

EVALUATION OF THE
SMARTER LUNCHROOM PROJECT:
BROADENING THE USE OF BEHAVIORAL
ECONOMICS IN OKLAHOMA MIDDLE SCHOOLS

By

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Abstract: Childhood obesity is a major problem for American youth. Evidence suggests consumption of fruits and vegetables contributes to a healthy weight. The school environment and National School Lunch Program (NSLP) are fundamental in supporting healthy eating behaviors, including fruits and vegetables, but forcing these behaviors may be counterproductive. Recent research suggests that use of behavioral economic (BE) strategies in school nutrition settings influences students to choose healthy foods. The low or no cost BE strategies are simple, making them appropriate for use in schools.

The purpose of this study, referred to as the Smarter Lunchroom Project, was to broaden use of BE in Oklahoma middle schools, identify factors associated with implementing BE principles, and examine the effects on students' fruits and vegetables selections. This community-based project trained Cooperative Extension Family and Consumer Science Educators to recruit middle schools from their respective counties, and train managers on incorporating Smarter Lunchroom strategies into their lunchrooms. Of the 69 recruited middle schools, 32 schools agreed to participate. The 8-week intervention was conducted in spring 2013. Data related to school demographics, the school lunchroom environment, use of BE strategies, and managers' attitudes, were collected using the Smarter Lunchroom Action Plan and Follow-up forms. Two sets of six-weeks of food production records, one from fall 2012, and one from the intervention period (weeks 3 through 8) were used for analysis of fruit and vegetable servings. Findings revealed a significant increase in the use of BE strategies. Managers' support of BE was high throughout the project and varied from very supportive to supportive. There was a moderate, positive correlation between managers' support and extent of BE strategy use. There was no increase in fruit and vegetable servings after the implementation of BE strategies, which may be due to timing of the project, and the recent implementation of the new NSLP meal pattern requirements. Use of the Diffusion of Innovation Theory may be useful in future efforts to further expand use of BE strategies in school cafeterias. Further research is needed to study the interaction of new meal pattern requirements and BE on students' food choices.

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CHAPTER I

INTRODUCTION

Childhood obesity is a major problem that results in significant consequences to American youth (Biro and Wien, 2010). Since 1980, the rate of childhood obesity has increased 13 percent. Currently obesity affects 17 percent of children and adolescents in the United States, as indicated by a body mass index (BMI) of greater than or equal to the 95th percentile on gender and age specific growth charts (Centers for Disease Control [CDC], 2013a). The CDC reports that the sharp increase in childhood obesity rates is a public health concern, in that obese children are at risk for severe and chronic health problems, most of which can be prevented with diet and lifestyle changes.

Obesity results from an imbalance of energy intake and energy expenditure (United States Department of Agriculture [USDA], 2010b). An example is the increased consumption of solid fats and added sugars that are often high in kilocalories (Biro & Wien, 2010). These foods often replace fruits and vegetables that are nutrient-rich, high in water volume and fiber content, and low in kilocalories (USDA, 2010b; Ohri-Vachaspati, Turner, & Chaloupa, 2012). Researchers have shown a relationship between the consumption of fruits and vegetables and the maintenance of overall health and decreased risk of disease and obesity (Epstein et al, 2008; Ohri-Vachaspati, Turner, & Chaloupa, 2012).

The USDA (2010b) establishes the Dietary Guidelines for Americans, which defines a healthy diet as one filled with fruits and vegetables, low-fat dairy, lean proteins, and whole grain foods. While these guidelines are provided to direct individuals towards consuming a diet that fulfills nutrient needs while maintaining a healthy weight, many Americans are not following these recommendations (CDC, 2009). This is especially true in Oklahoma, where data suggest that between 40 and 44 percent of Oklahoma adolescents are consuming less than one fruit and/or one vegetable per day (CDC, 2013b). In comparison, the recommendation for vegetables is 2.5 cups per day for girls, and 3 cups per day for boys, and the recommendation for fruits is 1.5 cups per day for both boys and girls (USDA, 2013b).

Increased consumption of fruits and vegetables may contribute to the prevention and decline of childhood obesity (Epstein et al., 2008). For this to occur, it is essential that youth have increased opportunities to access these foods (Institute of Medicine [IOM], 2012). Since children spend a majority of their time in the school environment and eat approximately 47 percent of their calories while at school, the IOM recommends that schools promote the consumption of fruits and vegetables and instill healthy habits in children.

Schools can achieve promoting healthy foods and habits through participation in the National School Lunch Program (NSLP) and School Breakfast Program (SBP). In response to the Healthy, Hunger-Free Kids Act of 2010, schools participating in these federal programs are required to serve a variety of fruits and vegetables in age-appropriate amounts in order to be reimbursed for the meals they serve (USDA, 2013a).

While schools are required to serve healthy food items under the NSLP, there are still many barriers that hinder the promotion and consumption of fruits and vegetables. These include a lack of funding for health promotion programs, students' perceived barriers when choosing fruits and vegetables over other types of foods, and competitive foods available to students in the lunchroom (Agron et al., 2010; Krolner et al., 2011; Guthrie et al., 2012).

With these barriers in place, schools need to be conscious and careful in the way they present healthy food changes to students. Changing a student's eating habits is not an easy task, but can be done with the help of behavioral economics (BE). Behavioral economics is based on the two principles of *reactance* and *self-attribution*, which describe how people react in certain situations (Just & Wansink, 2009). Just and Wansink describe that when people feel forced they tend to rebel, and when they choose to do something on their own, they are more likely to repeat that decision. Using BE strategies to influence what children choose in the lunchroom is a simple, cost-effective solution to getting children to choose these foods on their own, without being forced to do so (Hanks, Just, & Wansink, 2012).

Drs. David Just and Brian Wansink of Cornell University Center for Behavioral Economics in Child Nutrition Programs applied these two principles and BE research to school nutrition settings in what is referred to as the Smarter Lunchroom Movement (Cornell BEN center, 2013). The Movement promotes the use of strategies, referred to as choice architecture, to get children to choose healthier options without children realizing that they are being influenced (Hanks, Just, & Wansink, 2012). Strategies that are used in the Smarter Lunchroom Movement can be organized into four categories; convenience,

variety, appeal, and verbal prompts (Hanks, Just, Smith, & Wansink, 2013). For example, changing the location of where fruits and vegetables are served, such as placing the salad bar at the front of the lunchroom, offering fruits and vegetables by the cash register, and slicing fruit, increase the convenience of the foods. Offering more than one option of fruits and vegetables will increase variety. Creatively naming vegetable dishes and offering a variety of colors and textures increase appeal. Verbal prompts from food-service employees may contribute to the social norm of selecting a fruit or vegetable for a meal.

Problem Statement

The rise of childhood obesity is linked with low fruits and vegetables consumption, especially in school-aged youth (Nicklas & Johnson, 2004). The dietary trend is related, in part, to easy access to competitive foods, and limited access to fruits and vegetables in school nutrition settings (Guthrie et al., 2012). To date, use of BE principles has been limited to experimentally designed studies focusing on a specific strategy or a small number of strategies. Recently, Bangs (2012) conducted focus groups with school nutrition directors and learned the professionals felt the use of tested strategies, was feasible in school cafeterias. However, there has been little work done to study the extent to which the principles are implemented and the impact on students' fruits and vegetables selections. Most of the current studies on this topic are limited in the number of schools participating; therefore, a wider scale study is needed to evaluate the effectiveness of strategies as a public health approach. Further, little is known about the factors that may moderate the use of BE principles, referred to as the Smarter Lunchroom Movement.

Purpose, Objectives, and Hypotheses

The overall purpose of this study is to evaluate community-based efforts to increase the extent to which the BE principles are implemented in Oklahoma middle school nutrition settings and the impact on students' fruits and vegetables selections. A secondary goal is to assess factors that may moderate use of BE principles. Specific objectives include to:

1. Compare the extent to which BE strategies are used in middle school cafeterias before and after implementing the Smarter Lunchroom Project.
2. Compare middle school cafeteria managers' support (attitudes) for the use of BE strategies before and after implementing the Smarter Lunchroom Project.
3. Determine the relationship between managers' attitudes and the change in the use of BE strategies from before to after implementing the Smarter Lunchroom Project.
4. Compare middle school cafeteria environment characteristic scores before and after implementing the Smarter Lunchroom Project.
5. Compare the number of fruits and vegetables servings served before and after implementation of the Smarter Lunchroom Project.
6. Determine the association between the increase in fruits and vegetables servings served before and after implementing the Smarter Lunchroom project with change in 1) cafeteria managers' support for use of BE strategies, and 2) changes in the school cafeteria environment.

Hypotheses

1. Null: There will be no difference between the use of BE strategies before and after implementing the Smarter Lunchroom Project.

