participating versus not participating), were randomly drawn. Identifiable information was removed, and data were entered into SPSS software.

The ACTAAP test results were used based on the importance and relevance to Arkansas and to the educational leaders, students, parents, and community members that are all made aware of this student assessment each school year. Arkansas schools are ranked academically based on the information obtained from these test scores. Students were tested on two areas, which were used in this study, literacy and mathematics. In 1999, the Arkansas legislature approved ACT 999, which mandated the ACTAAP (Arkansas Department of Education, 2013a). Data-driven decision-making was introduced with the ACTAAP to enhance curriculum efforts, student progress, and faculty development programs. Data-driven decisions provide guidance in the implementation of educational policy. Title I funding components were also created by ACT 999. This was important due to the majority of Arkansas schools receiving Title I funding. Title I mandates that each state receiving this funding use an accountability

system for improvement of student performance and be able to demonstrate the improvement results (Arkansas Policy Foundation, 2013).

### **Analytical Methods**

To address the first and third hypothesis, a 2 x 2 factorial analysis of variance (ANOVA) was conducted using participation in the Provision 2 Meal Option (participation versus non-participation) and gender (male versus female). To address Hypotheses 2 and 4, the independent variables included participation in the Provision 2 Meal Special Alternative and race (Black versus White). The dependent variable for Hypotheses 1 and 2 was literacy achievement, and the dependent variable for Hypotheses 3 and 4 was mathematics achievement. To test the null hypotheses, the researcher used a two-tailed test with a .05 level of significance.

### **Limitations**

When conducting a research study, it is important to note any limitations that may exist that might have an adverse effect on the results of the study. The following were limitations associated with this study. One limitation is the limited number of school districts that were participating in the Provision 2 Meal Option, which gave a limited amount of data to be examined. According to the Arkansas Department of Education Child Nutrition Unit Director, W. Shockey, only 22 school districts in Arkansas chose to participate in Provision 2 out of 311 school districts in the state (personal communication, July 20, 2012).

Another limitation to this study was that schools in Arkansas differed in the decisions they make on implementing curriculum materials, educational programs, and initiatives and professional development opportunities. Next, they differed on grant

funding opportunities, whether only applied for but not received, approved but not implemented, or received and used in the schools. Finally, school stakeholders in each school; administrators, school board members, parents, and community members; differed in their opinions regarding health, wellness, and nutrition of the student population. There are dozens or even hundreds of variables that may have an effect on student achievement (Lubienski & Crane, 2010). It is impossible to account for every possible variable in a student's personal life, home, community, and school. This study attempted to mitigate this limitation by choosing schools with similar demographics, free/reduced meal status of the student population, race, and overall student population. Although no two schools are identical, the schools chosen for this study were similar enough that this study should be able to ascertain whether there was a statistically significant difference in achievement between student populations that were exposed to the Provision 2 Meal Option and those that were not.

## **CHAPTER IV**

### **RESULTS**

The purpose of this quantitative research study was to determine if participating in the Provision 2 meal option affected students' literacy and mathematics achievement from four rural Arkansas elementary schools whose free and reduced student population was above 70%. The study investigated this theory as it related to gender and race at the fourth-grade-level. The independent variables were participation, gender, and race. The dependent variables were literacy and mathematics test scores measured by the state's Augmented Benchmark Examinations. A 2 x 2 factorial analysis was conducted to examine each of the four null hypotheses (Leech, Barrett, & Morgan, 2011). The results of this analysis are found in this chapter.

#### **Hypothesis 1**

Hypothesis 1 stated that no significant differences will exist by gender between fourth-grade students in two rural Arkansas elementary schools that participated in Provision 2 meal option on literacy achievement compared to two rural Arkansas elementary schools who did not participate in the option. Table 2 presents the means and standard deviations of participants and non-participants in Provision 2 sorted by gender.

Table 2

*Descriptive Statistics for 2010 Arkansas Augmented Benchmark Examination Literacy Scale Scores Fourth-grade Sorted by Gender*

Participation in Provision 2	Gender	<i>M</i>	<i>SD</i>	<i>N</i>
Non-Participant in Provision 2	Male	669.12	195.91	60
	Female	718.25	193.46	57
	Total	693.05	195.44	117
Participant in Provision 2	Male	562.51	159.82	37
	Female	713.00	124.38	39
	Total	639.74	160.72	76
Total	Male	628.45	189.41	97
	Female	716.11	168.10	96
	Total	672.06	183.98	193

The data set was screened for outliers using the z-score method (Arkansas Department of Education, 2013b). It was determined that there were two outliers from the data set of 193 participants. This is well within what we would expect within this sample size. The data was also screened for normality using the Kolmogorov-Smirnov test. The results of this test were significant which means the data set can be treated as normal. Figure 4 shows the mean literacy scale scores for participants and non-participants in Provision 2 sorted by gender.

