EVALUATION OF FOOD AND FUN FOR EVERYONE: A NUTRITION EDUCATION PROGRAM FOR THIRD AND FOURTH GRADE STUDENTS

By

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CHAPTER I

INTRODUCTION

Food and Fun for Everyone is a school-based nutrition education curriculum compiled by and currently implemented through the Oklahoma Cooperative Extension Service's Community Nutrition Education Programs (CNEP). CNEP is designed to provide thorough education to participating low-income families so that they may "consume a diet that promotes good health" and "acquire an adequate amount of nutrient-dense foods every day through effective use of available resources" (Family and Consumer Sciences [FCS], 2009). CNEP is the administrative unit for two federally funded nutrition education programs, the Expanded Food and Nutrition Education Program (EFNEP) and the Supplemental Nutrition Assistance Program (SNAP), referred to as Oklahoma Nutrition Education (ONE).

The youth component of CNEP targets students in low-income schools where 50 percent or more of the students qualify for free or reduced meals as defined by the Oklahoma State Department of Education (OSDE) (OSDE, 2009). The *Food and Fun for Everyone* curriculum is based on social cognitive theory (SCT) in that it aims to increase the constructs of knowledge, self-efficacy and outcome expectancies related to the content of the lessons. It targets third and fourth grade students and consists of a series of six lessons for each grade level. *Food and Fun for Everyone* is taught by trained

Nutrition Education Assistants (NEAs) within each of the nine CNEP units (Figure 1.1) throughout the state of Oklahoma. NEAs are trained and employed by CNEP to serve as teaching paraprofessionals within their own communities (FCS, 2009).

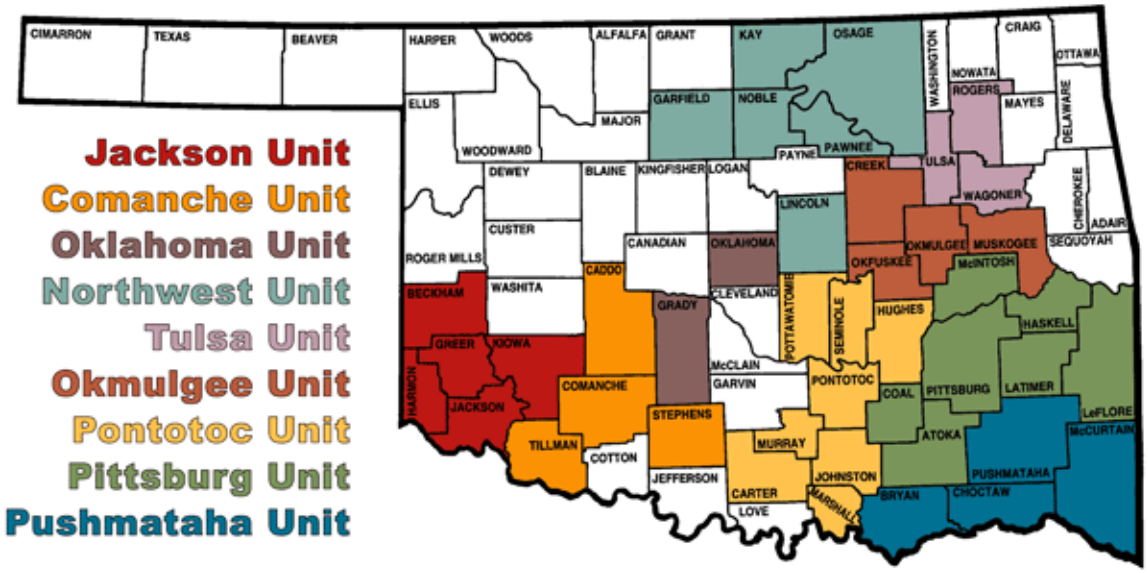

Figure 1.1 CNEP Counties by Unit in Oklahoma
Source: Family and Consumer Sciences. Oklahoma Cooperative Extension. Community Nutrition Education Programs (FCS, 2009).

Lessons are "research based and [reflect] the key nutrition and physical activity messages of the United States Department of Health and Human Services and United States Department of Agriculture *2005 Dietary Guidelines for Americans* and *MyPyramid Food Guidance System*" (CNEP, 2007, p. 6). Each lesson includes a brief physical activity component and one or more hands-on learning activities that utilize core academic skills. Third grade lesson topics include Getting to Know MyPyramid, Hurray for Whole Grains, Fantastic Fruit and Various Veggies, Magnificent Milk, Breakfast Builds Better Brains and Play it Safe: Fight BAC. Fourth grade lesson topics are similar and include Serving Up MyPyramid, What Happens to the Food We Eat, Label Logic,

Start Your Day with Breakfast, The Food Safety Danger Zone and Healthy Choices for Snacks and Eating Out. The six lessons are designed to be taught weekly and take approximately 45 minutes to teach. Parent newsletters following each lesson topic are used to impact the students' home environment. In addition, each lesson has a corresponding list of *Ag in the Classroom* (AITC) lessons, also incorporating core academic skills, available for use by the classroom teacher at their discretion. The main purpose of the AITC lessons as they relate to *Food and Fun for Everyone* is to expand and reinforce each lesson taught by the NEAs (CNEP, 2007).

Interventions such as *Food and Fun for Everyone* are important in that many children today have poor dietary habits including low consumption of fruits, vegetables, milk products and whole grains, as well as limited participation in physical activity (Guenther, Dodd, Reedy & Krebs-Smith, 2006; Kranz, Lin & Wagstaff, 2007; Cook & Friday, 2005; Anderson, Economos & Must, 2008). These behaviors contribute to the rise in the prevalence of childhood overweight and obesity throughout the United States (Ogden et al., 2006). For a variety of reasons, such as high enrollment and existing facilities, which allow children to be easily reached and provides an accessible place to do so, schools present an ideal location to teach children about nutrition and encourage increased levels of physical activity. However, many constraints, such as time, finances and emphasis on academic skills, exist as barriers to providing nutrition education in schools. Therefore, it is imperative to identify efficient, cost-effective, successful nutrition education programs aimed towards improving dietary behaviors and overall health that are not detrimental to academic achievement.

Purpose and Significance of Study

The purpose of this study was to evaluate the effectiveness of CNEP's *Food and Fun for Everyone* nutrition education curriculum on nutrition related behaviors in third and fourth grade students throughout Oklahoma. This was the first evaluation conducted with the *Food and Fun for Everyone* curriculum that evaluated behavior change using the pre- and post-surveys matched by individual versus by classroom. Moreover, this study contributes to the body of evidence supporting the use of theory based interventions, specifically SCT, in improving nutrition behaviors of elementary age students.

Hypothesis

The *Food and Fun for Everyone* nutrition education program will result in a positive, significant increase in the reported performance of the eight nutrition behaviors evaluated by the pre- and post-survey among third and fourth grade students in Oklahoma.

Terms

Body Mass Index (BMI): A measurement utilized to ascertain weight status that is a person's weight in relation to height. For children and adolescents, BMI percentile is determined by plotting BMI-for-age on the Centers for Disease Control (CDC) growth charts (Centers for Disease Control [CDC], 2009).

Community Nutrition Education Programs (CNEP): A federally funded program including the Expanded Food and Nutrition Education Program (EFNEP) and the Oklahoma Nutrition Education (ONE) Program designed to provide

thorough education to low-income families who participate so that they may acquire the skills and knowledge necessary to consume a healthful diet and lifestyle (FCS, 2009).

National School Lunch Program (NSLP): A federally funded meal program that functions in public and nonprofit private schools as well as residential child care institutions to supply reduced price or free lunches for children everyday that are nutritionally adequate and balanced (United States Department of Agriculture [USDA], 2009a).

Obesity: A term used to describe children and adolescents age two to 19 years who have a BMI-for-age equal to or above the 95th percentile when compared to children and adolescents of the same sex and age (CDC, 2009).

Overweight: A term used to describe children and adolescents age two to 19 years who have a BMI-for-age between the 85th and 95th percentile when compared to children and adolescents of the same sex and age (CDC, 2009).

School Breakfast Program (SBP): A federally assisted meal program that functions in public schools and residential childcare institutions to make breakfast available each day to students for a reduced price or free that are nutritionally adequate (USDA, 2009a).

Social Cognitive Theory (SCT): A theory that is a broad, multifaceted causal structure for regulating human behavior, drive and prosperity that involves various concepts such as self-efficacy, goals, outcome expectations and environment. This theory incorporates a central set of determinants, the system through which the

determinants function and the most favorable means of transforming knowledge into successful behaviors (Bandura, 2004).

CHAPTER II

REVIEW OF LITERATURE

Health Concerns of Elementary School-Age Children

The prevalence of obesity in children and adolescents ages six to 19 years tripled between 1980 and 2002 (Ogden, Flegal, Carroll & Johnson, 2002). The 2003-2004 National Health and Nutrition Examination Survey (NHANES) indicated 19.9 percent of boys and 17.6 percent of girls age six to 11 years-old were overweight or obese (Ogden et al., 2006). Data from the 2003 National Survey of Children's Health (NSCH) found 13.4 percent of Oklahoma children ages five to 17 were overweight and 21.9 percent of this age group were obese. A greater percentage of Oklahoma boys compared to girls were overweight and obese (Tudor-Locke, Kronenfeld, Kim, Benin & Kuby, 2007).

This is especially concerning because childhood overweight and obesity are likely to track into adulthood and appear to be an additional risk factor for morbidity and mortality observed in adults, creating a possible lifetime of inferior health (Steinberger, Morgan, Hong, Jacobs & Sinaiko, 2001; Dietz, 1998; Whitaker, Wright, Pepe, Seidel & Dietz, 1997). Morrison, Friedman and Gray-McGuire (2007), using data from the Lipid Research Clinics Princeton Prevalence Study (LRC) and Princeton Follow-up Study (PFS), reported that 63 percent of the children initially classified as overweight were

classified as obese in the follow-up. In addition, children who originally presented with metabolic syndrome were significantly more likely to present with CVD after 25 years.