Alternate: There will be a greater use of BE strategies after the implementation of the Smarter Lunchroom Project.

2. Null: There will be no relationship between managers' attitudes at the beginning of the project and the change in use of BE strategies.

Alternative: Managers' attitudes will be positively correlated with change in use of BE strategies.

3. Null: There will be no changes in middle school cafeteria environment scores before and after implementing the Smarter Lunchroom Project.

Alternate: Middle school cafeteria environment scores will be higher after implementing the Smarter Lunchroom project.

4. Null: There will be no increase in the number of fruits and vegetables served before and after implementing the Smarter Lunchroom Project.

Alternate: There will be more fruits and vegetables served after the implementation of the Smarter Lunchroom Project.

5. Null: There will be no relationship in the increase in number of fruits and vegetables servings before and after implementing the Smarter Lunchroom project with changes in 1) cafeteria managers' support for the use of BE strategies, and 2) the school cafeteria environment.

Alternative: There will be a positive correlation between the increase in the number of fruits and vegetables servings after implementing the Smarter Lunchroom with

changes in 1) cafeteria managers' support for the use of BE strategies, and 2) the school cafeteria environment.

Assumptions & Limitations

It is assumed that the school lunchroom managers at the sites used in this study filled out the food production records correctly as required by the USDA. It is assumed that the training provided by the Oklahoma State Extension Educators to school lunchroom managers and/or directors on how to implement Smarter Lunchroom strategies, was thorough and accurate. Schools that chose to participate in the project were assumed to implement strategies for the entirety of the intervention (8 weeks).

Limitations included a smaller than expected sample size which could limit the ability to measure significant changes. Some schools having less success over others may limit the ability to identify those schools with significant improvements in students' fruits and vegetables choices. Managers who did not accurately complete the food production records may have limited the reliability of the data. However, previous work has shown that these documents are useful in measuring change in students' fruits and vegetables choices (Bangs, 2012).

Definition of Terms

Body Mass Index (BMI): A reliable indicator of body fatness for most people calculated by dividing a person's weight (kg) by height (meters squared). It is used to screen for weight categories that may lead to health problems (CDC, 2011).

Childhood Obesity: Children and adolescents ages 2-19 with a BMI at or above the 95th percentile on age and gender specific growth charts (CDC, 2011).

Childhood Overweight: Children and adolescents ages 2 to 19 years who have a BMI at or above the 85th percentile and below the 95th percentile on age and gender specific growth charts (CDC, 2011).

Competitive Foods: Any foods or beverages sold in competition to the federally reimbursable meal during lunch or breakfast periods (USDA, 2012a).

Choice Architecture: Strategies designed to nudge people toward choices that are in their best interests without obstructing the individual's freedom of choice (Sugden, 2009).

Food Production Records: Records kept of all food served as part of a USDA reimbursable meal. Required information includes food items and recipes used, quantities prepared, portion sizes served, quantity of foods left over and number of meals and snacks served. The records demonstrate that meals served were in compliance with meal pattern requirements. They are used for nutrient analysis to document meals based on the age/grade appropriate nutrient standards when averaged for the school week (USDA, 2012c).

Free Meal: A meal served to students in households where the income is at or below 130 percent of the poverty level. The meal is served by a school district participating in the National School Lunch Program and/or School Breakfast Program (USDA, 2012b).

Healthy, Hunger-Free Kids Act 2010: Federal law requiring the USDA to establish nutritional standards for federal school nutrition programs based on up-to-date scientific evidence (USDA, 2013a).

Libertarian Paternalism: Change to policies that rely on behavioral cues so as to not infringe upon individual liberties (Hanks, Just, & Wansink, 2012).

National School Lunch Program (NSLP): Federally reimbursed meal program offered in the United States in public and non-profit private schools. It provides nutritionally balanced low-cost or free lunches to more than 31 million children each school day (USDA, 2012a).

Offer vs. Serve: A provision allowing students to decline some of the food offered in a USDA reimbursable meal at lunch or breakfast as long as they select the minimum number of food components. The purpose of the provision is to reduce plate waste (USDA, 2013b).

Reactance: The principle of what happens when people rebel as a reaction to feeling coerced into doing something (Just & Wansink, 2009).

Reduced-Price Meal: A meal served to students residing in households with incomes between 130 percent to 185 percent of the poverty level. The maximum charge for a reduced price meal is 40 cents for lunch and 30 cents for breakfast. The meal is served by school districts participating in the National School Lunch Program and/or School Breakfast Program (USDA, 2013c).

Reimbursable Meal: A school meal that meets the specific nutrient requirements of the United States Department of Agriculture Child Nutrition Program (USDA, 2012a).

Self-attribution: Individuals, who make their own decision, without being coerced, are more likely to repeat that decision in the future (Just & Wansink, 2009).

CHAPTER II

REVIEW OF THE LITERATURE

Background

Obesity affects 17 percent or about 12.5 million children and adolescents in America (CDC, 2013a). In the last thirty years, obesity rates have tripled for children ages 2-5 years old, as well as for adolescents ages 12-19 years old, from 6.5 percent in 1980 to 19.6 percent in 2008, and they have quadrupled for children ages 6-11 years old from 5 percent to 18 percent (Bleich, Ku, & Wang, 2011). Obesity is described in children and adolescents as a BMI (kg/m²) of greater than or equal to the 95th percentile on gender specific BMI-for-age growth charts (CDC, 2013a).

The concerns with these rising obesity rates in children and adolescents are the increased health problems associated with high a BMI (CDC, 2011). Biro and Wien (2010) present evidence that the degree of obesity tends to worsen with the transition into adulthood, indicating obese children are at a greater risk of being obese adults. Studies have shown that almost half of overweight adults were overweight as children, and an obese adolescent is at an increased risk of multiple co-morbidities in adulthood, which include chronic diseases such as diabetes and cancer, even if the obesity does not persist (Biro & Wien, 2010; Nicklas & Johnson, 2004). Children and adolescents who are obese are in danger of developing hypertension, high cholesterol, and diabetes, as well as

psychosocial difficulties including low self-esteem, depression, and low quality of life, but most of these problems can be prevented by diet and lifestyle changes (CDC, 2013a).

Behind smoking, obesity is considered the second leading cause of preventable death (Biro & Wien, 2010). Contributing causes to obesity include genetic and environmental factors. Biro & Wien describe recent studies showing that genetics play a role in the storage of excess calories as fat, and that early and late infant feeding practices may affect adiposity later in life. However, most attention has been paid to the effect of environmental and behavioral factors as contributors of obesity.

Excess fat leading to obesity develops in an individual when there is an imbalance of caloric input exceeding caloric output (USDA, 2010b). One factor believed to be associated with the obesity trend in children is excessive consumption of refined sugars and solid fat, and an inadequate consumption of fruits, vegetables, and whole grains (Nicklas & Johnson, 2004). In 1977, snacks contributed 18 percent of total energy consumed by children ages 6-11 years, and by 1996, the ratio increased to 24 percent (Biro & Wien, 2010). Other factors include physical inactivity and time spent in front of the screen (television, computer). Ebbeling, Pawlak, & Ludwig (2002) describe that a lifestyle with excessive inactivity may contribute to obesity in children. A US nationally representative cross-sectional study found that children with the most time spent watching television or who spent the least time engaging in vigorous physical activity, tended to be the most overweight (Andersen et al., 1998). Additionally, television viewing is associated with increased energy intake, contributing to weight gain (Ebbeling, Pawlak, & Ludwig, 2002). The imbalance of calories may be a result of decrease intake of low-energy dense food and increase intake of sugar-sweetened

beverages, in addition to lack of physical activity and an increase in sedentary activities such as watching television and playing video/computer games (Biro & Wien, 2010).

Fruits and vegetables consumption has been shown to decrease the risk of many adult chronic diseases including cancer, heart disease, and stroke (Van Duyn & Pivonka, 2000). Fruits and vegetables are nutrient-dense, high in water and fiber, low in kilocalories, and their consumption has been linked to lower BMIs (Ohri-Vachaspati, Turner, & Chaloupa, 2012). Epstein et al.'s (2008) study provides support that the consumption of fruits and vegetables over high energy-dense foods can decrease a child's BMI. Epstein's behavioral weight control study focusing on increasing fruits and vegetables intake and low-fat dairy products, showed a significant decrease in BMI and percent overweight after 2 years in children, over a diet focusing on lowering the consumption of high energy-dense foods. Fruits and vegetables are highlighted in the Dietary Guidelines for Americans 2010, as foods that help to maintain overall health and decrease the risk of obesity and other chronic diseases, and the Dietary Guidelines maintain that Americans should increase their intake of these foods (USDA, 2010b).