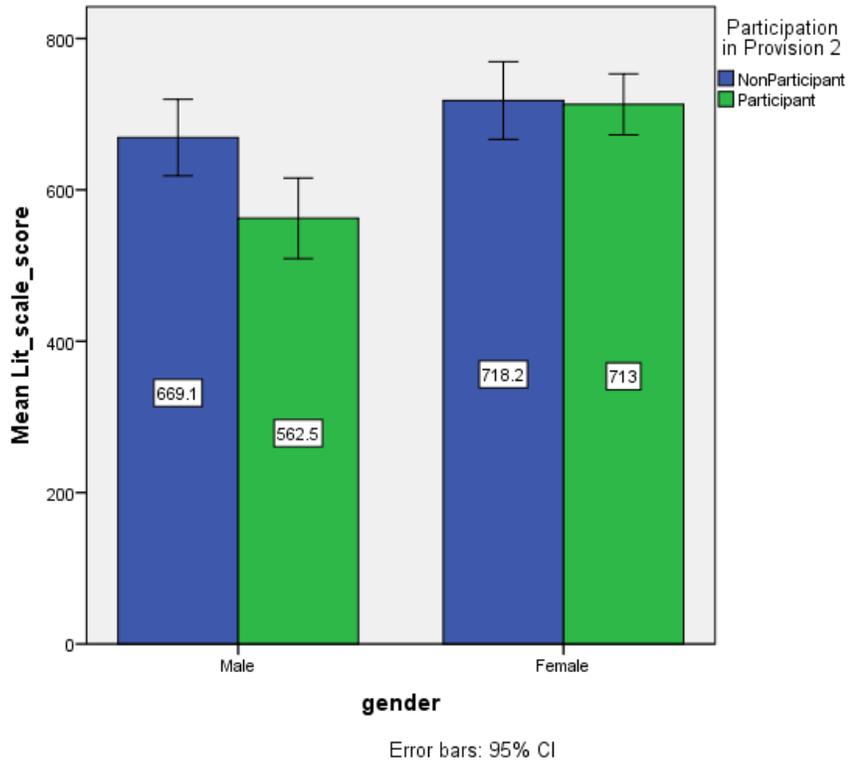


Figure 4. 2010 Comparison of mean literacy scale scores on Arkansas Augmented Benchmark Exam—Fourth-grade sorted by gender.

Levene’s test indicated that the assumption of homogeneity of variances was met  $F(1, 191) = 2.30, p = .131$ . A 2 x 2 between subjects factorial ANOVA was calculated to compare the literacy scale scores of students who were participants in Provision 2 and students who were not participants in Provision 2 by gender. Table 3 presents the results of the 2 x 2 factorial analysis for participants and non-participants in Provision 2 sorted by gender.

Table 3

*Results of 2 x 2 Factorial ANOVA—2010 Literacy Scale Scores of Participants and Non-Participants in Provision 2 Sorted by Gender*

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Participation	143995.76	1	143995.76	4.64	.033
Gender	458643.80	1	458643.80	14.77	.000
Participation*Gender	118249.53	1	118249.53	3.81	.052
Error	5867617.99	189	31045.60		
Total	93669605.00	193			

The results of the factorial ANOVA indicate the main effect for participation was significant,  $F(1, 189) = 4.638$ ,  $p = .033$ . The literacy scale scores for participants in Provision 2 were significantly different from those students who were not participants. The results indicate the main effect for gender was significant,  $F(1, 189) = 7.843$ ,  $p < .001$ . The literacy scale scores for female students were significantly different from the scores for male students. The interaction effect was not significant,  $F(1, 189) = 3.809$ ,  $p = .052$ , suggesting that participation in Provision 2 did not have a significant moderating effect on gender at the  $p = .05$  level of significance. As a result, Hypothesis 1 cannot be rejected.

### **Hypothesis 2**

Hypothesis 2 stated that no significant differences will exist by race between fourth-grade students in two rural Arkansas elementary schools that participated in Provision 2 meal option on literacy achievement compared to two rural Arkansas

elementary schools who did not participate in the option. Table 4 presents the means and standard deviations of participants and non-participants in Provision 2 sorted by race.