Childhood obesity has been linked to numerous negative physical, emotional and social consequences. Obesity in children can result in hypertension, type 2 diabetes mellitus, hyperlipidemia, nonalcoholic fatty liver disease and metabolic syndrome, diseases usually associated with adult overweight or obesity (Spiotta & Luma, 2008; Weiss & Kaufman, 2008). The SEARCH for Diabetes in Youth (SEARCH) Study Group (2006) reported that the prevalence of type 2 diabetes among American children 10 to 19 years-old ranged from six percent for non-Hispanic white children (0.19 cases per 1000 youth overall) to 76 percent for American Indian children (1.74 cases per 1000 youth overall). A child's weight also appears to affect school absence. Geier et al. (2007) studied the number of days urban fourth to sixth grade Pennsylvania children were absent and their relative weight, and reported obese students were absent significantly more often than those in the normal weight range. Furthermore, children and adolescents classified as overweight or obese experienced psychological distress, body image dissatisfaction, lower self-esteem and lower psychosocial quality of life (Young-Hyman et al., 2006; Huang, Norman, Zabinski, Calfas & Patrick, 2007; Wallander et al., 2009).

Epstein, Paluch, Beecher and Roemmich (2008) indicated that concentrating on an increased intake of healthful dietary choices, such as fruit, vegetable and low-fat milk products, rather than just a decreased intake of high energy-dense items was more beneficial at reducing weight of children and their parents. With the recent increase in prevalence of overweight and obesity throughout the United States and the serious consequences associated with obesity, it is imperative to identify cost-effective,

successful programs aimed at improving dietary behaviors and overall health, especially among children. Lifestyle behaviors acquired during childhood greatly impact future lifetime activities and habits; therefore, the most reasonable solution is to provide education directed toward behavior change during childhood (Baker et al., 2005).

Health Benefits of Fruits, Vegetables, Whole Grains and Milk Products

The *2005 Dietary Guidelines for Americans* identifies fruits, vegetables, whole grains and low-fat milk products as food groups to encourage in the attainment of good nutritional status (United States Department of Health and Human Services [USDHHS] & USDA, 2005). The scientific evidence supports that people who consume adequate quantities of these foods have a lower risk for developing cardiovascular disease (CVD), type 2 diabetes and osteoporosis (Bazzano, He, Ogden, Loria & Whelton, 2003; Slavin, 2008; Ma, Johns & Stafford, 2007).

Adequate fruit and vegetable consumption has been linked to a decreased risk of certain types of cancer, CVD, stroke, hypertension and overweight and obesity (Van Duyn & Pivonka, 2000; Tohill, Seymore, Serdula, Kettel-Khan & Rolls, 2004). The protective health benefits are thought to be mediated through antioxidants and phytochemicals, which are present in fruits and vegetables (Van Duyn & Pivonka, 2000). Antioxidants and phytochemicals are biologically active compounds that function in the body to scavenge free radicals preventing cell damage, which is thought to protect against disease (Gropper, Smith & Groff, 2005). A cross-sectional study conducted by Djousse et al. (2004) found that fruit and vegetable intake was inversely associated with low-density lipoprotein (LDL) cholesterol and that groups with the highest intake had a LDL

cholesterol approximately six percent to seven percent lower than the group with the lowest intake. Joshipura and colleagues (1999) reported a protective link between eating fruits and vegetables and risk of ischemic stroke using data from two large cohorts. Lin and Morrison (2002) found a link between low fruit and vegetable intake and a greater body weight in both males and females.

Although much of the research regarding fruits and vegetables and disease has been conducted with adults, more recent research reports protective benefits in adolescents. Holt and colleagues (2009) examined the relationship between fruit and vegetable intake and markers of inflammation and oxidative stress in a cohort of Minnesota students whose average age was 15 years. The adolescents consumed an average of 3.9 servings of fruits and vegetables excluding 100 percent fruit juice and French fried potatoes and an average of 5.5 servings per day when including these two items. Results indicated a diet with high amounts of fruits and vegetables was linked to decreased levels of inflammatory markers and markers of oxidative stress in adolescents, highlighting the fact that diet can affect health early in life (Holt et al., 2009).

A common component in fruits, vegetables and whole grains is dietary fiber (Slavin, 2008). A high-fiber diet (approximately 14 grams per 1000 calories) has been shown to have protective effects regarding CVD, type 2 diabetes and obesity (Slavin, 2008). Mozaffarain and colleagues (2003) compared people who consumed whole grain cereal with intakes in the highest quartile to those in the lowest quartile and found they had a 21 percent lower risk of developing CVD. Fiber has the ability to bind fatty acids, cholesterol and bile acids within the gut decreasing their absorption, which ultimately leads to lower serum cholesterol (Gropper et al., 2005). This metabolic mechanism is

beneficial in adults as well as children. Williams and Strobino (2008) conducted a longitudinal study with mostly low-income Head Start preschool children and found that a high intake of dietary fiber was linked to a decreased total cholesterol level by age seven to 10 years.

Data from the Nurses' Health Study indicated that increasing whole grain intake by two servings each day was linked to a 21 percent decrease in the risk of type 2 diabetes (de Munter, Hu, Spiegelman, Franz & van Dam, 2007). Fiber is thought to slow the rate at which glucose enters the blood after eating, thereby diminishing insulin secretion (Slavin, 2008). In studies of people with type 2 diabetes, results suggested dietary fiber slows gastric emptying speed, digestion and glucose absorption benefiting postprandial glucose metabolism and long term glucose control (Anderson, Allgood, Turner, Oeltgen & Daggy, 1999; Chandalia et al., 2000). One added benefit of high fiber foods is that they tend to be more nutrient dense versus energy dense and are generally lower in added sugar and fat (Slavin, 2008). Studies have linked increased satiety, reduced hunger and feelings of fullness to dietary fiber (Slavin & Green, 2007). Thus, a high fiber diet would prompt a person to consume less impacting their overall energy intake, which could contribute to maintaining a healthful weight.

Milk and milk products are good sources of calcium and vitamin D (Greer et al., 2006), both of which are required for attaining peak bone mass and preventing osteoporosis (USDHHS, 2004; Ma et al., 2007). It is crucial to begin osteoporosis prevention during childhood (USDHHS, 2004). Research has shown that the quantity of calcium consumed during children's development directly affects the quantity of bone accumulation (USDHHS, 2004), meaning that a low calcium intake leads to a lower bone

density. Peak bone mass is generally attained by the late teen years and early 20s, which could be crucial for lessening the possibility of fractures in adulthood (USDHHS, 2004; Greer et al., 2006). Epidemiological data has linked a decline in the degree of osteoporosis later in life with obtaining optimal peak bone mass in adolescence (IOM, 1997). Goulding and colleagues (1998; 2001) indicated that children and adolescents who had experienced fractures had lower calcium consumption than age matched control subjects. Goulding et al. (2004) also found children who avoided drinking milk had a greater number of fractures than those children who did drink milk. Thus, it is not only important to encourage children to consume calcium-rich foods now for protection later in life, but also for their current bone health. Learning healthful dietary habits at a young age will carry into adulthood and improve quality of life.

Fruits and Vegetables

Americans, including both adults and children, have been exposed to various campaigns focused on increasing fruit and vegetable intake, yet consumption continues to fall short of recommendations. Data from the 1999 to 2000 NHANES indicated that only 5.3 percent of four to eight year-old boys and 1.2 percent of nine to 13-year-old boys ate the recommended combined servings of fruits and vegetables each day (Guenther et al., 2006). On average, a higher percentage of girls consumed recommended amounts of fruits and vegetables with 9.8 percent of four to eight year-olds and 3.6 percent of nine to 13-year-olds meeting the recommendation. This highlights the fact that the majority of children eight to 11 years old do not meet MyPyramid recommendations of three to five cups of fruits and vegetables daily (MyPyramid, 2005).

Youth Risk Behavior Surveillance (YRBS) data from 2007, which surveys high school students, indicated that 15.7 percent of Oklahoma students consumed five or more fruits and vegetables each day, excluding fried potatoes and potato chips (CDC, 2008). Although this percentage is higher than national estimates, the YRBS data is a self-reported estimate, which suggests it is likely higher than actual intakes. Children acquire dietary behaviors and build food preferences at an early age, which most likely affects future habits (Devaney & Fox, 2008). Therefore, it is likely that poor eating behaviors observed in Oklahoma adolescents, such as low fruit and vegetable intake, were present in middle childhood.

School environments may play a role in children's intake choices. Merely presenting healthy items might not provide incentive for children to eat these items (Condon, Crepinsek & Fox, 2009). Cullen and Zakeri (2004) tracked students for two years beginning in fourth grade across their move from elementary to middle school and through fifth grade in which they gained access to a la carte and snack bar items. Researchers observed significant decreases in regular vegetable (vegetables which are not fried) and fruit intake with a parallel increase in the intake of high-fat, fried vegetables.

Fruit Recommendations and Consumption Trends

MyPyramid recommends eight to eleven year-old children consume 1.5 to two cups of fruit each day (MyPyramid, 2005). Guenther and colleagues (2006) reported boys age four to eight have an average intake of 1.5 servings of fruit per day with intakes decreasing to 1.2 servings per day among boys nine to 13 years old. In comparison, girls four to eight years consumed approximately 1.4 servings per day while nine to 13 year-old girls ate an average of 1.3 servings of fruit per day. Lorson, Melgar-Quinonez and

Taylor (2009), reported children classified as overweight by body mass index (BMI) had a considerably higher average intake of total fruit. This study also found children in the six to 11 age category were less likely to meet the recommended servings of fruit than two to five year-olds, indicating mean intake of fruit declines with age.

Income level has also been associated with fruit intake. Children living in families with an income above 350 percent of the poverty level had a significantly higher total fruit intake and a greater consumption of 100 percent fruit juice compared to children residing in households between 130 percent and 150 percent of the poverty level (Lorson et al., 2009). However, children living in both of these income groups were less likely to meet the recommended amount of fruit servings than children from households below 130 percent of the poverty level.

Participation in school meals appears to have a positive impact on fruit consumption in children. Among elementary school age children, slightly more National School Lunch Program (NSLP) participants consumed fruit (fresh, canned and 100 percent juice) than nonparticipants (55 percent compared to 45 percent, respectively) (Condon et al., 2009). Similar numbers of elementary students ate fresh fruit and drank 100 percent fruit juice at lunch; however, NSLP participants were significantly more likely to consume canned fruit than nonparticipants. NSLP participants who were classified as low-income reported eating more fruit than their nonparticipant peers (Cole & Fox, 2008). At breakfast, two thirds of elementary School Breakfast Program (SBP) participants consumed fruit, whereas only one third of nonparticipants ate fruit (Condon et al., 2009). One-hundred percent fruit juice was the main fruit item consumed during

breakfast for both participants and nonparticipants; however, nonparticipants were significantly more likely to consume whole fruit.