The current Dietary Guidelines for Americans encourage Americans to build a healthy plate through its switch from the Food Pyramid model to Choose My Plate (USDA, 2010b). These new guidelines advise individuals to have half of their plate as fruits and vegetables, and to choose a variety of (red, orange, and dark-green) vegetables. The guidelines also suggest switching to non-fat or low-fat dairy products, to make half of grains whole grains, to vary protein choices and choose lean proteins. The guidelines suggest cutting back on food high in fat, added sugars and salt, and eating the right amount of calories to maintain a healthy weight.

While most Americans know about the dietary guidelines, many people are not following them. This is evident by the CDC's State Indicator Report on Fruits and Vegetables, which utilizes data from the Behavioral Risk Factor Surveillance Systems for adult consumption and the Youth Risk Behavior Surveillance Systems for adolescent consumption trends (CDC, 2013b). The 2013 report reflects that only 14 percent of adolescents are eating the daily requirement of greater than or equal to two fruits and three vegetables per day. In Oklahoma, the trend is much worse. Recent data from the CDC State Indicator Report on Fruits and Vegetables 2013, suggests that 44.3 percent of adolescents report that they consumed fruit less than one time per day and 40.4 percent report consuming less than one vegetable per day (CDC, 2013b,). This lack of adequate fruits and vegetables consumption may be contributing to increased waistlines in America's children (CDC, 2011). Providing more opportunities for children to eat fruits and vegetables may help decrease the risks many children face in regards to not getting proper and adequate nutrition, often associated with obesity (IOM, 2012).

School Environment

Tackling the obesity problem in American children requires a multi-faceted approach including the individual, family, community, and broader society (IOM, 2012). The IOMs report *Accelerating Progress in Obesity Prevention: Solving the Weight of the Nation* (2012) suggested that a comprehensive approach to addressing the obesity problem in this country needs to come from transforming messages about physical activity and nutrition, and by creating environments that ensure that food and beverage options are healthy choices. The report describes school environments, food and beverage environments, healthcare and work environments, and physical activity environments, as

settings that can encourage healthy choices by developing and implementing these positive messages. It also suggests that implementing the *Dietary Guidelines for Americans* in schools would help to increase a child's consumption of healthy foods to support a healthy weight.

The USDA endorses the school environment as a strategy for promoting the consumption of fruits and vegetables and instilling healthy eating habits in children and adolescents. Since children spend a majority of their time at school, and eat approximately 47 percent of their daily calories in the school environment, schools can have strong influences on improving children's diets (Gordon et al., 2009). The Healthy, Hunger-Free Kids Act of 2010 (HHFKA) requires the USDA to establish nutritional standards for federal programs such as the NSLP and SBP, that are based on up-to-date scientific evidence from reports such as the IOM's *School Meals: Building Blocks for Healthy Children*, and the 2010 Dietary Guidelines for Americans (USDA, 2013a; IOM, 2012.) These nutrition standards were designed to help provide children with easy access to nutritious meals while they are away from their home (USDA, 2013a). These new nutrition requirements were effective July 1st, 2012 for the NSLP, and July 1st, 2013 for the SBP (USDA, 7 CFR 210 and 220).

Much of the new NSLP requirements pertain to fruits and vegetables. They are now considered two separate components, each with increased quantity requirements adjusted for three specific age/grade groups. Quantities increased from $\frac{1}{2}$ to $\frac{3}{4}$ cup of combined fruits and vegetables to $\frac{1}{2}$ -1 cup of fruits per day and $\frac{3}{4}$ -1 cup of vegetables per day (USDA, 2012d). In addition to increased quantities, a larger variety of vegetables (i.e., dark green, red/orange, beans/peas, starchy, and "other") per week are required. The

meal pattern also includes serving fat-free (flavored or unflavored) and unflavored low-fat milk, age/grade specific calorie ranges, a whole-grain requirement, and limits on calories, saturated fat and sodium (USDA, 7 CFR 210 and 220). The new guidelines are designed to help fight childhood obesity and childhood hunger (Marcason, 2012), and are summarized in Table 2.1.

Table 2.1: Final Rule Nutrition Standards in the National School Lunch and Breakfast Programs –Jan. 2012 (USDA 2012d).

	Breakfast Meal Pattern			Lunch Meal Pattern		
	Grades K-5 ^a	Grades 6-8 ^a	Grades 9-12 ^a	Grades K-5	Grades 6-8	Grades 9-12
Meal Pattern	Amount of Food ^b Per Week (Minimum Per Day)					
Fruits (cups) ^{c,d}	5 (1) ^e	5 (1) ^e	5 (1) ^e	2½ (½)	2½ (½)	5 (1)
Vegetables (cups) ^{c,d}	0	0	0	3¾ (¾)	3¾ (¾)	5 (1)
Dark green ^f	0	0	0	½	½	½
Red/Orange ^f	0	0	0	¾	¾	1¼
Beans/Peas (Legumes) ^f	0	0	0	½	½	½
Starchy ^f	0	0	0	½	½	½
Other ^{f,g}	0	0	0	½	½	¾
Additional Veg to Reach Total ^h	0	0	0	1	1	1½
Grains (oz eq) ⁱ	7-10 (1) ^j	8-10 (1) ^j	9-10 (1) ^j	8-9 (1)	8-10 (1)	10-12 (2)
Meats/Meat Alternates (oz eq)	0 ^k	0 ^k	0 ^k	8-10 (1)	9-10 (1)	10-12 (2)
Fluid milk (cups) ^l	5 (1)	5 (1)	5 (1)	5 (1)	5 (1)	5 (1)
Other Specifications: Daily Amount Based on the Average for a 5-Day Week						
Min-max calories (kcal) ^{m,n,o}	350-500	400-550	450-600	550-650	600-700	750-850
Saturated fat (% of total calories) ^{n,o}	< 10	< 10	< 10	< 10	< 10	< 10
Sodium (mg) ^{n,p}	≤ 430	≤ 470	≤ 500	≤ 640	≤ 710	≤ 740
Trans fat ^{m,o}	Nutrition label or manufacturer specifications must indicate zero grams of trans fat per serving.					

^aIn the SBP, the above age-grade groups are required beginning July 1, 2013 (SY 2013-14). In SY 2012-2013 only, schools may continue to use the meal pattern for grades K-12 (see § 220.23).

^b Food items included in each food group and subgroup and amount equivalents. Minimum creditable serving is ¼ cup.

^cOne quarter-cup of dried fruit counts as ½ cup of fruit; 1 cup of leafy greens counts as ½ cup of vegetables. No more than half of the fruit or vegetable offerings may be in the form of juice. All juice must be 100% full-strength.

^dFor breakfast, vegetables may be substituted for fruits, but the first two cups per week of any such substitution must be from the dark green, red/orange, beans and peas (legumes) or “Other vegetables” subgroups as defined in §210.10(c)(2)(iii).

^eThe fruit quantity requirement for the SBP (5 cups/week and a minimum of 1 cup/day) is effective July 1, 2014 (SY 2014-2015).

^fLarger amounts of these vegetables may be served.

^g This category consists of “Other vegetables” as defined in §210.10(c)(2)(iii)(E). For the purposes of the NSLP, “Other vegetables” requirement may be met with any additional amounts from the dark green, red/orange, and beans/peas (legumes) vegetable subgroups as defined in §210.10(c)(2)(iii).

^hAny vegetable subgroup may be offered to meet the total weekly vegetable requirement.

ⁱAt least half of the grains offered must be whole grain-rich in the NSLP beginning July 1, 2012 (SY 2012-2013), and in the SBP beginning July 1, 2013 (SY 2013-2014). All grains must be whole grain-rich in both the NSLP and the SBP beginning July 1, 2014 (SY 2014-15).

^jIn the SBP, the grain ranges must be offered beginning July 1, 2013 (SY 2013-2014).

^kThere is no separate meat/meat alternate component in the SBP. Beginning July 1, 2013 (SY 2013-2014), schools may substitute 1 oz. eq. of meat/meat alternate for 1 oz. eq. of grains after the minimum daily grains requirement is met.

^lFluid milk must be low-fat (1 percent milk fat or less, unflavored) or fat-free (unflavored or flavored).

^mThe average daily amount of calories for a 5-day school week must be within the range (at least the minimum and no more than the maximum values).

ⁿDiscretionary sources of calories (solid fats and added sugars) may be added to the meal pattern if within the specifications for calories, saturated fat, trans fat, and sodium. Foods of minimal nutritional value and fluid milk with fat content greater than 1 percent milk fat are not allowed.

^oIn the SBP, calories and trans fat specifications take effect beginning July 1, 2013 (SY 2013-2014).