Table 4

*Descriptive Statistics for 2010 Arkansas Augmented Benchmark Examination Literacy Scale Scores Fourth-grade Sorted by Race*

Participation in Provision 2	Gender	<i>M</i>	<i>SD</i>	<i>N</i>
Non-Participant in Provision 2	White	657.15	180.80	46
	Black	716.31	202.21	71
	Total	693.05	195.44	117
Participant in Provision 2	White	606.10	138.24	49
	Black	700.78	182.29	27
	Total	639.74	160.72	76
Total	White	630.82	161.45	95
	Black	712.03	196.12	98
	Total	672.06	183.98	193

The data set was screened for outliers using the z-score method. It was determined that there were two outliers from the data set of 193 participants. This is well within what we would expect within this sample size. The data was also screened for normality using the Kolmogorov-Smirnov test. The results of this test were significant which means the data set can be treated as normal. Figure 5 shows the mean literacy scale scores for participants and non-participants in Provision 2 sorted by race.

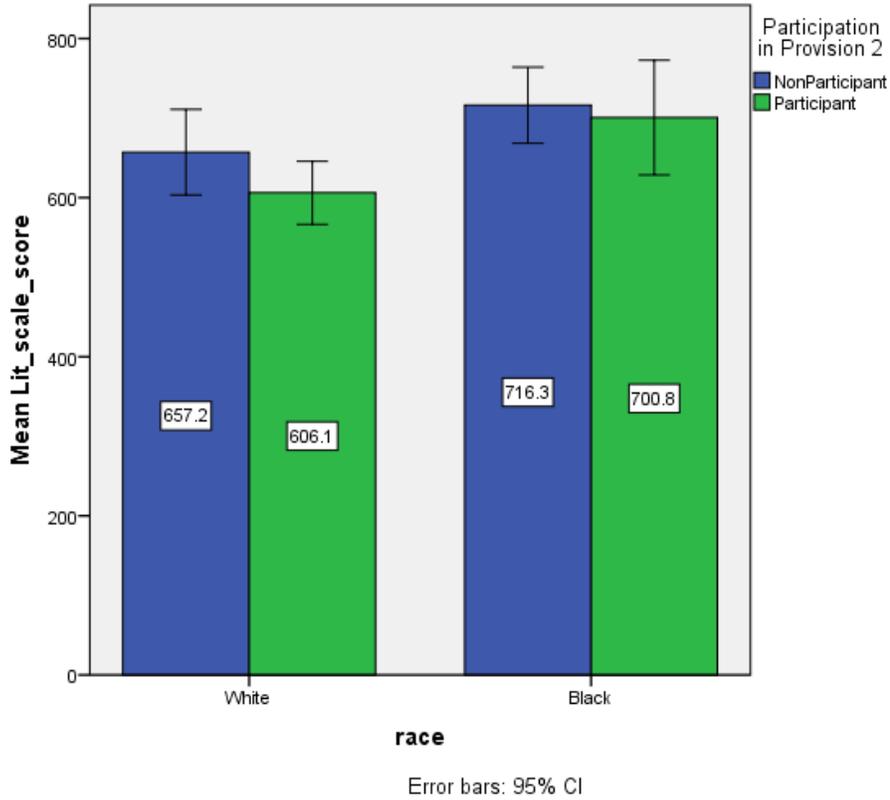


Figure 5. 2010 Comparison of mean literacy scale scores on Arkansas Augmented Benchmark Exam—Fourth-grade sorted by race.

Levene’s test indicated that the assumption of homogeneity of variances was met,  $F(1, 191) = 1.369, p = .244$ . A 2 x 2 between subjects factorial ANOVA was calculated to compare the literacy scale scores of students who were participants in Provision 2 and students who were not participants in Provision 2 by race. Table 5 presents the results of the 2 x 2 factorial analysis for participants and non-participants in Provision 2 sorted by race.

Table 5

*Results of 2 x 2 Factorial ANOVA—2010 Literacy Scale Scores of Participants and Non-Participants in Provision 2 Sorted by Race*

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Participation	47531.32	1	47531.32	1.47	.227
Race	253725.92	1	253725.92	7.84	.006
Participation*Race	13525.76	1	13525.76	0.42	.519
Error	6114424.27	189	32351.45		
Total	93669605.00	193			

The results of the factorial ANOVA indicate the main effect for participation was not significant,  $F(1, 189) = 1.469$ ,  $p = .227$ . The literacy scale scores for participants in Provision 2 were not significantly different from those students who were not participants. The results indicate the main effect for race was significant,  $F(1, 189) = 7.843$ ,  $p = .006$ . The literacy scale scores for White students were significantly different from the scores for Black students. The interaction effect was not significant,  $F(1, 189) = .418$ ,  $p = .519$ , suggesting that participation in Provision 2 did not have a significant moderating effect on race. As a result, Hypothesis 2 cannot be rejected.