Lack variety in fruit intake appears to be a frequent problem in children's diets. One-hundred percent fruit juice accounted for greater than 30 percent of total fruit consumption in six to 11 year-olds (Lorson et al., 2009). Of all the 100 percent fruit juice consumed, orange and grapefruit juices alone make up half (Bachman, Reedy, Subar & Krebs-Smith, 2008). Apples, pears, bananas and melons are the top four whole fruit items consumed in the United States by residents two years and older (Bachman et al., 2008). These consumption trends indicate nutrition education programs need to focus not only on increasing total fruit intake, but also promoting variety and emphasizing fresh, frozen or canned fruits over 100 percent fruit juice.

Vegetable Recommendations and Consumption Trends

According to MyPyramid, eight to 11 year-olds should consume 1.5 to three cups of vegetables each day (MyPyramid, 2005). Of these, 1.5 to three cups per week should be dark green vegetables, one to two cups per week should be orange vegetables, one to three cups per week should be legumes and starchy vegetables should not exceed 2.5 to six cups per week. Guenther et al. (2006) indicated four to eight year-old boys and girls had a mean daily vegetable intake of 2.0 servings per day. Nine to 13 year-old boys and girls consumed 2.4 and 2.5 servings, respectively, of all vegetables each day. Boys ages four to 13 ate about 1.1 servings everyday of starchy vegetables and 0.1 servings per day each of dark green vegetables, orange vegetables and legumes. Girls ages four to 13 followed the same pattern with the exception of a slight increase to 0.2 servings of legumes per day among nine to 13 year-olds. Two times as many elementary school

NSLP participants ate a minimum of one vegetable compared to nonparticipants (51 percent versus 24 percent) (Condon et al., 2009).

The frequent consumption of white potatoes may replace consumption of more nutrient dense legumes and orange and dark green vegetables. Approximately 80 percent of starchy vegetable servings came from white potatoes, which accounted for a mean daily intake of 1.0 servings (Guenther et al., 2006). Bachman and colleagues (2008) reported other white potatoes, fried white potatoes and potato/corn/other chips as the top three contributors to starchy vegetables followed next by corn. Among children, French fries contributed over 28 percent of the total vegetable intake (Lorson et al., 2009). In food insecure households, French fries accounted for a greater percentage of children's total vegetable intake compared to peers residing in food secure households. Also, children classified as obese were found to eat a greater amount of French fries than those classified as normal weight or overweight.

School meal participation seems to contribute to white potato and starchy vegetable intake. Condon et al. (2009) reported NSLP participants were more likely to consume various forms of white potatoes, excluding French fries, than nonparticipants. One possible reason for this is that starchy vegetables were the most likely to be included in school lunch menus compared to other vegetable subgroups. Although starchy vegetables are the most commonly consumed vegetable for both groups, NSLP nonparticipants were significantly less likely than participants to consume such vegetables (Condon et al., 2009). This could be due to the fact that NSLP nonparticipants are less likely to consume vegetables in general.

Other vegetables, such as dark green or orange vegetables, were also affected by school meal consumption. No more than eight percent of elementary age students consumed orange or dark green vegetables, non-entrée lettuce salads and other vegetables; however, NSLP participants were significantly more likely to eat the lettuce salads and other vegetables than nonparticipants (Condon et al., 2009). The top three contributors to dark green vegetables were broccoli, lettuces, such as romaine, and spinach (Bachman et al., 2008). Top contributors to orange vegetable intake are mainly carrots, but also sweet potatoes. Lettuce and tomatoes and tomato sauces were leading sources of vegetables from the other vegetable subgroup. As with fruit, variety also seems to be lacking regarding vegetable intake providing an opportunity for nutrition education programs to introduce a wide range of vegetables to children.

Milk and Milk Products

The *2005 Dietary Guidelines* recommend two to eight year-olds consume two servings from the milk group each day, while children age nine and older need three servings each day (USDHHS & USDA, 2005). Research highlights that the majority of third and fourth grade students do not meet milk group recommendations. Kranz and colleagues (2007), using combined NHANES data from 1999 to 2000 and 2001 to 2002, found that four to eight year-olds met MyPyramid recommendations for dairy intake while nine to 13 year-olds consumed significantly less than three cups each day. Both age groups consumed on average between one to 1.5 cups from fluid milk and approximately two servings overall from the milk group per day (Kranz et al., 2007). The discrepancy in meeting needs between age groups appears to arise from the increased recommendation

of two to three servings each day. Kranz et al. (2007) also reported nine to 13 year-old children consumed significantly less calcium than the adequate intake (AI) level whereas younger children's calcium intake was considerably higher than the AI. In keeping with national trends, the YRBS prevalence data indicated that only 10.8 percent of Oklahoma high school students consumed three or more glasses of milk each day (CDC, 2008). Moreover, Cullen and Zakeri (2004) reported milk consumption significantly decreased when children entered fifth grade and gained access to a snack bar, which was paralleled with an increase in sugar-sweetened beverage intake. Therefore, nutrition education programs promoting increased milk consumption should encourage children to add one more serving each day, perhaps with lunch or dinner, and stress health benefits of milk compared to sugar-sweetened beverages.

Fluid milk accounted for over 60 percent of American's milk group servings followed by cheese (36 percent) and yogurt (two percent) (Bachman et al., 2008). Bachman and colleagues (2008) reported reduced fat milk (one percent and two percent fat) is most commonly consumed followed by whole milk and lastly skim milk. The choice of reduced-fat fluid milk by more people compared to whole milk does not hold true for cheese choices. Cheese made from whole-milk eaten as a separate item accounted for 44 percent of American's cheese intake and is eaten about five times more than reduced-fat cheese (eight percent) (Bachman et al., 2008). These consumption trends hold true in children who mostly consumed fluid milk followed by cheese and dishes containing cheese, like pizza or pasta dishes, and yogurt (Kranz et al., 2007). For children ages four to 13, the dairy items eaten were generally higher fat forms of the foods (Kranz et al., 2007).

Flavored milk is an appealing choice for children and may encourage consumption without contributing excessive calories. NSLP and SBP participants were significantly more likely to drink flavored milk compared to nonparticipants (Condon et al., 2009). Four to 13 year-olds reported drinking flavored milk between 16 percent and 18 percent of the time (Kranz et al., 2007). Murphy, Douglass, Johnson and Spence (2008) found that consuming flavored milk did not significantly increase added sugars or have adverse effects on weight in a nationally representative sample of children, but that access to flavored milk could aid in encouraging total milk intake. Milk drinkers, regardless of whether the milk was flavored or plain, were reported to have better-quality nutrient intakes than milk nondrinkers. Thus, it seems to be more important that children consume any flavor of milk than no milk at all.

Whole Grains

Five to seven ounces of grains are recommended each day, of which at least half, about three ounces, should be whole grains (MyPyramid, 2005; USDHHS & USDA, 2005). Research indicated all children consumed a mean daily intake of just 0.8 to 1.0 servings of whole grains, which falls well below the recommendation (Cook & Friday, 2005; Harnack, Walters & Jacobs, 2003). On average, six to 11 year-olds met the total grain recommendation each day, but ate only 0.9 servings of whole grains (Harnack et al., 2003). Approximately 13 percent of children ages six to 11 consumed two or more servings of whole grains everyday. Furthermore, school age children living at or below 150 percent of the poverty level had a greater likelihood of eating less than one whole grain serving each day (Harnack et al., 2003).

The second Continuing Survey of Food Intakes by Individuals (CFSII) reported ready-to-eat cereals (33.5 percent), yeast breads (19.2 percent), corn and other chips (16.5 percent), popcorn (9.9 percent) and hot breakfast cereals (8.1 percent) as the top five sources of whole grains in six to 11 year-old children's diets (Harnack et al., 2003). More recent NHANES data (2001-2002) confirmed ready-to-eat cereals and hot cereals combined contributed over 40 percent of whole grains consumed in American's diets, as well as identifying yeast breads, popcorn and crackers as other leading contributors (Bachman et al., 2008). Grain-based desserts (3.5 percent) contributed more whole grain sources than rice or rice dishes (2.8 percent). Therefore, schools should include more whole grain items at both breakfast and lunch, such as ready-to-eat cereals, items as part of combination entrées and separate bread items, while nutrition education programs promote their health benefits and children's exposure to whole grains.

Breakfast

Breakfast has been termed the most important meal of the day yet it is the meal most frequently skipped by children in elementary school (Rampersaud, Pereira, Girard, Adams & Metzl, 2005; Briefel, Wilson & Gleason, 2009). Briefel and colleagues (2009) reported approximately eight to 10 percent of elementary age children skip breakfast, while NHANES 2001-2002 data indicated 13 percent of six to 11 year-olds skip breakfast (USDA, 2009b). Gross, Bronner, Welch, Dewberry-Moore and Paige (2004) conducted a study to determine meal skipping patterns in fourth grade students from Maryland and found 17 percent of the students stated they skipped breakfast, with children residing in suburban areas being the least likely to report skipping breakfast (eight percent) followed

by rural children (13 percent) and urban children (27 percent). Breakfast skipping appears to increase with age and be more prominent among certain minorities and low income families (USDA, 2009b; Niemeier, Raynor, Lloyd-Richardson, Rogers & Wing, 2006). The most commonly eaten breakfast items for two to 11 year-olds included milk; ready-to-eat cereals; breads, bagels, rolls, etc. (mostly white breads) and 100 percent fruit juice (USDA, 2009b).

Breakfast has been associated with nutrient profiles, memory, academic performance, attendance and weight status. Consuming breakfast is linked to greater nutrient intake overall and children who regularly consume breakfast have a greater chance of better diet quality including macronutrient, micronutrient and fiber intake (Rampersaud et al. 2005). Research shows eating breakfast could positively influence cognitive function, especially memory, academic performance and school attendance rates (Rampersaud et al., 2005; Mahoney, Taylor, Kanarek & Samuel, 2005; Kleinman et al., 2002). Meal composition has been shown to have an effect, with children consuming oatmeal versus ready-to-eat cereal performing better on short term memory tasks (Mahoney et al., 2005). Furthermore, consuming breakfast has been associated with a lower BMI among children and adolescents (Gleason & Dodd, 2009; Niemeier et al., 2006).