^pFinal sodium specifications are to be reached by SY 2022-2023 or July 1, 2022. Intermediate sodium specifications are established for SY 2014-2015 and 2017-2018. See required intermediate specifications in § 210.10(f)(3) for lunches and § 220.8(f)(3) for breakfast

The United States Census data shows that in 2011 there were 55.5 million children and adolescents attending school (pre-K through grade 12) in the United States (U.S. National Center for Education Statistics, 2011). Of these 55.5 million children, 31.6 million participated in the NSLP (USDA, 2010a). The NSLP is operated in 101,000 public schools at a cost of \$10.5 billion (USDA, 2010a). Free lunches are available to students from households with incomes at or below 130 percent of the poverty level, and reduced-price lunches are available to students in households with incomes between 130-185 percent of the poverty level (USDA, 2012b). In order for participating schools to receive reimbursement from USDA's Food and Nutrition Service for the meals they serve, meals must meet certain nutrition standards (USDA, 2012b). When meal pattern and dietary specifications are met (see Table 2.1), schools are reimbursed based on the number of free, reduced- and full-price meals (i.e., breakfasts and lunches) served. The rate of reimbursement is dependent upon the percentage of lunches served at a free and reduced rate, and varies from year to year. In school year 2012/2013 schools serving 60 percent or less of their lunches as free or reduced price received \$2.46 for a reduced price lunch, and \$2.86 for a free lunch, whereas schools serving 60 percent or more of their lunches as free and reduced received \$2.48 and \$2.88 respectively (USDA, 7 CFR 210 and 220, 2012b). This reimbursement rate makes it difficult to plan and serve healthy nutritious food under the nutrition requirements set by the USDA, since this rate does not cover all the costs (food, transportation, labor, etc.,) of producing a school meal (Story, Nannery, & Schwartz, 2009).

Barriers to Implementing Change

School boards and administrators, as well as school lunchroom managers, are supportive of nutrition and wellness programs in their schools (Agron et al., 2010; Bangs, 2012). However, there are multiple barriers that schools face when trying to create healthy school environments. The largest of these barriers seems to be funding, when it comes to implementing these programs (Agron et al., 2010). Agron describes that schools are under a lot of pressure to meet the requirements from the HHFKA and feel that they are hard-pressed financially to make changes. For example, the National Food Service Management Institute recommends a ratio of food costs to total revenue of 40 percent. At the current (School Year 2014) reimbursement rate of \$2.99 for a free meal, funds available to purchase food equates to \$1.19. Likewise the ratio for foodservice labor cost to total revenue is 50 percent, or about \$1.49 per meal (Cater, Conklin, & Cross, 2005). As such, careful menu planning requiring low cost foods and limited preparation is essential.

However beneficial school meals are to obesity prevention and reducing hunger, the benefits are not realized unless youth choose and eat the offered foods. Obstacles to choosing and eating healthful foods at schools include the presence of and constant exposure to unhealthy food as well as the higher price of fruits and vegetables in cafeterias (Krolner et al., 2011). McKinley et al. (2005) described students' perceived barriers to healthy eating as taste, appearance of food, filling power, time/effort, cost, choice/availability, risk they may not like the food, rebellion, and body image/weight concerns. Junk food tends to look more appealing, taste better, take less time to eat, and

have a low risk. A student in the McKinley study was quoted as saying “sometimes you can get bad fruit but you never get bad chocolate” (McKinley et al., 2005 p. 547).

In addition to the food provided by the NSLP, students often have access to competitive foods in the school nutrition environment that are consumed by 40 percent of public school students in a typical day (Guthrie et al., 2012). These foods and beverages are any foods sold in competition to the reimbursable school meal (USDA 7 CFR 210, 2012a). Historically, regulation of these foods by USDA was limited to those served “à la carte” in the meal service area during the meal service period, allowing only for items not classified as a food of minimal nutritional value (i.e., less than 5 percent of the RDA per serving for eight key nutrients including calories, total fat, saturated fat, protein, calcium, iron, vitamins A and C) (USDA 7 CFR 210, 2012a). To address this gap, the HHS gave USDA regulatory authority over all foods provided on the school campus during the school day (USDA, 2013a). The interim final rule was issued on June 28, 2013 and is scheduled to take effect July 1, 2014. While still subject to revision, the interim final rule, known as Smart Snacks in Schools, requires all foods and beverages served on the school campus during the school day to meet nutritional values similar to those served under the NSLP. While the foods and beverages offered under this rule should be healthier, they will continue to compete with the reimbursable meal including the required fruits and vegetables components.

In addition to the food service area, common points of sale for competitive foods include snack bars, vending machines, and school stores (Kubik et al., 2003). Because of easy access, competitive foods often replace fruits and vegetables in a student’s diet, lowering the nutritional quality and adding unnecessary calories and fat (Guthrie et al.,

2012). While this a concern of parents, schools are often hesitant to eliminate competitive foods because the sales provide revenue needed to support operational food service costs and other school programs (Guthrie et al., 2012).

With these new NSLP guidelines and the effort to make competitive foods healthier, there is a strong movement to get children to choose healthier options. However, small and subtle changes seem to work best on children (Just and Wansink, 2009). There is a delicate line between nudging and forcing a child to eat something, and the latter comes with reactance and avoidance behaviors (Hanks, Just, Smith & Wansink, 2013; Fisher & Birch, 1999). Therefore, schools need to be strategic in the ways in which they present dietary changes to children.

Behavioral Economics

While schools are now required to offer healthier foods in order to be reimbursed for the meals they serve under the NSLP, healthy food is more expensive and fewer students are willing to eat it (Hanks, Just, Smith & Wansink, 2013). Schools are already struggling with budgetary cuts so they need to increase the sales of those healthy food options that are within their budget (Just & Wansink, 2009). While this is not an easy task, there are ways to accomplish this feat with minimal cost, and in a way that will be subtle enough that students do not think healthy food is being forced upon them.

When restraints are placed on food choices, there is evidence to suggest that people respond negatively and react by exhibiting rebellious behavior (Hanks, Just, & Wansink, 2012). In a study that restricted children's snack foods, Fisher and Birch (1999) demonstrated that children's food choices were directed towards the foods that were being taken away. The researchers concluded that restricting palatable foods often leads

to behaviors opposite of what is intended. While the changes made to the NSLP are a step in the right direction to improving dietary quality, this change will not necessarily teach children to make healthy choices, and forcing healthy foods to be on their trays does not mean that they will actually eat them (Hanks, Just, & Wansink, 2012). Because the new NSLP meal pattern requires students to take a fruit and/or vegetable, students may perceive this as paternalistic and could result in unintended consequences. To counter this reactance, changes are needed in the way that both healthy and less healthy foods are presented and marketed to students (Hanks, Just, & Wansink, 2012).

A strategy that is appealing to both schools, in terms of budget and time, and students, in terms of appeal, uses the principles of BE. Just and Wansink (2009) describe BE as the combination of behavior models of psychology and decision models of economics to show how purchasing decisions are influenced by biases in memory, thought processes, and perception. This approach helps to identify triggers that lead to choosing, purchasing, and eating certain foods, and in this case, a healthier food item.

Behavioral economics is based on two psychological principles that can help change target behaviors. The first is *reactance*. Just and Wansink (2009) describe this principle as what happens when people rebel as a reaction to feeling coerced into doing something. The second is *self-attribution*. When people make decisions on their own, without feeling pressured or coerced, they own that decision and feel good about the outcome, and are more likely to repeat that decision. For example, a student who is forced to take an apple because it is placed on the lunch tray instead of a cookie because the cookie is taken away from the lunchroom in an effort to get children to eat healthier, will feel forced, and as a result will not eat the apple and will go find the cookie

somewhere else (vending machine, or at home). However, if the student sees the apple and picks it up on her own merit, she owns that decision and feels good about it, and is more likely to repeat that decision again. Hanks, Just, and Wansink (2012) describe this phenomenon as *libertarian paternalism*, in that changes made in this way rely on behavioral cues that do not infringe upon individual liberties, but still influence a person's decision. As such, "careful consideration must be given to policies designed to encourage healthier eating in lunchrooms so that students do not feel restricted and so that they eat the fruits and vegetables they place on their trays" (Hanks, Just, & Wansink, 2012, p. 6).

Policies and practices that promote the use of strategies consistent with libertarian paternalism and BE are known as choice architecture (Mancino & Guthrie, 2009). Choice architecture places foods and beverages in a cafeteria in such a way that influences students to make their own decisions in making healthier food choices and has the potential to change eating habits for the long term (Hanks et al., 2012). Factors related to BE can be manipulated at a very low cost, which is why it is so attractive for school lunch settings (Just and Wansink, 2009).