### **Hypothesis 3**

Hypothesis 3 stated that no significant differences will exist by gender between fourth-grade students in two rural Arkansas elementary schools that participated in Provision 2 meal option on mathematics achievement compared to two rural Arkansas

elementary schools who did not participate in the option. Table 6 presents the means and standard deviations of participants and non-participants in Provision 2 sorted by gender.

Table 6

*Descriptive Statistics for 2010 Arkansas Augmented Benchmark Examination  
Mathematics Scale Scores Fourth-grade Sorted by Gender*

Participation in Provision 2	Gender	<i>M</i>	<i>SD</i>	<i>N</i>
Non-Participant in Provision 2	Male	636.57	115.80	60
	Female	656.42	113.81	57
	Total	646.24	114.77	117
Participant in Provision 2	Male	587.32	97.15	37
	Female	660.72	99.15	39
	Total	624.99	104.28	76
Total	Male	617.78	111.17	97
	Female	658.17	107.57	96
	Total	637.87	110.97	193

The data set was screened for outliers using the z-score method. It was determined that there were six outliers from the data set of 193 participants. This is more than what we would expect from a sample this size. Because of the nature of the data, the outliers remained in the data set for all calculations. The data was also screened for normality using the Kolmogorov-Smirnov test. The results of this test were significant for participants and for males. The results were not significant for nonparticipants and females. Further analysis of the skewness and kurtosis shows that the skewness for all

tests is within an acceptable range, but the kurtosis for non-participants and females was greater than 1 which shows the data distribution was steeper than the normal curve.

Because the results of the Kolmogorov-Smirnov along with skewness and kurtosis were mixed, and the researcher treated the data set as normal. Figure 6 shows the mean mathematics scale scores for participants and non-participants in Provision 2 sorted by gender.