Food Safety Knowledge

It is important for children to understand basic food safety knowledge, such as washing hands, keeping foods cold or hot and separating foods to decrease the likelihood of foodborne illness, but also because many times they have a role in preparing snacks for

themselves or, in some cases, helping prepare meals. Researchers have little insight regarding the role of adolescents in food-related tasks such as shopping and preparation as few studies have depicted their involvement (Larson, Story, Eisenberg & Neumark-Sztainer, 2006). However, Larson and colleagues (2006) reported that 68.6 percent of adolescents assisted with dinner preparation at home and 49.8 percent had helped grocery shop at least once in the previous week. Younger adolescents (i.e. middle school) and females aided with preparing and shopping more often than older adolescents and males. Additionally, students classified in the low socioeconomic status (SES) assisted with food-related jobs more often ($p<0.001$) than peers who were considered to be middle and high SES (Larson et al., 2006).

Few studies have evaluated hand washing prevalence and adherence to food safety rules among children as well. Abbot, Byrd-Bredbenner, Schaffner, Bruhn and Blalock (2009) found that just 39 percent of young adults stated washing their hands before preparing food and were observed to follow only 25 percent of the recommended procedures for hand washing. Moreover, the young adults abided by less than half of the optimal standards for safe food handling. These behaviors have most likely carried over from childhood.

Physical Activity

Eight to 11 year-old children should participate in at least 60 minutes of physical activity each day (USDHHS & USDA, 2005; Council on Sports Medicine, 2006). The American Academy of Pediatrics (AAP) recommends the physical activity be of moderate intensity from an assortment of activities including sports, recreation,

transportation, chores, work, planned exercise and school-based physical education classes and that numerous smaller bouts of activity throughout the day versus continuous activity is acceptable (Council on Sports Medicine, 2006). In order for children to meet the recommendation, the activity should be mostly unstructured and enjoyable (Council on Sports Medicine, 2006). In addition, children older than two years should be limited to no more than two hours of quality screen time each day including television, video games, computer time, computer games, etc (Committee on Public Education, 2001).

YBRS 2007 data indicated 49.6 percent of Oklahoma high school students participated in at least 60 minutes of physical activity that increased their heart rate on five or more days of the week prior to the survey (CDC, 2008). A smaller percentage of Oklahoma female students met the recommendation than males (36.1 percent versus 62.4 percent). NHANES 2001-2004 data found that 37.3 percent of four to 11 year-olds engaged in low levels of active play each week and 65 percent of four to 11 year-olds engaged in more than two hours of screen time per day, while 26.3 percent of this age group had both low levels of active play and high screen time (Anderson et al., 2008). Again, boys were more likely to be active than girls with 31.4 percent reported to have low active play compared to 43.4 percent of girls.

Matthews et al. (2008) reported six to 11 year-old children spent on average approximately six hours each day participating in all types sedentary behaviors, which was measured by an accelerometer, and that girls were more sedentary than boys. Most importantly, time spent in sedentary activities increased to approximately eight hours per day through the teen years. Nineteen percent of Oklahoma high school students reported playing video or computer games, or using a computer for at least three hours each day

and 33 percent reported watching at least three hours of television each day (CDC, 2008). Physical activity is perhaps just as important as a proper diet to be able to live a healthy lifestyle and education programs should focus on promoting enjoyable activities to increase the likelihood of lifetime participation in physical activity.

School-Based Interventions

For a variety of reasons, schools present an ideal location to teach children about nutrition and encourage increased levels of physical activity. School systems have acknowledged they hold some accountability for nutrition and physical activity (Baranowski, Cullen, Nicklas, Thompson & Baranowski, 2002). A large percentage of school age children are enrolled in school settings where they spend a considerable amount of their time and eat a sizeable amount of their daily intake (Baranowski et al., 2002; Katz et al., 2005; Story, 2009). Many schools provide multiple meal services (breakfast, lunch, and after school snack) offering an opportunity for students to practice healthy food choices, which can lead to the development of a healthier diet (Briefel et al., 2009). In addition, the food environment at school is able to present healthful items to students repeatedly increasing their exposure to these items (Burgess-Champoux, Chan, Rosen, Marquart & Reicks, 2007). Similarly, gym facilities can be utilized to introduce students to a wide range of physical activities that can be enjoyed throughout their lifetime (Katz et al., 2005).

Because schools offer a prime location for delivery of nutrition education programs, numerous school-based interventions have been developed and have resulted in fairly consistent increases in nutrition knowledge; however, additional reinforcement

might be necessary for sustainability of positive dietary behavior changes (Robertson & Zalles, 2004; DeVault et al., 2009). In a meta-analysis of school-based obesity prevention programs, Baranowski and colleagues (2002) found successful programs were taught by staff trained and employed from outside the school system and implemented positive messages. With the increasing amount of pressure on teachers to achieve academic benchmarks, Belansky et al. (2006) emphasizes the importance of fun, engaging curricula. Their school-based study in a low-income, rural area evaluated program effectiveness including assessing teachers' impression of the program and found that teachers identified the use of writing, hands-on learning and cooperative learning as the most effective approaches to teaching the curriculum. A study interviewing key informants involved with the Child and Adolescent Trial for Cardiovascular Health (CATCH) program revealed ease of use by those involved, children's approval and satisfaction, proper training concerning implementation, provision of supplies or needed items and confidence in the advantages to students as reasons and incentive for continuing the CATCH program (Lytle, Ward, Nader, Pedersen & Williston, 2003).

Howerton et al. (2007) conducted a meta-analysis of school-based nutrition programs primarily involving elementary children and reported the interventions were successful in prompting a moderate increase in fruit and vegetable intake. All the included studies utilized the school classroom in at least one component of the curriculum. Results indicated gender, race and intervention length did not significantly impact net relative change in fruit and vegetable intake; however, grade, dose, type of intervention and relationship between dose and grade did significantly influence fruit and

vegetable consumption. Interestingly, more concise doses, evaluated by minutes per year, were more likely to result in increased fruit and vegetable consumption.

Gimme 5, a program designed to increase fruit and vegetable consumption, was directed toward third, fourth and fifth grade students in the school setting for a period of six weeks and included 12 sessions of approximately 45 minutes each (Baranowski et al., 2000). This nutrition intervention employed social cognitive theory (SCT) and the lessons were participatory in nature. In addition, newsletters were sent home with students weekly. Results of Gimme 5 indicated the program was able to positively affect children's intake of fruits and vegetables; however, only slight changes were noted.

Other successful nutrition intervention programs were of shorter duration. Powers, Struempler, Guarino & Parmer (2005) evaluated a nutrition education program based on SCT directed towards mostly low-income second and third grade students. The program was taught by nutrition educators from the Alabama Cooperative Extension Nutrition Education Program, focused on nutrition knowledge and behavior change and was assessed using a self-reported pre- and post-test. Lessons were taught weekly for six weeks. Results indicated six hours of nutrition education significantly ($p<0.001$) increased overall nutrition knowledge and several specific nutrition knowledge categories, as well as successfully influencing small dietary behavior changes specifically regarding dairy and vegetable intake at lunch and fruit intake. Fahlman, Dake, McCaughtry and Martin (2008) evaluated the effects of Michigan Model (MM) Nutrition Curriculum, which consisted of eight lessons, among middle school students (mean age approximately 12 years) through a self-reported pre- and post-test. Researchers found,

after receiving eight to 10 hours of instruction, children increased their knowledge and were more likely to indicate making changes to their eating behaviors.

While many nutrition education programs have shown improvements in students' knowledge and attitudes, changes in long-term behavior have been minimal. Because schools must contend with demands for time, assets, staff and space (Gittelsohn et al., 2003), effective nutrition education programs have to be able to overcome these demands. Lytle and colleagues (2003) identified constraint on time, little concern for inclusion of health education in schools, insufficient training and financial implications as major barriers to implementing the CATCH program. Many times, administrators and teachers are focused on the need to spend classroom time on core academics. One strategy for addressing these concerns is the incorporation of literacy, math and other core skills measured in state mandated testing programs (Belansky et al., 2006). Another barrier to successful outcomes is infidelity to intervention protocols. Townsend, Johns, Shilts and Farfan-Ramirez (2006) indicated individuals involved in delivering an EFNEP nutrition education program did not consistently adhere to the protocols they were trained to follow.

Sahay, Ashbury, Roberts and Rootman (2006) concluded that successful nutrition intervention programs were based on theory, engaged the family, conveyed clear messages, offered sufficient training, provided continued assistance and that schools were a principal network, especially when targeting larger groups. Additionally, interventions may provide more benefit if they are simple and concise enough to be completed during the allotted class time (Belansky et al., 2006). As such, present nutrition education

programs should be developed with these items in mind so that the programs begin with high probability of being successful.

Social Cognitive Theory

Social cognitive theory (SCT) is a multifaceted causal structure for human behavior, drive and prosperity that involves various concepts such as self-efficacy, goals, outcome expectations and environment (Bandura, 1977; 1986; 1997; 2004). This theory incorporates a central set of determinants, the system through which the determinants function and the most favorable means of transforming knowledge into successful behaviors (Bandura, 2004). SCT involves three major factors, individual or personal factors, behavioral factors and environmental factors, which are described below.

Individual or personal factors involve inner thoughts and feelings including forethought and self-reflection, which are able to affect behavior (Contento, 2007). Outcome expectations and self-efficacy are important aspects of personal factors involved in prompting a new behavior. Outcome expectations are defined as "beliefs about anticipated outcomes from engaging in a behavior or health-related lifestyle (that is, reasons that make the behavior or lifestyle desirable)" and there are three types (Contento, 2007, p. 116). Physical outcomes are the physical or health impacts related to the behavior, social outcomes are the social consequences of the behavior and self-evaluative outcomes are the self-evaluative responses to behaviors (Contento, 2007). All three types entail both positive outcomes and negative outcomes (Bandura, 2004). Self-efficacy "involves the exercise of personal control, requiring both skills and the confidence that we can effectively and consistently use them, even under difficult

circumstances" (Contento, 2007, p. 118). Individual efficacy attitudes can be improved through practicing or mastering a behavior, watching others, social encouragement and adaptation of emotional or physical reactions to the behavior. Thus, individuals have control over their behavior and are able to influence their own behavior change (Contento, 2007).