Use of the choice architecture strategies in school cafeteria settings can be moderated by the attitudes of nutrition directors and staff. As part of a thesis research project, Bangs (2012) conducted focus groups with school nutrition directors from Oklahoma to understand their attitudes and perspective of feasibility in using BE as a basis for making changes to the cafeteria environment. Bangs concluded that there was an overall positive response in implementing interventions to the school nutrition program,

suggesting that positive attitudes of staff may help increase the extent of changes that can be made in the school.

Smarter Lunchrooms

Drs. David Just and Brian Wansink launched the Smarter Lunchrooms Movement in 2009, that is a behavioral-based program that uses choice architecture strategies to nudge students to make healthier choices, but yet are subtle enough that the students do not realize they are being influenced to choose the healthier option (Godfrey, 2012).

Smarter Lunchroom makeovers are feasible for school nutrition programs in that they are easy to implement and often cost less than \$50 to schools, and yield desirable results in getting children to choose healthier options (Hanks, Just, & Wansink, 2013). Hanks, Just, and Wansink did a pilot study where two cafeterias underwent Smarter Lunchroom makeovers and students' consumption of fruit increased by 18 percent and vegetable consumption increased by 25 percent. The interventions that were used in these schools implemented changes in the categories of convenience, attractiveness of fruits and vegetables, and normativeness. Specific changes used to make lunchrooms smarter can be seen in Table 2.2. These types of strategies helped guide students to make healthy choices despite having less healthy choices available for them to pick from. Children in the study were 13.4 percent more likely to take a fruit and 23 percent more likely to take a vegetable, which shows that the Smarter Lunchroom intervention allowed children to make these healthy choices upon their own volition. The changes are also attractive to school lunchroom administrators and managers because they were low cost and took less than 3 hours to implement, which shows that they are easy and cost-effective to implement in schools.

Table 2.2 Intervention in the Smarter Lunchroom Makeover (Hanks, Just, & Wansink, 2013)	
Category of Change	Specific Changes
Convenience: Improving the convenience of fruits and vegetables	<p>“Healthy convenience line” with only submarine sandwiches and healthier sides (ie, fruits and vegetables)</p> <p>Salad served in see-through containers</p> <p>Fresh fruit located next to the cash register</p> <p>100% fruit juice boxes kept in freezer next to ice cream</p>
Attractiveness: Improving the attractiveness of fruits and vegetables relative to other options	<p>Lunch menu posted with nice color photos of fruits and vegetables served</p> <p>Vegetables labeled with descriptive names</p> <p>Fresh fruit displayed in nice bowls or tiered stands</p>
Normativeness: Making the selection of fruits and vegetables seem normative	<p><i>“Would you like to try...?”</i> (verbal prompt by cafeteria staff)</p> <p><i>“No veggie? How about...?”</i></p> <p><i>“You can get another side with your meal. How about grabbing a piece of fruit by the register?”</i></p> <p><i>Last chance for fruit</i> sign displayed next to fruit basket at the cash register</p>

The Smarter Lunchrooms Movement is based on evidence that shows that by increasing variety, convenience, appeal, and the use of verbal prompts, students are more inclined to make healthy decisions on their own (Hanks, Just, & Wansink, 2012). Based on behavioral psychology, individuals who make their own decisions are much more likely to repeat those decisions in the future. Evidence is presented below on these four categories of strategies.

Variety:

It is assumed that when presented with a variety of options in a cafeteria, individuals tend to consume more (Kahn & Wansink, 2004). Kahn and Wansink found that changing the perception of variety could influence consumption. This study observed the structure of assortment, and found that presenting options in an organized vs. disorganized manner changed how much a person consumed. Kahn and Wansink demonstrated that increasing the variety of Jellybeans from 6 to 24 in a disorganized way (all flavors and colors interspersed) decreased consumption, whereas increasing variety in an organized way (separating colors and flavors) increased consumption.

Small changes to the cafeteria environment can have significant changes on children's fruit consumption. Perry et al. (2004) exhibited that by increasing the opportunities for children to eat a variety of fruits and vegetables, increasing the attractiveness, and encouraging fruits and vegetables at lunch, students increased their consumption of fruits. Bucher et al. (2011) found that increasing the variety of vegetables in a selection (on a cafeteria line) can improve the meal composition with more vegetable consumption and less non-vegetable (starch, protein) consumption. Increasing the variety made it more likely that students chose more fruits and vegetables, and thus they were more likely to consume these foods (Kahn & Wansink, 2004).

Appeal:

Students can be influenced to choose fruits and vegetables in school by the increase of the appeal of these foods. Research suggests that giving descriptive names to healthy foods raises awareness and taste expectations and can increase selection of these foods by 28 percent (Wansink, Just, Payne, & Klinger, 2012). Wansink et al. conducted

two studies to look at whether giving vegetables fun and descriptive names would increase the selection and consumption of these foods, and to determine if these effects would endure over time. The first study looked at giving a fun name to carrots “X-ray Vision Carrots”, a simple name “The Food of the Day”, and control that was left unnamed, in five elementary schools where the menu was left unchanged except for the addition of carrots. Results from this study showed that 66 percent of the carrots with the fun name “X-ray Vision Carrots” were eaten in comparison to only 32 percent of the carrots named “Food of the Day,” and 35 percent of the unnamed carrots. In study 2, one elementary cafeteria changed the names of carrots, green beans, and broccoli to “X-ray Vision Carrots”, “Silly Dilly Green Beans”, “Power Punch Broccoli”, and “Tiny Tasty Tree Tops” and put the names of the dishes on cards next to the food item for two months to test a longitudinal effect. The control school served the same dishes but did not change the names. Results from study 2 indicated that the selection of these vegetables with fun names increased by 99.0 percent from baseline to month two of the intervention, and the proportion of students taking a vegetable from the control school decreased by 16.2 percent. This study showed that by adding attractive names, broccoli selection increased by 109.4 percent, green beans increased by 176.9 percent and carrots by 30.2 percent. This study demonstrated that simply changing the name went a long way in influencing the selection of these healthy foods.

Convenience:

How convenient a food is, can influence whether or not it sells. Behavioral economics teaches not to restrict unhealthy foods but instead to offer the healthy food

options (fruits, vegetables, whole grains), in a more convenient and easy way (Hanks, Just, & Wansink, 2012).

To evaluate the effectiveness of this strategy, Hanks et al. (2012) conducted a study that added a convenience line that only contained healthy foods (salad bar, sandwich bar, vegetables, fruits, yogurt, and flavored milk) to a high school cafeteria for 8 weeks. In addition to evaluating students' food selections, a plate waste study was also conducted to determine the quantity of foods consumed. This study provides evidence that increasing convenience of the healthy foods nudged students to select more of the healthy foods. Findings revealed that students reduced consumption of the less healthy foods available to them by 27.9 percent. The researchers suggested that no change in consumption of the healthy foods, as indicated by the plate waste study, may have been related to food preference. Hanks et al. (2012) imply that having students consume less of the unhealthy foods saves them calories, which over time can have a large influence on weight and lead to life-long preferences for healthy foods.

With the new NSLP guidelines, students are required to take more fruits and vegetables, but there is concern that these may go to waste, due to children not actually consuming them (Wansink et al., 2013). A way to help make fruits and vegetables more convenient and easier for students to consume is to offer them to students pre-sliced. Results from a study done by Wansink et al. show that when three schools introduced a fruit slicer into their cafeteria, apple sales increased by 71 percent compared to three control schools. This study displayed similar results to a study done in 2009 by Swanson et al. who found that simply presenting oranges that are already sliced, increased consumption of oranges by four times that of the consumption of oranges that were not

sliced. As such, the simple low-cost strategy of slicing makes fruit such as pears and oranges, easier (i.e., convenient) and less messy to eat (Wansink et al., 2013).

Verbal Prompts:

An easy, very cost-effective way to increase the likelihood a child will choose fruits and vegetables is through the use of verbal prompts by cafeteria staff. A pilot study done by Schwartz (2007) showed that when staff asked students at lunch if they would like fruit or 100 percent fruit juice, students' selection of fruit or juice increased to over 90 percent, compared to 60 percent when students did not receive verbal prompts. More importantly, the study data obtained through visual observation in both the intervention and control schools, demonstrated that 70 percent of students in the intervention school consumed the fruit serving compared to less than 40 percent of students in the control school. This study was consistent with findings from Perry et al. (2004) who found that verbal encouragement was significantly associated with the consumption of fruits and vegetables.

The strategies of the Smarter Lunchroom Movement can be implemented easily and, based on the evidence presented above, tend to have significant results on both students' selection and consumption of fruits and vegetables. The majority of changes that can be made in lunchrooms do not require extensive financial investment, but rather a "willingness to rethink and revise existing processes" (Storey et al., 2011. p. 35). Programs can be successful by using available resources including the staff, teachers, and parent volunteers (Lakkakula et al., 2011). These changes may not take a lot of effort or cost very much to implement but can help children choose fruits and vegetables.