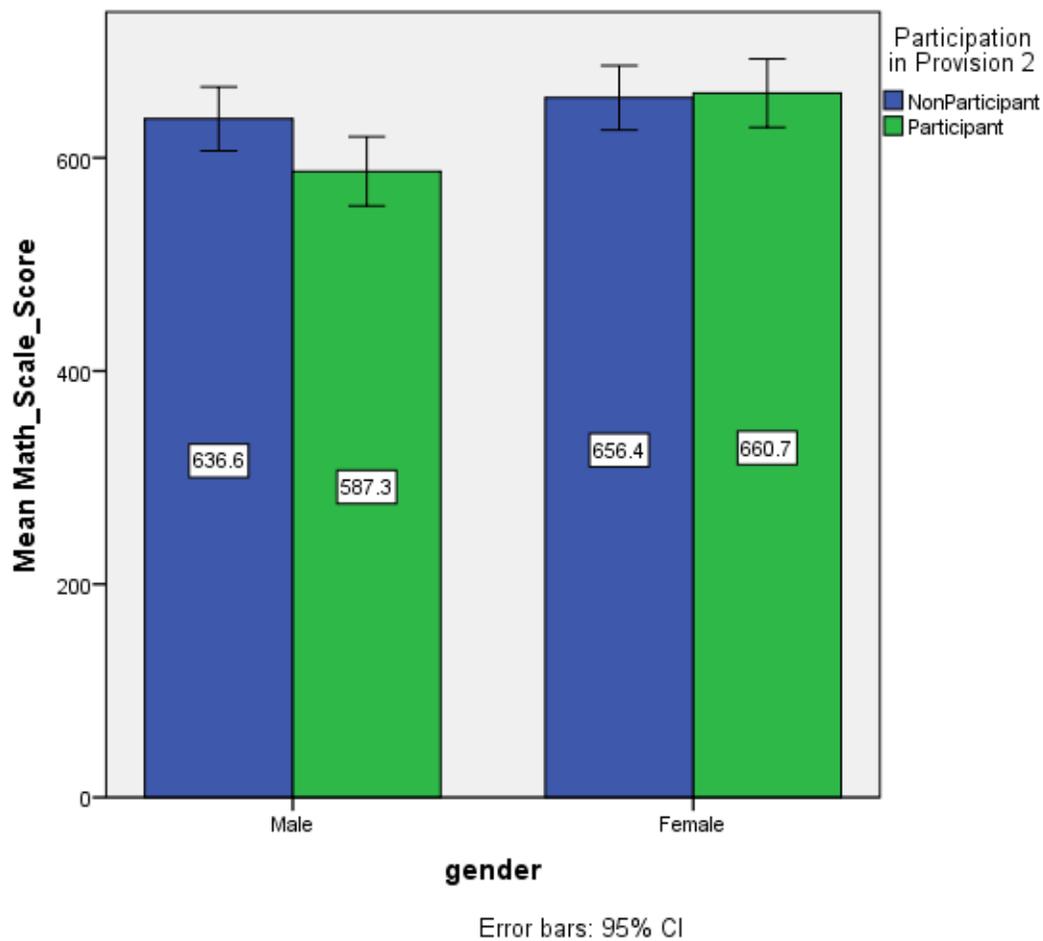


Figure 6. 2010 Comparison of mean mathematics scale scores on Arkansas Augmented Benchmark Exam—Fourth-grade sorted by gender.

Levene’s test indicated that the assumption of homogeneity of variances was met,  $F(1, 191) = .276, p = .600$ . A 2 x 2 between subjects factorial ANOVA was calculated to

compare the mathematics scale scores of students who were participants in Provision 2 and students who were not participants in Provision 2 by gender. Table 7 presents the results of the 2 x 2 factorial analysis for participants and non-participants in Provision 2 sorted by gender.

Table 7

*Results of 2 x 2 Factorial ANOVA—2010 Mathematics Scale Scores of Participants and Non-Participants in Provision 2 Sorted by Gender*

Source	SS	df	MS	F	p
Participation	23251.91	1	23251.91	1.97	.162
Gender	100084.41	1	100084.41	8.48	.004
Participation*Gender	32993.75	1	32993.75	2.80	.096
Error	2229832.63	189	11798.06		
Total	80892035.00	193			

The results of the factorial ANOVA indicated the main effect for participation was not significant,  $F(1, 189) = 1.971, p = .162$ . The mathematics scale scores for participants in Provision 2 were not significantly different from those students who were not participants. The results indicated the main effect for gender was significant,  $F(1, 189) = 8.483, p = .004$ . The mathematics scale scores for female students were significantly different from the scores for male students. The interaction effect was not

significant,  $F(1, 189) = 2.797, p = .096$ ) suggesting that participation in Provision 2 did not have a significant moderating effect on gender. As a result, Hypothesis 3 cannot be rejected.

#### Hypothesis 4

Hypothesis 4 stated that no significant differences will exist by race between fourth-grade students in two rural Arkansas elementary schools that participated in Provision 2 meal option on mathematics achievement compared to two rural Arkansas elementary schools who did not participate in the option. Table 8 presents the means and standard deviations of participants and non-participants in Provision 2 sorted by race.

Table 8

*Descriptive Statistics for 2010 Arkansas Augmented Benchmark Examination  
Mathematics Scale Scores Fourth-grade Sorted by Race*

Participation in Provision 2	Gender	<i>M</i>	<i>SD</i>	<i>N</i>
Non-Participant in Provision 2	White	618.15	87.50	46
	Black	664.44	126.70	71
	Total	646.24	114.77	117
Participant in Provision 2	White	600.69	90.95	49
	Black	669.07	113.88	27
	Total	624.99	104.28	76
Total	White	609.15	89.26	95
	Black	665.71	122.74	98
	Total	637.87	110.97	193

The data set was screened for outliers using the z-score method. It was determined that there were two outliers from the data set of 193 participants. This was well within

what we would expect within this sample size. The data was also screened for normality using the Kolmogorov-Smirnov test. The results of this test were significant for participants and for White students. The results were not significant for non-participants and Black students. Further analysis of the skewness and kurtosis showed that the skewness for all tests is within an acceptable range, but the kurtosis for non-participants and Black students was greater than 1 which showed the data distribution was steeper than the normal curve. Because the results of the Kolmogorov-Smirnov along with skewness and kurtosis were mixed, the researcher treated the data set as normal. Figure 7 shows the mean mathematics scale scores for participants and non-participants in Provision 2 sorted by race.