Behavioral factors related to nutrition "include our food-, nutrition-, and health-related knowledge and skills" (Contento, 2007, p. 115). These behavioral capabilities, or knowledge and skills, are required to perform or practice the chosen behavior and include factual knowledge, procedural knowledge and specific skills (Contento, 2007). Factual knowledge needs to be identifiable to the selected behavior. Specific to nutrition, factual knowledge could include information about foods, food labels, MyPyramid, etc. and how to utilize it. For example, to be able to choose dark green or orange vegetables, children must know facts about them such as their appearance. Procedural knowledge includes skills or knowledge to be able to do something. These skills can be simple or complex as would be needed for critical thinking, such as evaluating advantages or disadvantages to performing a behavior. An example of procedural knowledge would be knowing the hand washing steps in order to practice food safety. These two types of knowledge alone cannot translate into action regarding nutrition-related behavior (Contento, 2007). Bandura (1986) states active learning or physically performing these behavioral capabilities creates translation into action. By doing so, people gain behavioral skills (Contento, 2007). Ideally, individuals gain these skills through observation and practice, which allows the skills to become routine. SCT also states self-regulation or self-control, "the ability to direct and control our behavior", is necessary along with motivation to

begin behavior change (Contento, 2007, p. 120). Self-regulation incorporates observing the intended behavior change in order to gain the information needed to set specific behavior change goals, which allows individuals to establish the skills needed to achieve their goals. Self-regulation also includes problem solving and decision making to discover successful methods for reaching goals that are not initially achieved (Contento, 2007). Overall, individuals must utilize behavioral factors in order to ultimately attain their goals.

Environmental factors "include those factors external to us, such as the physical and social environment" (Contento, 2007, p. 115). Environmental factors also include the objective factors that influence our behavior (Contento, 2007). SCT states the environment is composed of three diverse forms: imposed, selected and created environments (Bandura, 1997). Imposed environments are out of individuals' control and include physical and sociostructural environments; therefore, individuals are only able to manage their reaction to them, work inside them or act to modify them (Contento, 2007). Selected environments are not fixed and are centered around the idea of potential and actual environments. Potential environments develop into actual environments depending on an individual's response. In other words, the actual environment changes depending on an individual's utilization of an opportunity in the potential environment. Created environments are environments that "were not even potentially there waiting to be selected" (Contento, 2007, p. 120). Individuals can create an environment to allow conduciveness for behavior change. One key feature of the environment is that it permits observational learning and behavior modeling, empowering individuals to learn about the rules of the behavior more rapidly (Contento, 2007).

Today, nutrition education programs most often employ Bandura's SCT because it offers a framework for comprehending the determinants of behavior and illustrates a means to influence behavior change that can translate into approaches to aid in behavior change action (Contento, 2007). Contento et al. (1995) indicated that behavioral theory-based nutrition education programs have proven more effective than knowledge-based programs in producing nutrition related behavior change. As previously discussed, Baranowski et al. (2000) and Powers et al. (2005) reported small, positive dietary behavior changes when using curricula based on SCT. CATCH, 5 a Day Power Plus, Integrated Nutrition Project (INP), Alabama High 5 and Squire's Quest! Programs were also rooted in social cognitive theory and all showed significant positive nutrition behavior changes (Perry et al., 1998a; Perry et al., 1998b; Auld, Romaniello, Heimendinger, Hambidge and Hambidge, 1998; Reynolds et al., 2000; Baranowski et al., 2003).

Summary

Today, children are at increased risk of becoming overweight and obese, which can lead to numerous health consequences such as metabolic syndrome, type 2 diabetes, hyperlipidemia and hypertension. Overall, children do not meet the MyPyramid recommendations for fruit, vegetable, dairy or whole grain consumption. In addition, increased time spent in sedentary activities contributes to low participation in physical activity and, thus, increases the risk of obesity among children. Schools provide prime locations and facilities for providing nutrition education to a large number of students, but are also faced with multiple barriers to implementing these programs such as time,

availability of resources and focus on core academics. SCT, which emphasizes self-efficacy, or an individual's confidence/belief in himself/herself to carry out a behavior, is widely utilized within nutrition education programs because of its proven success regarding nutrition behaviors. The most effective nutrition education programs appear to include the following characteristics: theory based, include the family, communicate clear messages, offer sufficient training and provide continued assistance. One such program is *Food and Fun for Everyone*, which is based on SCT, taught by trained Nutrition Education Assistants (NEA), supported through CNEP and includes a parent newsletter for each lesson.

CHAPTER III

METHODOLOGY

The purpose of this study was to evaluate the effectiveness of CNEP's *Food and Fun for Everyone* nutrition education curriculum for improving nutrition related behaviors in third and fourth grade students enrolled in schools meeting low-income criteria throughout the nine CNEP units in Oklahoma. The study utilized quantitative, quasi-experimental design with a purposive sample. Demographic data (Appendix A) and pre- and post-survey (Appendix B) scores were collected from January to May 2009. This study was approved by the Oklahoma State University Institutional Review Board as non-human research (Appendix C).

The CNEP unit Area Coordinators (AC) were trained and instructed to have the Nutrition Education Assistants (NEA) administer the pre-survey prior to teaching the lesson series, conduct all six lessons, and administer the post-survey after completion of the last lesson presentation. The protocol was to be followed in three third grade and three fourth grade classes in each unit, yielding approximately 1,080 completed matched surveys. To minimize error from variability in teaching styles, ACs were asked to have only one NEA per unit conduct the lessons and collect the surveys utilized in this study. NEAs were instructed to adhere to the following protocol: staple the attachment (Appendix A) to both the pre- and post-surveys before administering them, match the

pre-survey and post-survey by student initials, make copies as needed for unit use, rubber-band each class's surveys together, label by CNEP unit and send the originals to the evaluator for data entry. Only two of the units, Oklahoma and Tulsa, were coded as urban; all other units were considered rural as defined by the United States Census Bureau (US Census Bureau, 2008). Two units, Northwest and Pontotoc, were unable to collect matched surveys during the study period and were excluded.

The *Food and Fun for Everyone* behavior survey was modified from the Healthy Oklahoma Youth survey, which has a reported reliability coefficient of r = 0.94 (Brown and Hermann, 2004). The survey used for this study was previously reviewed for content validity by the CNEP Director, CNEP Evaluator and CNEP Area Coordinators familiar with the lessons. The surveys were then tested with third grade students to determine their interpretation of the behavior statements. As a result, the surveys were modified to the current version, presented in Appendix B.

The dependent variables were behavior change for eight behaviors assessed by the surveys and measured with a three-point Likert scale. The scale included the following responses related to daily practices: almost always, sometimes and not very often, which were coded as "3", "2" and "1", respectively for statistical analysis. Students checked the corresponding box on the pre-survey and post-survey for each of the eight statements concerning the following behaviors: hand washing, drinking water, eating breakfast, consuming milk products, eating fruits and vegetables (two questions), eating whole grains and being physically active. Inclusion criteria for data included having completed, matched pre- and post-surveys. If one or two questions between a matched pre- and post-survey had multiple answers, the lesser behavior was entered. Exclusion criteria for data

included more than two unanswered questions or more than two answers for each question.

At the end of the data collection period, an open-ended NEA survey (Appendix D) was conducted via email to assess fidelity to lesson protocol. Only the NEAs who taught *Food and Fun for Everyone* to classes from which the matched surveys were collected were asked to respond. Questions were designed to promote a short discussion, or more than one word answers, regarding how NEAs teach lessons and what they include or eliminate. The questions included how long they had been teaching this particular curriculum; if they taught all lessons and, if not, why and what lessons are eliminated per grade; the time period for teaching the six lesson series; what specific activities are eliminated or added for each lesson; why activities were eliminated or added; if the *Ag in the Classroom* (AITC) activities were provided to the teacher; if the parent newsletters were handed out; and if teaching this year was comparable to previous years.

Statistical Analysis

Data was analyzed using Statistical Program for Social Sciences (SPSS) version 16.0 for Windows (SPSS Inc, Chicago IL, 2009). Frequencies analysis was used to provide descriptive characteristics of the sample, including grade, gender, race and residential location. Pre-survey answers were subtracted from post-survey answers to obtain the values used for statistical analysis. A paired *t* test was performed to assess differences in reported frequency of behaviors from pre to post intervention for students within third grade and fourth grade. A one-way ANOVA was conducted to compare

differences in the amount of reported behavior change between third grade and fourth grade students. Significance for all analyses was set a $p<0.05$. Qualitative content analysis was utilized to identify repeating ideas or themes reported by NEAs in the NEA survey.

CHAPTER IV

FINDINGS

Demographics

A total of 746 completed, matched pre- and post-surveys were received and analyzed. Demographic characteristics are summarized in Table 4.1 (p. 38). Third grade students represented 52.7 percent of the participants and 47.3 percent were fourth grade students. An equal number of boys (50 percent) and girls (50 percent) had complete data. The sample consisted of 37.8 percent White, 18.0 percent American Indian/Alaskan Native, 17.8 percent Black/African American, 4.3 percent Hispanic/Latino, 0.7 percent Asian, 0.4 percent Native Hawaiian/Pacific Islander and 20.5 percent mixed race. The majority of the students (69.7 percent) lived in rural parts of Oklahoma versus urban locations (30.3 percent).

Table 4.1 Demographic Characteristics

	n	%
Grade		
Third	393	52.7
Fourth	353	47.3
Total	746	100.0
Gender		
Boy	373	50.0
Girl	373	50.0
Total	746	100.0
Race		
White	282	37.8
Mixed Race	153	20.5
American Indian/Alaskan Native	134	18.0
Black/African American	133	17.8
Hispanic/Latino	32	4.3
Asian	5	0.7
Native Hawaiian/Pacific Islander	3	0.4
Total	742	100.0
Residential Location		
Rural	520	69.7
Urban	226	30.3
Total	746	100.0

Behavior Change

Pre- and post-survey results for both third and fourth grade students are reported in Appendix E. A paired *t* test was conducted to identify behavior changes among students in third grade and fourth grade by comparing the pre- and post-surveys. Third grade results are reported in Table 4.2 (p. 39), fourth grade in Table 4.3 (p. 40). Overall, students in both grades reported an increased frequency in performing each evaluated behavior. For third grade students, six of the eight behaviors, “I wash my hands before I eat” ($p \leq 0.001$), “I drink water every day” ($p=0.003$), “I drink milk or eat cheese or yogurt every day” ($p \leq 0.001$), “I eat fruit every day” ($p \leq 0.001$), “I eat green or orange vegetables every day” ($p \leq 0.001$) and “I eat whole grains every day” ($p=0.035$), were found to be

positively, significantly different after receiving the *Food and Fun for Everyone* program. Fourth grade students had positive, significantly different results for seven of the eight behaviors including "I wash my hands before I eat" (p=0.005), "I drink water every day" (p=0.010), "I eat breakfast at school or at home" (p=0.020), "I drink milk or eat cheese or yogurt every day" (p≤0.001), "I eat fruit every day" (p≤0.001), "I eat green or orange vegetables every day" (p=0.008) and "I eat whole grains every day" (p=0.019).