Summary

A possible contributing factor to childhood obesity may be a result of not eating the recommended servings of fruits and vegetables and consuming in excess, foods high in calories from added solid fats and sugars (USDA, 2010b). The school environment can serve as a primary location in addressing the obesity problem in America's youth, since children spend a majority of their time and eat approximately 47 percent of their calories at school (IOM, 2012). Federal programs such as the NSLP and SBP are fundamental to helping provide adequate nutrition for students (USDA, 2013a). However, schools have limited time and funding to make large changes in cafeterias to offer healthy foods to children in ways which children will eat these foods. Studies also show that forcing children to choose healthy foods may have unintended consequences (Hanks, Just, & Wansink, 2012; Fisher & Birch, 1999). The Smarter Lunchroom Movement incorporates BE strategies that schools can use to make changes that are simple, inexpensive, and effective in getting students to choose healthy foods (Wansink et al., 2013). By increasing the variety, convenience, and appeal of healthy foods in school cafeterias, and through the use of verbal prompts, school lunchroom managers can create a positive food environment for students to choose more fruits and vegetables (Hanks, Just, Smith, & Wansink. 2013).

CHAPTER III

METHODOLOGY

The purpose of this study was to evaluate efforts to increase the extent to which BE principles were implemented in Oklahoma middle school nutrition settings and the impact on students' fruits and vegetables selections. A secondary goal was to assess factors that may moderate use of BE principles.

Training of Cooperative Extension Family and Consumer Science Educators

Cooperative Extension Family and Consumer Science (FCS) County Educators in Oklahoma were invited to attend a Smarter Lunchroom Training conducted in November 2012, by researchers trained in use of BE in school nutrition settings. Thirty educators and two community partners attended the one-day training consisting of both classroom instruction (i.e., theory, strategies, and examples of use in food service settings) and applied learning (i.e., observing food service venues on the Oklahoma State University campus and photo documentation). Instruction also included techniques and materials for recruitment of schools, use of data collection forms (i.e., Action Plan and Follow-up forms, and Inventory of Smarter Lunchroom Practices, and food production records, found in Appendix A), and guidance for providing support to schools during the

intervention. The purpose of each document is described below under the subheading *Measures and Data Collection*.

Recruitment and Study Sites

Trained FCS County Extension Educators returned to their respective counties across the state of Oklahoma to recruit middle schools to participate in the Smarter Lunchroom project and study. The goal for each educator was to recruit three to four schools. The recruitment period was January through February 2013 followed by an eight week study period. Inclusion criteria consisted of serving middle school age students (i.e., 5th through 8th grade) and the school's participation in the NSLP. During recruitment, Educators made contact with school districts nutrition director/school lunchroom manager to describe the Smarter Lunchroom Project with the help of "Create a Smarter Lunchroom" recruitment flyer. Educators also scheduled a date with managers/directors for the school nutrition assessment.

Tiered wooden baskets were provided to Educators to give to the schools they were recruiting in the spring of 2013 before the start of the intervention. Baskets were used as an incentive for the school to participate in the study, and as an easy way to increase the appeal of fruits.

Assessment and Intervention

During the assessment, Educators used the Action Plan and Smarter Lunchroom Strategies Inventory handout to help lunchroom managers assess the cafeteria environment and select BE strategies, as indicated on the Action Plan, that would be most appropriate for their cafeteria. Educators were trained to help manager's select no more than three strategies. A limited number of strategies were encouraged as to not

overwhelm school lunchroom managers with many changes at once. During the assessment, a start date for the intervention was also determined. Copies of cafeteria food production records from October 1st-November 16th, 2012, were collected during this visit.

Schools participating in the project started implementing the Smarter Lunchroom strategies that were determined from the pre-assessment during a 8 week time period that was feasible for each school. The intervention lasted eight weeks of spring semester 2013. Mid-project assessments were done between weeks 4-6 of the intervention to make sure schools felt support from Educators and so that Educators could make sure schools were on the right track.

Educators returned to schools after the intervention was complete in the spring of 2013 for a post-assessment. Using the Smarter Lunchroom Follow-up form with managers, changes were tracked in the areas of the cafeteria environment, BE strategies used, and support for the project. Food production records from weeks 3-8 of the intervention were collected and sent to the researchers. The dates of these records varied between schools but were between the months of March-May.

Measures and Data Collection

The Smarter Lunchroom Action Plan consisted of five sections including schools' demographic data, section 1) observation of the school cafeteria environment, section 2) Smarter Lunchroom action levels, section 3) list of choice architecture strategies, and section 5) questionnaire to assess the school cafeteria managers' attitudes related to use of the strategies. (There was no section 4 due to researchers error.)

The Observation of the School Cafeteria Environment (Section 1) was developed by the Behavioral Economics in Nutrition (BEN) Center at Cornell University for use in the Smarter Lunchroom Movement (Cornell Center for Behavioral Economics). It consisted of four scales: 1) approach to lunchroom (nine items, with maximum score of 27); 2) serving area (seven items, with maximum score of 21); 3) snack area (ten items, with maximum score of 30); and 4) dining area (sixteen items, with maximum score of 48). Response options for each item were “+” for a positive impression and coded 3 for analysis, “n” for a neutral impression and coded 2, “-“ for a negative impression and coded 1, and “n/a” for not applicable and coded 0. The item scores in each scale were summed for a scale score and the scale scores summed to assess changes to school cafeteria environment. Section 1 was used to test hypotheses 3 and 5.

The Smarter Lunchroom Level (Section 2) was adapted from a similar form developed by the BEN Center for use in the Smarter Lunchroom Movement to be specific to fruit and vegetable offerings (Cornell BEN Center, 2013). Strategies were categorized into four groups, 1) convenience, 2) appeal, 3) variety, and 4) verbal prompts. For each group there were six action levels. Each action level was coded with A=1 and F=6, with higher codes reflecting a higher extent of implementation. The scores for each category were summed to assess the extent to which BE strategies were being implemented. This section was used to test hypotheses 1 and 2.

The Create a Smarter Lunchroom (Section 3) listed the BE strategies demonstrated in previous studies to be most effective for increasing students’ fruits and vegetables selections and those most likely to be used by Oklahoma school nutrition

programs (Bangs, 2012). These strategies are summarized in Table 3.1. The number of individual strategies marked, were summed.

The Support for a Smarter Lunchroom (Section 5) was compiled using findings from focus groups conducted with Oklahoma school food service directors and managers (Bangs, 2012) and a survey of middle school cafeteria managers (Meredith, Kennedy, & Hildebrand, 2013). Response options were on a four-point Likert scale where 4= “strongly agree” and 1 = “strongly disagree”. Responses for each item (n=12) were summed for an overall score of the cafeteria managers’ attitudes toward use of BE strategies. Section 5 was used to test hypotheses 2 and 5.

The Follow-up Form was used to collect the same data as the Action Plan after 8 weeks of the intervention, with the exception of school demographics.

Table 3.1 Smarter Lunchroom Practices	
Strategies	Category
Offer a fruit and vegetable bar	Variety
Verbal encouragement for fruits and vegetables	Verbal prompts
Allow unlimited amounts of fruits and vegetables with a reimbursable meal	Variety
Place vegetables as the first item on the serving line	Convenience and appeal
Offer fruits and vegetables in multiple locations	Convenience and appeal
Offer monthly taste-testing of unfamiliar fruits and vegetables, then incorporate into the menu	Appeal
Move the salad or fruits and vegetables bar to a convenient, high-traffic area	Convenience
Offer a variety of fruit and vegetable options each day	Variety
Change the default options for fruit and vegetable side dishes	Non-verbal prompt
Place fresh fruit at the cash register or point of service	Convenience
Place fresh fruit in colorful basket or bowl	Appeal
Cut up fruit and arrange by color	Convenience and appeal
Place snack foods in less convenient area in the cafeteria	
Use creative, age-appropriate names for vegetables on menus and sign-age	Appeal
Offer “Grab & Go” fruit and vegetable snack options	Convenience

School food production records were used to measure changes in students’ fruits and vegetables side-dish selections. Fruits and vegetables used in main dishes were not recorded due to variability in amounts served. Pre-intervention quantities were calculated from production records from October 1–November 16, 2012 (6 weeks). Post-intervention quantities were calculated from records representing weeks 3-8 (6 weeks

total) of the intervention. Six weeks, beginning two weeks after the beginning of a BE intervention was determined by the BEN Center as a reasonable amount of time to assess change (Cornell BEN Center, 2013). Food production records are designed to record information to support that meals served have met federal meal pattern requirements. The information includes 1) actual number of meals served, 2) type of food served (fruit, green vegetable, grain, etc.), 3) serving size, 4) amount prepared, and 5) amount left over. Students' selection of fruits and vegetables were determined by calculating the number of 1-cup servings using the actual amount of fruits and vegetables served (amount prepared – amount left over). Conversions to 1-cup servings were made using the USDA Food Buying Guide for Child Nutrition Programs (USDA Food and Nutrition Service, 2008). Food production records were used to test hypotheses 4 and 5.