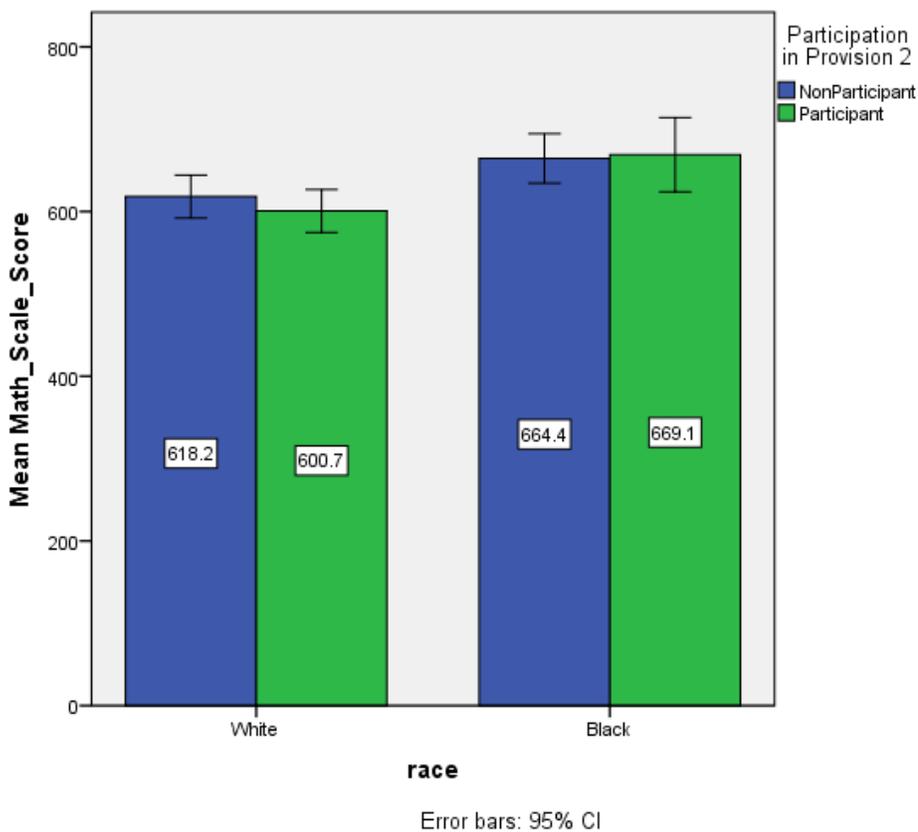


Figure 7. 2010 Comparison of mean mathematics scale scores on Arkansas Augmented Benchmark Exam—Fourth-grade sorted by race.

Levene’s test indicated that the assumption of homogeneity of variances was met,  $F(1, 191) = 3.364, p = .068$ . A 2 x 2 between subjects factorial ANOVA was calculated to compare the mathematics scale scores of students who were participants in Provision 2 and students who were not participants in Provision 2 by race. Table 9 presents the results of the 2 x 2 factorial analysis for participants and non-participants in Provision 2 sorted by race.

Table 9

*Results of 2 x 2 Factorial ANOVA—2010 Mathematics Scale Scores of Participants and Non-Participants in Provision 2 sorted by Race*

Source	SS	df	MS	F	p
Participation	1762.37	1	1762.37	0.15	.698
Race	140968.63	1	140968.63	12.10	.001
Participation * Race	5234.57	1	5234.57	0.45	.504
Error	2202433.66	189	11653.09		
Total	80892035.00	193			

The results of the factorial ANOVA indicate the main effect for participation was not significant,  $F(1, 189) = .151, p = .698$ . The mathematics scale scores for participants in Provision 2 were not significantly different from those students who were not participants. The results indicate the main effect for race was significant,  $F(1, 189) = 12.097, p = .001$ . The mathematics scale scores for White students were significantly

different from the scores for Black students. The interaction effect was not significant,  $F(1, 189) = .449, p = .504$ ), suggesting that participation in Provision 2 did not have a significant moderating effect on race. As a result, Hypothesis 4 cannot be rejected.

## **CHAPTER V**

### **DISCUSSION**

Meeting the hunger needs of all students during the school day so that students can focus on learning instead of their empty stomachs has been a daunting task for educators for many years. The objective of this study was to add research information in determining the academic effectiveness of the Provision 2 Meal Option for Arkansas elementary age students. Elementary schools with a high free/reduced student meal population, at least 70% or greater, participated in the Provision 2 Option to be more able to provide free meals to all students during the school day, that included breakfast and lunch being available for free to all students.