Table 4.2 Third Grade Students Mean Pre/Post Intervention Scores

Behavior	n	Mean ± SD[a]	P-value[b]
I wash my hands before I eat.	393	Pre 2.43 ± 0.70 Post 2.59 ± 0.60	0.001[b]
I drink water every day.	392	Pre 2.48 ± 0.64 Post 2.59 ± 0.62	0.003[b]
I eat breakfast at school or at home.	389	Pre 2.57 ± 0.65 Post 2.63 ± 0.61	0.107
I drink milk or eat cheese or yogurt every day.	390	Pre 2.15 ± 0.75 Post 2.30 ± 0.75	0.001[b]
I eat fruit every day.	390	Pre 2.19 ± 0.74 Post 2.38 ± 0.66	0.001[b]
I eat green or orange vegetables every day.	390	Pre 1.89 ± 0.78 Post 2.14 ± 0.75	0.001[b]
I eat whole grains every day.	389	Pre 2.18 ± 0.76 Post 2.28 ± 0.70	0.035[b]
I am physically active every day.	392	Pre 2.80 ± 0.50 Post 2.84 ± 0.44	0.204

[a] 3 point Likert Scale
1 = Not Very Often
2 = Sometimes
3 = Almost Always
[b] significant at p<0.05

Table 4.3 Fourth Grade Students Mean Pre/Post Intervention Scores

Behavior	n	Mean ± SD[a]	P-value[b]
I wash my hands before I eat.	352	Pre 2.47 ± 0.63 Post 2.57 ± 0.60	0.005[b]
I drink water every day.	353	Pre 2.54 ± 0.61 Post 2.63 ± 0.55	0.010[b]
I eat breakfast at school or at home.	353	Pre 2.61 ± 0.61 Post 2.69 ± 0.56	0.020[b]
I drink milk or eat cheese or yogurt every day.	353	Pre 2.24 ± 0.79 Post 2.44 ± 0.67	0.001[b]
I eat fruit every day.	351	Pre 2.28 ± 0.68 Post 2.43 ± 0.64	0.001[b]
I eat green or orange vegetables every day.	353	Pre 2.08 ± 0.79 Post 2.19 ± 0.75	0.008[b]
I eat whole grains every day.	353	Pre 2.31 ± 0.70 Post 2.41 ± 0.68	0.019[b]
I am physically active every day.	353	Pre 2.84 ± 0.43 Post 2.89 ± 0.36	0.079

[a] 3 point Likert Scale
1 = Not Very Often
2 = Sometimes
3 = Almost Always
[b] significant at $p<0.05$

Frequencies were run on the amount of change between the pre- and post-surveys. Percents for third and fourth grade students are reported in Table 4.4 (p. 41-42). Those reporting a positive change mostly indicated only one degree of change. Less than eight percent of third grade students and less than six percent of fourth grade students reported two levels of improved behavior change. Approximately 15 percent to 25 percent of students in both grades reported one level of positive change with the exception of "I am physically active every day" for which approximately 80 percent and 85 percent of the students (third and fourth grade respectively) reported no change. For the other seven

behaviors, the majority of children reported no change before and after the lessons, with the exception of "I eat whole grains every day" for third grade students (45.8 percent). Less than 25 percent of third grade students and less than 18 percent of fourth grade students reported a decline in the frequency of the evaluated behaviors. It should be noted that the analysis does not differentiate the frequency of change, but only the level of change. For example, a change from not very often to sometimes and sometimes to almost always were both calculated as one level of change.

Table 4.4 Percent Students Reporting Degree of Behavior Change[a]

Behavior	3rd Grade Level of Change (%)	4th Grade Level of Change (%)
I wash my hands before I eat.		
2 levels of change	4.3	2.3
1 level of change	20.6	17.8
No change	62.6	68.0
-1 level of change	11.2	10.5
-2 levels of change	1.3	1.1
I drink water every day.		
2 levels of change	2.5	1.4
1 level of change	21.1	21.5
No change	62.8	64.0
-1 level of change	10.9	11.0
-2 levels of change	2.3	2.0
I eat breakfast at school or at home.		
2 levels of change	4.1	2.3
1 level of change	15.8	17.3
No change	64.6	68.8
-1 level of change	11.2	9.6
-2 levels of change	3.3	2.0
I drink milk or eat cheese or yogurt every day.		
2 levels of change	7.1	5.9
1 level of change	21.9	23.8
No change	53.2	55.5
-1 level of change	13.2	13.6
-2 levels of change	3.8	1.1

Table 4.4 Percent Students Reporting Degree of Behavior Change[a], *continued*

Behavior	3rd Grade Level of Change (%)	4th Grade Level of Change (%)
I eat fruit every day.		
2 levels of change	5.3	2.5
1 level of change	24.4	25.2
No change	55.0	56.4
-1 level of change	12.7	15.0
-2 levels of change	1.8	0.3
I eat green or orange vegetables every day.		
2 levels of change	7.9	4.8
1 level of change	25.7	22.1
No change	50.6	56.4
-1 level of change	13.0	13.3
-2 levels of change	2.0	3.4
I eat whole grains every day.		
2 levels of change	7.4	4.2
1 level of change	22.4	21.5
No change	45.8	56.4
-1 level of change	19.6	15.6
-2 levels of change	3.8	2.3
I am physically active every day.		
2 levels of change	3.1	1.7
1 level of change	8.7	7.1
No change	78.9	85.3
-1 level of change	7.4	5.7
-2 levels of change	1.8	0.3

[a]One level of positive change indicates an increase in the reported frequency of a behavior such as a change from not very often to sometimes or sometimes to almost always. One level of negative change indicates a decline in the frequency of a behavior such as a change from almost always to sometimes or sometimes to not very often. Two levels of change indicate a change from not very often to almost always (positive) or almost always to not very often (negative).

A one-way ANOVA was conducted to compare the mean behavior change reported by third grade and fourth grade students to ascertain whether or not one set of lessons (third or fourth grade) had more impact. The data is summarized in Table 4.5 (p. 43). A weak, but significant difference between the two grades was only observed for one

behavior, “I eat green or orange vegetables every day” (p=0.035). Third grade students reported a greater behavior change between the pre- and post-surveys (mean 0.25 ± 0.86) than fourth grade students (mean 0.12 ± 0.82).

Table 4.5 Comparison of Mean Change between Third and Fourth Grade Students

Behavior	3rd Grade (mean ± SD)	4th Grade (mean ± SD)	P-value[a]
I wash my hands before I eat.	0.16 ± 0.72	0.10 ± 0.64	0.244
I drink water every day.	0.12 ± 0.71	0.09 ± 0.67	0.788
I eat breakfast at school or at home.	0.06 ± 0.75	0.08 ± 0.66	0.695
I drink milk or eat cheese or yogurt every day.	0.15 ± 0.88	0.20 ± 0.79	0.470
I eat fruit every day.	0.19 ± 0.79	0.15 ± 0.71	0.453
I eat green or orange vegetables every day.	0.25 ± 0.86	0.12 ± 0.82	0.035[a]
I eat whole grains every day.	0.10 ± 0.93	0.10 ± 0.79	0.986
I am physically active every day.	0.04 ± 0.60	0.04 ± 0.45	0.914

[a] Significant at $p<0.05$

NEA Survey

Six NEA surveys were returned out of nine surveys that were sent to the NEAs. Of those responding, all NEAs reported teaching the *Food and Fun for Everyone* curriculum for the past two to three years. Overall, the NEAs taught all six lessons over a six week period. One NEA stated he/she occasionally taught one hour a week for three weeks providing two 30 minute lessons per hour. The average amount of time allotted to teach each lesson was 30 to 45 minutes, but ranged from 30 minutes to one hour. Most NEAs reported eliminating activities for each lesson due to time constraints and the activity eliminated varied per individual discretion. One NEA stated he/she added activities when possible to create a more hands-on, participatory lesson. The majority of

the NEAs did not give the list of *Ag in the Classroom* (AITC) activities to the classroom teacher. Two NEAs stated they were not aware of these activities and one reported the AITC websites do not work. Most NEAs handed out the parent newsletters that accompany each lesson, however, these are relatively new and one NEA was unable to distribute them because he/she had received them at the end of the school year. Overall, about half of the NEAs who returned the interview stated teaching the curriculum this year was similar to previous years. One NEA stated this year was somewhat different because children have verbalized issues related to food costs, specifically when gas prices were high.

CHAPTER V

DISCUSSION AND CONCLUSIONS

The purpose of this evaluation was to determine the effectiveness of the *Food and Fun for Everyone* nutrition education curriculum for bringing about positive nutrition related behavior changes among third and fourth grade students enrolled in low-income schools throughout Oklahoma. The *Food and Fun for Everyone* curriculum was based on SCT in that it aimed to increase the constructs of knowledge, self-efficacy and outcome expectancies of students. Targeted behaviors included washing hands before eating, drinking water, eating breakfast, consuming dairy products, eating fruits and vegetables, eating whole grains and being physically active each day. By improving these behaviors at a young age, children can develop positive behaviors that improve their current health and support lifelong well-being.

Discussion

The results show that third and fourth grade students in the study reported significant, positive changes in the majority of the evaluated behaviors. Third grade students reported a positive, significant difference in six of the eight behaviors including "I wash my hands before I eat", "I drink water every day", "I drink milk or eat cheese or yogurt every day", "I eat fruit every day", "I eat green or orange vegetables every day",

and “I eat whole grains every day”. Fourth grade students stated positive, significant changes for “I wash my hands before I eat”, “I drink water every day”, “I eat breakfast at school or at home”, “I drink milk or eat cheese or yogurt every day”, “I eat fruit every day”, “I eat green or orange vegetables every day” and “I eat whole grains every day”, seven of the eight behaviors. There was no significant difference between third and fourth grade students when comparing the mean level of behavior change for each of the behaviors with one exception, that being “I eat green or orange vegetables every day.” Third grade students reported greater positive mean change than fourth grade students.