Statistical Analyses

Frequency analysis was used to describe demographic characteristics of schools.

A paired t-test compared mean scores for 1) the extent of BE strategy use (hypothesis 1), 2) managers' support for use of BE strategies (hypothesis 2), 3) changes in school cafeteria environment scores (hypothesis 3).

A oneway ANOVA compared the mean number of fruit and vegetable servings served before and after the implementation of the Smarter Lunchroom project (hypothesis 4).

A Spearman's Correlation analysis was used to determine the relationship between school cafeteria managers' support (attitudes) for use of BE strategies prior to beginning the Smarter Lunchroom project and extent to which BE strategies were used (hypothesis 2).

Spearman Correlation analysis was planned to evaluate the relationship between the increase in the number of fruit and vegetable servings served before and after implementing the Smarter Lunchroom project with change in 1) cafeteria managers' support for use of BE strategies, and 2) changes in school cafeteria environments (hypothesis 5). NOTE: This analysis was not conducted because there was no increase in fruit and vegetable servings served, and no significant change in management support scores, and cafeteria environment scores.

The Smarter Lunchrooms study was reviewed and approved by the Oklahoma State University Institutional Review Board (Appendix B). The project was funded by USDA flow-through Funds awarded by Cornell University Center for Behavioral Economics in Childhood Nutrition Programs.

CHAPTER IV

FINDINGS

The purpose of the study was to examine the extent to which a community-based approach could increase the use of BE strategies in middle school cafeterias and the resulting impact on students' fruits and vegetables selections. Of the 69 schools that were approached by FCS educators, 32 schools agreed to participate, and 26 submitted complete sets of data (i.e., Action Form, Follow-up Form, and pre and post food production records) within the time frame to be included in the analyses.

Demographic Information

A frequency analysis was conducted to describe school demographic characteristics (Table 4.1). The schools that submitted complete sets of data are included in Table 4.1. All of the schools met the inclusion criteria of participating in the NSLP and served students within the middle school grade group (the combination of middle school grade groups varied by school district). Eighty-five percent of participating schools reported greater than 50 percent of their students as eligible for free or reduced price lunches, indicating that a majority of the schools qualify as low-income schools. Approximately 60 percent of the schools had an enrollment of less than 300 students, indicating that most of the schools were small in size.

Table 4.1 Action Plan Demographic Data

Category	n	%
NSLP	32	100
Free/Reduced		
<50%	5	16
51-79%	16	50
>80%	11	35
Grade Level		
5	8	25
6	30	94
7	30	94
8	30	94
9	3	9
Enrollment		
<300	19	60
302-699	8	20
700-999	4	13
>1000	1	3
Racial/Ethnic Groups		
American Indian/Alaska Native		
<25%	11	38
26-50%	14	48
51-75%	2	7
76-100%	2	7
Asian		
<25%	29	100
26-50%	0	0
51-75%	0	0
76-100%	0	0
Black/African American		
<25%	27	93
26-50%	2	7
51-75%	0	0
76-100%	0	0
Hawaiian/Pacific Islander		
<25%	29	100
26-50%	0	0
51-75%	0	0
76-100%	0	0
White		
<25%	1	4
26-50%	10	36
51-75%	13	46
76-100%	4	14
Hispanic		

<25%	27	93
26-50%	2	7
51-75%	0	0
76-100%	0	0
Other		
<25%	29	100
26-50%	0	0
51-75%	0	0
76-100%	0	0

Table 4.2 summarizes the characteristics of food service operations in the participating schools. A majority of the schools (94 percent) had a self-operated food service management system, but only about one-fourth of the schools (23 percent) engaged students in a nutrition advisory council. The trend for time allotted for lunch was 20-30 minutes (78 percent of schools). The age of kitchens varied between schools, with approximately two-thirds (67%) being built or renovated in the last 25 years, 30 percent of schools reported a kitchen less than 10 years old, and only 10 percent of schools reported kitchens greater than 40 years old. Ninety percent of schools had 1-2 serving lines (50 percent and 40 percent respectively), and 72 percent had a fruit and vegetable/salad bar prior to beginning the Smarter Lunchroom Project. A quarter of the schools had a separate snack line and approximately 30 percent of schools reported having one or more à la carte items for sale.

Table 4.2 Descriptions of Food Service Operation Characteristics

Category	n	%
Food Service Management System		
Self operated	30	94
Contract management	2	6
Has a Nutrition Advisory Council	7	23
Length of Lunch Period (minutes)		
15	2	7
20	6	19
25	7	23
30	11	36
35	3	10
45	1	3
60	1	3
Age of Kitchen (years)		
<10	9	30
11-25	11	37
26-40	7	23
>40	3	10
Serving Lines		
1	16	50
2	13	41
>3	3	9
Separate Snack Line	8	25
Fruit/Vegetable Bar	23	72
Types of à la carte items*		
Sugar Sweetened Beverages	10	32
100% Fruit Juice	10	32
Milk (>12oz)	8	25
Pastries	7	22
Granola or Energy Bars	4	13
Ice-cream/frozen desserts	9	28
Other	14	44

* Schools could select more than one option for à la carte items resulting in the sum of percentages are being > 100%.

Objective 1: Extent of BE use

The extent to which BE strategies were used in the schools that participated in the Smarter Lunchroom Project were compared before and after implementation of the project using a paired sample t-test. These comparisons were evaluated through the data

collected from Section 2 of the Action Plan and Follow-up forms. The t-test results indicated there was a significant increase overall from pre ($M=10.47$, $SD=3.73$) to post intervention ($M=12.87$, $SD=4.27$) in the extent to which behavioral economic strategies were implemented ($p=0.008$). When each category was looked at individually significance ($p=0.015$) was seen in the category of convenience from pre ($M=2.42$, $SD=1.96$) to post intervention ($M=3.13$, $SD=2.01$). These findings are summarized in Table 4.3. Verbal prompts were trending toward a significant difference ($p=0.053$).

Table 4.3 Comparison of the Extent of BE Strategy Usage from Pre to Post Intervention

Extent of Use Category	Pre Mean \pm SD	Post Mean \pm SD	p value^a
Over-all ^b	10.46 \pm 3.73	12.86 \pm 4.72	0.008*
Convenience ^c	2.42 \pm 1.96	3.13 \pm 2.01	0.015*
Appeal ^c	2.33 \pm 1.42	2.80 \pm 1.51	0.105
Variety ^c	2.71 \pm 1.70	3.19 \pm 1.54	0.215
Verbal Prompts ^c	3.00 \pm 1.29	3.58 \pm 1.52	0.053

^a $p < 0.05$

^b Max score=24

^c Max score=6

Objectives 2 and 3: Support for Use of BE Strategies

Middle school cafeteria managers' support scores were compared before and after the implementation of the Smarter Lunchroom Project using a paired sample t-test. This data was acquired through Section 5 of the Action Plan and Follow-up forms. Results from the t-test (Table 4.4) indicate the mean score for managers' attitudes related to use of BE strategies were high at the beginning of the project ($M=37.7$, $SD=4.71$), and did not change significantly after participation in the project ($M=37.8$, $SD=5.31$) ($p=0.888$).

Table 4.4 Comparison of Managers' Support of BE Strategies at Pre and Post Intervention

	Pre	Post	<i>p</i> value^a
	Mean \pm SD	Mean \pm SD	
Attitudes ^b	37.7 \pm 4.71	37.8 \pm 5.31	0.888

^a $p < 0.05$

^b Max score=48

Further review using frequency analysis revealed the support scores ranged from 48 to 30 (compared to a maximum score of 48 and minimum of 12) prior to beginning the project. A Spearman's correlation was used to determine if a relationship existed between managers' attitudes prior to beginning the project and the extent of use of BE strategies at the end of the project. The middle school cafeteria managers' attitudes before the intervention were moderately correlated to the extent of use of BE strategies after the intervention (rho $r = .326$), and neared significance at the $p = 0.073$ level.