The focus of this study was to examine the effects of the Provision 2 Meal Option on literacy and mathematics student achievement by gender and race for students in fourth-grade in four rural Arkansas public elementary schools. A causal-comparative study was conducted using a 2 x 2 ANOVA to analyze data that was collected from four Arkansas elementary schools' ACTAAP test data from literacy and mathematics scores. The data collected was from the 2010 school year. The researcher compared male and female students, as well as Black and White students in both literacy and mathematics testing areas. This chapter includes a description of the data collected and analyzed in this study. Second, recommendations based on the conclusions found in the data analysis. Finally, the implication and significance of this study are discussed.

## **Conclusions**

This research study was conducted using a 2 x 2 factorial ANOVA that was used to examine data and determine if participation in the Provision 2 meal option was significant to Arkansas school districts based on the academic and nutritional needs of the student population in elementary school age students. An ANOVA test was conducted because the study was quantitative and causal-comparative. The study used fourth-grade ACTAAP literacy and mathematics test scores from the 2010 school year results from four Arkansas public elementary schools with similar demographic designs.

### **Hypothesis 1**

Hypothesis 1 stated that no significant difference will exist by gender (male versus female) for fourth-grade students who were exposed to two schools that participated in Provision 2 Meal Option compared to two schools that did not participate on literacy achievement from the ACTAAP exam from 2010. The data when analyzed through the ANOVA revealed that the main effect for participation was significant. The literacy scale scores for participants in Provision 2 were significantly different from those students who were not participants. The results indicated the main effect for gender was significant. The literacy scale scores for female students were significantly different from the scores for male students. The interaction effect was not significant suggesting that participation in Provision 2 did not have a significant moderating effect on gender.

Therefore, Hypothesis 1 is accepted.

### **Hypothesis 2**

Hypothesis 2 stated that no significant difference will exist by race (Black versus White) for fourth-grade students who were exposed to two schools that Provision 2 Meal

Option compared to two schools that did not participate on literacy achievement from the ACTAAP exam from 2010. The data revealed that the main effect for participation was not significant. The literacy scale scores for participants in Provision 2 were not significantly different from those students who were not participants. The results indicated the main effect for race was significant. The literacy scale scores for White students were significantly different from the scores for Black students. The interaction effect was not significant suggesting that participation in Provision 2 did not have a significant moderating effect on race. As a result, Hypothesis 2 is accepted.

### **Hypothesis 3**

Hypothesis 3 stated that no significant difference will exist by gender (male versus female) for fourth-grade students who were exposed to two schools that participated in Provision 2 Meal Option compared to two schools that did not participate on mathematics achievement from the ACTAAP exam from 2010. The data revealed that the main effect for participation was not significant. The mathematics scale scores for participants in Provision 2 were not significantly different from those students who were not participants. The results indicated that the main effect for gender was significant. The mathematics scale scores for female students were significantly different from the scores for male students. The interaction effect was not significant suggesting that participation in Provision 2 did not have a significant moderating effect on gender. Hypothesis 3 is accepted.

### **Hypothesis 4**

Hypothesis 4 stated that no significant difference will exist by race (Black versus White) for fourth-grade students who were exposed to two schools that Provision 2 Meal

Option compared to two schools that did not participate on mathematics achievement from the ACTAAP exam from 2010. The data indicated that the mathematics scale scores for participants in Provision 2 were not significantly different from those students who were not participants. The results revealed that the main effect for race was significant. The mathematics scale scores for White students were significantly different from the scores for Black students. The interaction effect was not significant suggesting that participation in Provision 2 did not have a significant moderating effect on race. As a result, Hypothesis 4 is accepted.

### **Implications**

Research from Adrogué and Orlicki (2009) found that school meals impacts learning and increases test scores. The findings of this study revealed that when looking at Provision 2 Meal Option status in literacy achievement that the female students that attended the schools that participated in Provision 2 scored higher on the ACTAAP test than the male students that participated in Provision 2. These data suggested that female students benefitted from participation in Provision 2 compared to the male students that participated in Provision 2 but the interaction effect did not implicate a significant difference based on participation in Provision 2.

A discrepancy existed between the research from Perie et al. (2005) and the data revealed in this study from the literacy performance of Black students compared to White students. They indicated that Black students read below basic levels at Grade 4 as compared to their White peers. The Black students out-performed the White students from both participating Provision 2 schools and non-participating schools according to the 2010 ACTAAP literacy exam data.