According to SCT, personal, behavioral and environmental factors work together to influence behavior (Contento, 2007). As applied to nutrition education, this theory allows educators to understand determinants of behaviors and develop strategies to aid individuals with taking action (Contento, 2007). One focus of *Food and Fun for Everyone* was to increase children’s knowledge and skills, or behavioral capabilities. Each lesson first taught the knowledge needed to be capable of performing a behavior. For example, third grade students were taught they should eat items from each of the five food groups every day, while fourth grade students were taught the recommended amounts to consume from each food group every day. Students then participated in activities that allowed them to turn knowledge into skills. Following the example above, third grade students practiced categorizing items into the correct food groups and planned meals containing items from all five food groups, while fourth grade students also practiced planning a meal keeping recommendations in mind. In this way, students were able to practice and observe the prerequisite knowledge and skills needed to take action. Self-efficacy, or confidence to correctly perform intended behaviors (Contento, 2007),

was positively targeted through influencing the behavioral capabilities necessary for the behavior and by observation and practice. Children were also taught the benefits of eating fruits, vegetables, milk, etc., such as helping them stay healthy and grow strong bones and teeth, influencing outcome expectancies by adding reasons for and value to performing the intended behaviors. Our results suggest that, by utilizing the SCT constructs, the *Food and Fun for Everyone* program was able to significantly influence the majority of the evaluated behaviors reported by third and fourth grade students, which is consistent with previous studies (Perry et al., 1998a; Baranowski et al., 2000; Reynolds et al., 2000; Powers et al., 2005).

Although breakfast is frequently skipped more often than other meals, approximately 87 percent to 90 percent of elementary age students reported eating breakfast (Briefel et al., 2009; USDA, 2009b). Results from this study appear to be consistent with previous studies. Prior to participating in the *Food and Fun for Everyone* nutrition education intervention, almost two-thirds of third grade and fourth grade students (65.4 percent and 68 percent, respectively) reported they ate breakfast at school or home almost always. Students participating in this program are enrolled in low-income schools suggesting that many are likely participants in the school breakfast program, which could partially explain the high percentage reporting almost always consuming breakfast. The high percentage of students already performing the behavior possibly explains why we found no significant difference in the frequency for eating breakfast in third grade students.

Findings from this evaluation also indicated that a high percentage of children reported almost always participating in physical activity every day (84.7 percent for third

grade and 87.0 percent for fourth grade). Again, this could explain the non-significant behavior change for physical activity participation in third and fourth grade students. With a high percentage of children already engaging in physical activity, there is little room for improvement. Children this age have multiple opportunities throughout the day to be active, such as recess and physical education at school, afterschool programs and organized sports; thus, a high percentage reporting physical activity participation every day is expected. However, the survey instrument used in this study does not quantify the amount of physical activity children engage in and, therefore, findings are not comparable to physical activity recommendations. Previous studies indicated the majority of children and adolescents did not meet physical activity recommendations (Anderson et al., 2008; CDC, 2008).

The two sets of lessons, one for third grade and one for fourth grade, were similar in their effect with one exception. Results from this study indicate the only significantly different self-reported behavior between third and fourth grade students is "I eat green or orange vegetables every day." Third grade students reported a greater positive mean change between the pre- and post-survey than fourth grade students. Guenther et al. (2006) indicated that the percentage of children consuming the recommended amount of fruit and vegetable servings declined with age. Although the mean servings of vegetable intake increased between four to eight year-olds and nine to 13 year-olds, this was explained by an increase in the consumption of starchy vegetables and other vegetables.

The main concerns identified by the NEA surveys were time constraints regarding teaching the lessons (most only had 30 to 45 minutes) and elimination of activities related to these constraints. The activity NEAs eliminated varied widely and appeared to be

related to perceived importance by each NEA. However, these two concerns do not appear detrimental to the effectiveness of *Food and Fun for Everyone* as evidenced by our findings of significant behavior changes for the majority of the behaviors in both third and fourth grade students. Intervention length does not appear to impact program effectiveness and programs that are concise enough to be taught during allotted class time may be more beneficial (Howerton et al., 2007; Belansky et al., 2006). Townsend et al. (2006) evaluated the effectiveness of an EFNEP nutrition education program in California, which included a questionnaire for leaders (individuals teaching the lessons) involved with the treatment. Implementation scores of leaders did not foretell child outcomes, which included *Eat a Variety of Foods, Nutrition Knowledge, Food Selection* and *Food Preparation Skills and Safety Practices.*

Overall, this study highlighted a positive, significant increase in the reported frequency of the majority of the eight behaviors evaluated for both third and fourth grade students. *Food and Fun for Everyone* was based on SCT, taught by trained NEAs who are employed outside the school environment and engaged the family by including the parent newsletter, all of which are components of previously successful education programs (Sahay et al., 2006; Baranowski et al., 2002). The significant findings in the current evaluation are supported by Powers et al. (2005) who employed a similar length of curriculum and produced positive, significant behavior changes. In contrast, Perry et al. (1998a), Baranowski et al. (2000) and Reynolds et al. (2000) found positive behavior changes with programs employing a greater number of lessons. Hildebrand and Cragun (2008) found nine to 12 lessons minimum were needed to produce significant changes with adult CNEP participants. However, as mentioned previously, Howerton et al. (2007)

indicated that intervention length did not necessarily significantly affect behavior change among children. Therefore, it appears to be more important that nutrition education programs are designed well and convey understandable messages.

Several limitations should be considered. Data used in this evaluation was self-reported by the students lending itself to potential bias. As such, it is plausible the students were reporting a change in knowledge rather than actual behavior. This could be especially true for the last lesson. The post-survey was administered at the end of the sixth lesson for both grades; therefore, there was not an appropriate amount of time to allow for behavior change regarding the content of these lessons. In addition, students could have been reporting the "correct" answer or socially acceptable answers related to each behavior. Although the survey instrument was tested for validity, it was not tested for reliability and should be included in future projects utilizing the evaluation tool. Moreover, variation in teaching styles by NEAs could have influenced lesson effectiveness and reported results.

Conclusions

Positive, significant self-reported behavior changes emerged after receiving the *Food and Fun for Everyone* lessons for the majority of the eight behaviors for third and fourth grade students; therefore, the program was effective in that there was an increase of positive reported dietary behaviors in Oklahoma children participating in CNEP.

Recommendations for Future Research

Future studies should include a control group to confirm that the positive change in the measured behaviors was due to the *Food and Fun for Everyone* education program. In addition, research should focus on follow-up methods to identify if the positive dietary behaviors are sustainable. Stricter measures should be employed to uncover NEA fidelity to lesson protocol to ensure students are receiving the important activities reinforcing each lesson. In addition, the survey instrument should be evaluated for reliability.

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APPENDICES

APPENDIX A
Demographic Survey

My initials are: ___ ___ ___

Please check one:

I am a: ☐ Boy ☐ Girl

I am:
- ☐ American Indian/Alaskan Native
- ☐ Asian
- ☐ Black/African American
- ☐ Hispanic/Latino
- ☐ Native Hawaiian/Pacific Islander
- ☐ White
- ☐ Mixed Race

My age is: _____

APPENDIX B
Pre- and Post-Surveys

PRE

What do you do?

*Teacher's Name*_____ *Grade* _____
*Today's Date*_____
Read each sentence and decide how often you do each activity and put an X in the box (☒).

Sentence	Almost Always	Sometimes	Not Very Often
I wash my hands before I eat.	☐	☐	☐
I drink water every day.	☐	☐	☐
I eat breakfast at home or at school.	☐	☐	☐
I drink milk or eat cheese or yogurt every day.	☐	☐	☐
I eat fruit every day. (foods like apples, bananas, oranges, and peaches)	☐	☐	☐
I eat green or orange vegetables every day. (foods like spinach, carrots, squash, & broccoli)	☐	☐	☐
I eat whole grains every day. (foods like oatmeal, brown rice and whole wheat bread or tortillas)	☐	☐	☐
I am physically active every day. (run, swim, play sports, walk to or from school, dance, ride a bike, skate board, etc.)	☐	☐	☐

Revised 6-08: Youth Pre: FS-Y302

POST

What do you do?

*Teacher's Name*_____ *Grade* _____
*Today's Date*_____
Read each sentence and decide how often you do each activity and put an X in the box (☒).

Sentence	Almost Always	Sometimes	Not Very Often
I wash my hands before I eat.	☐	☐	☐
I drink water every day.	☐	☐	☐
I eat breakfast at home or at school.	☐	☐	☐
I drink milk or eat cheese or yogurt every day.	☐	☐	☐
I eat fruit every day. (foods like apples, bananas, oranges, and peaches)	☐	☐	☐
I eat green or orange vegetables every day. (foods like spinach, carrots, squash, & broccoli)	☐	☐	☐
I eat whole grains every day. (foods like oatmeal, brown rice and whole wheat bread or tortillas)	☐	☐	☐
I am physically active every day. (run, swim, play sports, walk to or from school, dance, ride a bike, skate board, etc.)	☐	☐	☐

Revised 6-08: Youth Post: FS-Y303

APPENDIX C
Oklahoma State University IRB Approval

Oklahoma State University Institutional Review Board

Request for Determination of Non-Human Subject or Non-Research

Federal regulations and OSU policy require IRB review of all research involving human subjects. Some categories of research are difficult to discern as to whether they qualify as human subject research. Therefore, the IRB has established policies and procedures to assist in this determination.

1. Principal Investigator Information

First Name: Theresa	Middle Initial: M	Last Name: Jacob
Department/Division: Nutritional Sciences		College: Human Environmental Sciences
Campus Address: 301 HES		Zip+4: 74078-6141
Campus Phone: 405.744.5059	Fax:	Email: therej@okstate.edu
Complete if PI does not have campus address:		
Address:		City:
State:	Zip:	Phone:

2. Faculty Advisor (complete if PI is a student, resident, or fellow) ☐ **NA**

Faculty Advisor's name: Deana Hildebrand, PhD		Title: Assistant Professor/Extension Nutrition Specialist
Department/Division: Nutritional Sciences		College: Human Environmental Sciences
Campus Address: 315 HES		Zip+4: 74078-6141
Campus Phone: 405.744.5059	Fax: 405.744.1357	Email: deana.hildebrand@okstate.edu

3. Study Information:

A. Title

Evaluation of *Food and Fun for Everyone* a Nutrition Education Program

B. Give a brief summary of the project. (See instructions for guidance)

This research project will be investigating the impact of nutrition curriculum among third and fourth grade students participating in *Food and Fun for Everyone*, a nutrition education program consisting of six nutrition lessons. The nutrition program is a component of the ongoing Community Nutrition Education Program (CNEP) conducted in traditional education settings. We are interested in identifying if the curriculum will bring about a behavior change within six nutrition lessons. Also, we will be evaluating the curriculum and identifying weaknesses/needed changes. This program is taught by Nutrition Education Assistants (NEAs) in low income schools as identified by the Oklahoma Department of Education where 50% of the students or more qualify for free or reduced meals. Process evaluation will be conducted through an email survey sent to the NEAs. The implementation period of the six lessons ranges from six weeks to three months depending on the school's schedule. Data will be collected using pre- and post-surveys asking questions to identify a behavior change. We will be collecting surveys from three third grade and three fourth grade classes in each of the nine CNEP units. We will add an attachment to the survey asking for gender, race and age as well as students' initials solely for the purpose of matching the two surveys. The surveys will be matched by the NEAs and a copy will be sent to us. The NEAs will then label each class' surveys by CNEP unit, which will be used to identify county. This information will only be used to evaluate the data by urban or rural areas.

C. Describe the subject population/type of data/specimens to be studied. (See instructions for guidance)

Students currently participating in the *Food and Fun for Everyone* nutrition education curriculum implemented through CNEP include third and fourth graders (approximate age range 8-10 years). Qualitative data will be collected from a convenience sample of approximately 1,080 surveys (540 third grade and 540 fourth grade) collected from three third grade and three fourth grade classes from each of the nine CNEP units. The students currently fill out the pre- and post-surveys regarding nutrition behaviors/behavior change as part of the CNEP program. Additional information includes age, gender and race. The students' initials will be included solely for the purpose of matching the pre- and post-surveys. The surveys will be matched by the NEAs who will then send a copy to us. We will determine the schools to be rural or urban as defined by the US Census. The email survey sent to NEAs includes questions regarding how they teach the lesson, time allowed to teach, if activities are eliminated, etc. This will be used to identify variables in delivery methods related to this curriculum. We will maintain our copies of the behavior change and process surveys locked in HES 315 and they will be kept through the completion of this research project.

4. Determination of "Research".
45 CFR 46.102(d): *Research* means a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge. Activities which meet this definition constitute research for purposes of this policy whether or not they are conducted or supported under a program which is considered research for other purposes.

One of the following must be "no" to qualify as "non-research":

A. Will the data/specimen(s) be obtained in a systematic manner?
☐ No ☒ Yes

B. Will the intent of the data/specimen collection be for the purpose of contributing to generalizable knowledge (the results (or conclusions) of the activity are intended to be extended beyond a single individual or an internal program, e.g., publications or presentations)?
☐ No ☒ Yes

5. Determination of "Human Subject".
45 CFR 46.102(f): *Human subject* means a living individual about whom an investigator (whether professional or student) conducting research obtains: (1) data through intervention or interaction with the individual or (2) identifiable private information. Intervention includes both physical procedures by which data are gathered (for example venipuncture) and manipulations of the subject or the subject's environment that are performed for research purposes. Interaction includes communication or interpersonal contact between investigator and subject. Private information includes information about behavior that occurs in a context in which an individual can reasonably expect that no observation or recording is taking place, and information which has been provided for specific purposes by an individual and which the individual can reasonably expect will not be made public (for example, a medical record). Private information must be individually identifiable (i.e., the identity of the subject is or may be ascertained by the investigator or associated with the information) in order for obtaining the information to constitute research involving human subjects.

A. Does the research involve obtaining information about living individuals?
☒ No ☒ Yes grom
If no, then research does not involve human subjects, no other information is required.
If yes, proceed to the following questions.

All of the following must be "no" to qualify as "non-human subject":

B. Does the study involve intervention or interaction with a "human subject"?
☒ No ☐ Yes

C. Does the study involve access to identifiable private information?
☒ No ☐ Yes

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D. Are data/specimens <u>received</u> by the Investigator with identifiable private information?
☒ No ☐ Yes

E. Are the data/specimen(s) coded such that a link exists that could allow the data/specimen(s) to be re-identified?
☒ No ☐ Yes
If "Yes," is there a written agreement that prohibits the PI and his/her staff access to the link?
☐ No ☐ Yes

6. Signatures

Signature of PI Theresa Jacob **Date** 11/25/08

Signature of Faculty Advisor Deana A. Hildebrand **Date** 11.25.08
(If PI is a student)

☒ Based on the information provided, the OSU-Stillwater IRB has determined that this project **does not** qualify as human subject research as defined in 45 CFR 46.102(d) and (f) and **is not subject to oversight by the OSU IRB.**

☐ Based on the information provided, the OSU-Stillwater IRB has determined that this research **does** qualify as human subject research and **submission of an application for review by the IRB is required.**

Dr. Shelia Kennison, IRB Chair

12-1-08
Date

APPENDIX D
NEA Survey

Food and Fun for Everyone NEA Interview

The following questions relate to the *Food and Fun for Everyone* curriculum. Please answer them as thoroughly as possible. Feel free to use more room than allotted for your answers. **Please return no later than June 1, 2009.**

1. How many school years have you been teaching this curriculum?
   _____

2. Do you teach all six lessons?
   ☐ Yes ☐ No

   A. If no, why not?
   _____
   _____
   _____
   _____

   B. If no, which lessons do you leave out for each grade? (Please list by name.)
   _____
   _____
   _____
   _____

3. How many weeks does it take to teach the six lesson series? Are the lessons taught weekly, monthly, etc.?
   _____
   _____

4. How much classroom time do you have to teach each lesson?
   _____

5. Specific to each lesson, are there any activities you eliminate? Are there any activities that you add? (If yes, please list by lesson name and tell specifically what you eliminate or add.)
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____

Please return to Theresa Jacob by email at therej@okstate.edu or mail to 315 HES, OSU Stillwater OK, 74078 by June 1, 2009.

A. If you eliminate or add activities, why do you do this?

_____
_____
_____
_____

6. Do you give the list of the Ag in the Classroom (AITC) lessons to the classroom teacher for each lesson?
☐ Yes ☐ No

A. If no, why not?

_____
_____
_____
_____

B. If yes, does the classroom teacher use the AITC lessons to extend the nutrition messages?
☐ Yes ☐ No ☐ Don't know

7. Do you distribute the parent newsletters after each lesson?
☐ Yes ☐ No

A. If no, why not?

_____
_____
_____
_____

8. If you have taught the *Food and Fun for Everyone* curriculum before, was teaching it again this school year typical to prior years?
☐ Yes ☐ No

A. If no, what was different?

_____
_____
_____
_____
_____

9. Is there anything else you would like to tell us about teaching this curriculum?

_____
_____
_____
_____
_____

Thank you for taking the time to fill this out. It is very much appreciated!!!

APPENDIX E
Results for Third and Fourth Grade Students Pre- and Post-Surveys

Behavior	**3rd Grade (%)**		**4th Grade (%)**	
	Pre	**Post**	**Pre**	**Post**
I wash my hands before I eat.				
Not Very Often	12.2	5.9	7.4	5.4
Sometimes	32.6	29.8	37.7	32.3
Almost Always	55.2	64.4	54.7	62.3
I drink water every day.				
Not Very Often	7.6	6.9	5.9	3.7
Sometimes	36.4	27.2	34.3	29.5
Almost Always	55.7	65.9	59.8	66.9
I eat breakfast at school or at home.				
Not Very Often	8.7	7.1	6.8	5.1
Sometimes	25.2	22.6	25.2	20.4
Almost Always	65.4	70.0	68.0	74.5
I drink milk or eat cheese or yogurt every day.				
Not Very Often	21.9	17.6	22.1	9.9
Sometimes	40.7	34.4	32.0	36.5
Almost Always	36.9	47.8	45.9	53.5
I eat fruit every day.				
Not Very Often	19.3	9.7	13.0	7.9
Sometimes	42.0	42.7	45.9	41.4
Almost Always	38.2	47.3	40.8	50.4
I eat green or orange vegetables every day.				
Not Very Often	35.6	22.1	27.2	20.1
Sometimes	38.9	41.7	38.0	40.5
Almost Always	24.9	35.9	34.8	39.4
I eat whole grains every day.				
Not Very Often	20.9	14.5	13.3	10.8
Sometimes	39.9	42.5	41.9	37.1
Almost Always	38.9	42.2	44.8	52.1
I am physically active every day.				
Not Very Often	4.6	3.1	2.5	1.4
Sometimes	10.4	9.9	10.5	8.5
Almost Always	84.7	87.0	87.0	90.1

VITA

Theresa M. Jacob

Candidate for the Degree of

Master of Science

Thesis: EVALUATION OF FOOD AND FUN FOR EVERYONE: A NUTRITION EDUCATION PROGRAM FOR THIRD AND FOURTH GRADE STUDENTS

Major Field: Nutritional Sciences

Biographical:

Education: Bachelor of Science, Nutritional Sciences, Texas Tech University, Lubbock, Texas, May 2007. Completed the requirements for the Master of Science in Nutritional Sciences at Oklahoma State University, Stillwater, Oklahoma in July, 2009.

Experience: Graduate Research Assistant from August 2008 to June 2009.

Professional Memberships: American Dietetic Association, Oklahoma Dietetic Association.

Name: Theresa M. Jacob Date of Degree: July, 2009

Institution: Oklahoma State University Location: Stillwater, Oklahoma

Title of Study: EVALUATION OF FOOD AND FUN FOR EVERYONE: A NUTRITION EDUCATION PROGRAM FOR THIRD AND FOURTH GRADE STUDENTS

Pages in Study: 70 Candidate for the Degree of Master of Science

Major Field: Nutritional Sciences

Scope and Method of Study: The objective of the evaluation was to assess the efficacy of the *Food and Fun for Everyone* curriculum utilized by Community Nutrition Education Programs (CNEP) in bringing about self-reported positive dietary behavior changes. Data from this quantitative, quasi-experimental study came from 746 repeated measure surveys obtained from a purposive sample within CNEP units throughout Oklahoma. The pre- and post-surveys evaluated eight behaviors related to the lessons and employed a three point Likert scale to evaluate behavior change. Paired *t* tests were run to identify significant behavior changes from pre-test to post-test for third grade students and fourth grade students. A one-way ANOVA was conducted to determine significant differences in behavior change between third and fourth grade students. Interviews of Nutrition Education Assistants (NEAs), who presented the lessons series, were conducted to ascertain their fidelity to the curriculum protocol. Content analysis was performed to identify consistent breaches.

Findings and Conclusions: Third grade students reported positive, significant behavior changes for six of the eight behaviors, and fourth grade students reported positive, significant changes in seven of the eight behaviors. The one-way ANOVA identified the only significantly different behavior between third and fourth grade students as "I eat green or orange vegetables every day," with third grade students reporting a greater mean change between the pre- and post-survey. Consequently, the *Food and Fun for Everyone* nutrition education program proved effective in leading to positive self-reported dietary behavior changes in Oklahoma third and fourth grade students participating in CNEP.

ADVISER'S APPROVAL: Deana A. Hildebrand, PhD.