Research from Murphy et al. (2001) indicated that significant mathematics scores were found from students who ate breakfast at school from 133 elementary students. Hunger Solutions (2010) research revealed that school lunches had a positive impact on student achievement. On standardized mathematics tests, boys scored lower compared to girls until after Grade 4 according to research by Zembar and Blume (2011). Gains in the area of mathematics were greater for African American students, rather than with White students, that were taking a more demanding mathematics curriculum through research from Charles and O'Quinn (2001).

The data from this study revealed that in the area of literacy and mathematics females scored higher than the males in both participating Provision 2 schools and non-participating schools. In addition, the Black students scored higher compared to the White students in both participating Provision 2 schools and non-participating schools for literacy and mathematics. The participating females in Provision 2 scored higher compared to all other subjects in the study.

## **Recommendations**

### **Potential for Practice/Policy**

At the state level, Provision 2 Meal Option was created for school districts to opt to participate (feed all students free breakfast and lunch) or not to participate (USDA, 2009). Balancing student health and nutrition with affordability is a pressing concern in today's society (Public Health Law Center, 2012). According to Gunderson (1971), students who have healthy meals are more prepared to learn and receive more opportunities that are educational. This study provides research regarding free school meals and how they affect student achievement. Although the data did not reflect an

overall significant impact from participation in Provision 2 for fourth-grade students from the 2010 ACTAAP test data, the data did suggest that female students and Black students had higher test scores while participating in Provision 2. From this data, legislators and educational leaders at the national, state, and local levels could find this data useful in locating more funding to support meal programs and opportunities for students to gain healthier meals at school. Arkansas already has created options for school systems to receive grants for extra fruits and vegetables during the school day as well as additional breakfast options. With the Black-White Achievement Gap that exists currently for most school districts in Arkansas, the data in this study described that Black students that participated in Provision 2 scored higher compared to the White students. This information gives leaders research to assist them in locating funding for student meals to help support increased student achievement.

### **Future Research Considerations**

When comparing Provision 2 schools and schools that do not participate in Provision 2, a study could be conducted that examined more than one grade-level, Black females to White females, and Black males to White males. In addition, a study could be conducted that compared Provision 2 schools prior to participation and after participation in Provision 2. When this study was conducted, the ACTAAP scores did not allow for before and after results to be examined. Limited number of schools that participated in Provision 2 and no ACTAAP data prior to the schools' participation in Provision 2 existed to allow for a comparison study.

Another consideration for future studies would be to examine attendance to determine if participation in Provision 2 had a significant impact on increasing student

attendance for gender and race. According to a study conducted by Williams (2010), student attendance increased when schools began serving healthier meal options. A child's desire to attend school is lessened when food is scarce at home. This scarcity has a negative impact on a child's academic achievement at school and creates an environment of stress and insecurity (Marcus, 2010). Child hunger is linked to absenteeism in children and adults, which is costly to employers and increases health care costs for families and employers (Cook & Jeng, 2013). Research from Pediatrics (2010) reported that students who receive government assisted food programs demonstrate improved behavior and have higher test scores with increases in school attendance. Arkansas Department of Education Child Nutrition leaders as well as other leaders and decision makers from the Department of Education could use this research for future investigations into the importance of reducing child hunger at schools and placing emphasis on funding for meeting the hunger needs, which is a basic need of all humans. A child's basic need such as receiving food, must be met before any other needs can be satisfied (Maslow, 1987).

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## **APPENDIX**

APPENDIX A



Status of Request for Exemption from IRB Review

(For Board Use Only)

Date: April 19, 2013

Proposal Number: 2013 – 054

Title of Project: Effects of the National School Meal Option, Provision 2, on Academic Achievement in Literacy and Mathematics

Name and Contact information for the Principal Investigator: Suzanne Bailey; suzanne.bailey@lonokeschools.org

- Research exempted from IRB review.
Research requires IRB review.
More information is needed before a determination can be made. (See attachment.)

I have reviewed the proposal referenced above and have rendered the decision noted above.

This study has been found to fall under the following exemption(s):

- 1 [ ] 2 [ ] 3 [ ] 4 [x] 5 [ ] 6 [ ]

In the event that, after this exemption is granted, this research proposal is changed, it may require a review by the full IRB. In such case, a Request for Amendment to Approved Research form must be completed and submitted.

This exemption is granted for one year from the date of this letter. Renewals will need to be reviewed and granted before expiration.

The IRB reserves the right to observe, review and evaluate this study and its procedures

The IRB reserves the right to observe, review and evaluate this study and its procedures during the course of the study.

Rebecca O. Weaver

Chair
Harding University Institutional Review Board