Objective 4: Changes in Cafeteria Environment

Changes to the school cafeteria environment were compared pre and post intervention with a paired sample t-test for each section of the cafeteria environment. Environment scores were measured from data collected on Section 1 of the Action Plan (pre) and Follow-up form (post). There was not a significant improvement in scores from pre intervention for any of the sections. Results are presented in Table 4.5. Overall, managers' experienced a positive environment in regards to Approach to the Lunchroom, Serving Area, and Dining Area, and a neutral environment in regards to Snack Area (most schools participating did not have a separate snack area).

Table 4.5 Changes in Cafeteria Environment Characteristics from Pre to Post Intervention

Lunchroom Area	Pre Mean \pm SD	Post Mean \pm SD	<i>p</i> value^a
Approach ^b	22.16 \pm 3.68	22.96 \pm 3.81	0.206
Serving Area ^c	18.03 \pm 2.18	18.37 \pm 2.35	0.388
Snack Area ^d	7.09 \pm 11.43	9.97 \pm 13.03	0.127
Dining Area ^e	37.78 \pm 6.40	39.47 \pm 6.06	0.160

^a $p < 0.05$

^b Max score=27

^c Max score=21

^d Max score=30

^e Max score=48

Objective 5: Changes in Fruit and Vegetable Servings

The number of fruits and vegetables servings served at pre and post intervention was determined by the food production records provided from the schools using a oneway ANOVA. The results are summarized in Table 4.6. Overall, there were no increases in the number of fruits and vegetables servings after the intervention. There was a significant decrease in total fruit ($p < 0.001$), and in “other vegetable” sub-group ($p = 0.001$).

Table 4.6 Comparison of Fruit and Vegetable Servings Served at Pre and Post Intervention

Category	Mean ^b (cups served)	±SD	<i>p</i> value ^a
Total Fruit Pre	.50	.27	<0.00*
Total Fruit Post	.40	.18	
Total Veg Pre	.74	.44	0.742
Total Veg Post	.75	.40	
Fresh Fruit Pre	.40	.28	<0.00*
Fresh Fruit Post	.27	.19	
Can/Frozen Fruit Pre	.42	.20	<0.00*
Can/Frozen Fruit Post	.36	.21	
Dark Green Veg Pre	.20	.21	0.176
Dark Green Veg Post	.17	.15	
Legumes Pre	.35	.20	0.239
Legumes Post	.31	.19	
Fry/Tots Pre	.46	.21	0.172
Fry/Tots Post	.50	.19	
Other Veg Pre	.43	.35	0.001*
Other Veg Post	.36	.29	
Red/Orange Veg Pre	.20	.21	0.906
Red/Orange Veg Post	.17	.15	
Starchy Veg Pre	.41	.20	0.687
Starchy Veg Post	.42	.21	

^a *p* <0.05

^b Numbers are expressed as average cups served per meal, per day

Objective 6: Association Between Fruits and Vegetables, Managers' Support, and Cafeteria Environment

A correlation analysis was planned to determine if there was an association between the increase in fruits and vegetables servings served before and after the

intervention, with cafeteria managers' support for the use of BE strategies, and changes in the school cafeteria environment. This objective was based on the hypothesis that fruit and vegetable servings would increase as a result of the intervention. However, since there was no significant increase in fruit and vegetable selections, managers' attitudes or cafeteria environment scores, the correlation analysis was not conducted.

CHAPTER V

DISCUSSION

A primary goal of this study was to expand the extent of use of BE in Oklahoma middle schools. This was achieved, as evidenced by a significant increase in scores reflecting the extent of BE strategies used in the schools from pre to post intervention. This change was driven by an increase in the strategy of convenience, as well as, a trend in increased use of verbal prompts. Increases in fruit and vegetable servings after the intervention were not observed. Previous research demonstrated that implementation of BE strategies did lead to an increase in students' fruit and vegetable selection and consumption (Hanks, Just, Smith, & Wansink, 2013; Wansink, Just, Payne, & Klinger, 2012). However, these studies were experimental in design, included measuring plate waste, were limited to a few number of schools, and narrowed their research to only examine a select few BE strategies. In contrast, the Oklahoma Smarter Lunchroom Project was a broad community-based approach that depended on the adoption of BE strategies by schools to be successful. In other words, researchers did not go into schools to train managers and lunchroom staff directly, but depended on Extension Educators to be reliable trainers on behalf of the Smarter Lunchroom Project. Fruits and vegetables servings were not directly observed but were estimated through food production records, which may or may not be sensitive enough to reflect actual servings. Although there

were no increases in fruit and vegetable servings after the implementation of the project, schools were using BE strategies.

Managers' attitudes were high before the intervention (with a mean score of 37.7/48), demonstrating they were already supportive of the project and the use of BE strategies. However, attitudes varied from a strong positive to a positive range, resulting in a trend toward a moderate positive correlation between attitudes and the use of BE strategies. This positive support from the start of the project, as well as the maintenance of these high support scores post intervention, suggest that the managers who chose to participate in the study fell under the category of "early adopters" and "early majority" as described by the Diffusion of Innovation Theory (Rogers, 1995).

Everett Rogers, a leading researcher in this theory, suggests that the adoption of an innovation, or in this case, behaviors, is a process over time and does not occur in a single act. Rogers (1995) also suggests that with any new innovation, there is a certain percent of the population that readily adopts the innovation, where others are not as likely. The proportion of "early adopters" to "late majority" is typically found as a normal distribution, illustrated in Figure 5.1.

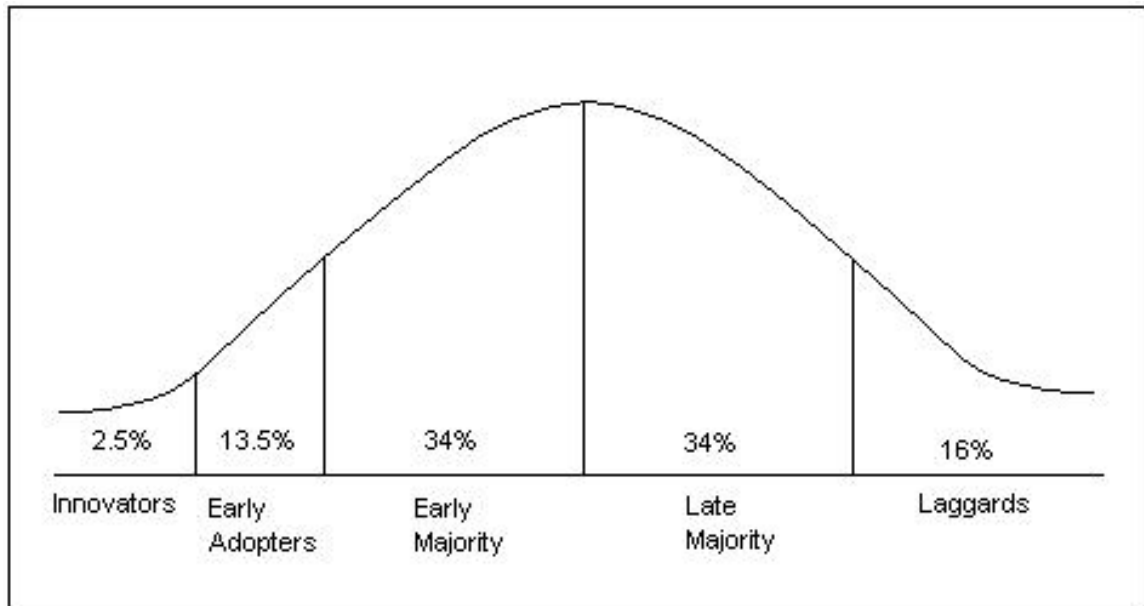


Figure 5.1: Hypothesized Adopter Categories within a Typical Population (Rogers, 1995)

Characteristics of people in each category are summarized in Table 5.1.

Table 5.1 Characteristics of Categories in the Diffusion and Innovation Theory
(Lefebvre, n. d.)

Innovators	Early Adopters	Early Majority	Late Majority	Laggards
Venturesome	Respect	Deliberate	Skeptical	Traditional
High tolerance of risk	Opinion leaders	Very local perspective	Sensitive to peer pressure and norms	The traditionalist – tired and true
Fascinated with novelty	Well-connected socially and locally	Very engaged in peer networks	Cautious	Keepers of the wisdom
Willingness to travel and learn	Resources and risk tolerance to try new things	Rely on personal familiarity before adoption	Usually scarce resources	Near isolates in their social networks
Seen as mavericks, not opinion leaders	Self-conscious experimenters	How does this help me?	Minimize uncertainty of outcomes	Suspicious of innovation and change agents
Social networks transcend geographic boundaries	They are watched by others – and they know it		Want to see the proof locally	Adoption will not fail

This study represents the first attempt to promote use of the Smarter Lunchroom Project across the state of Oklahoma. The goal was to recruit approximately 100 schools to implement BE strategies, however only 69 schools were recruited. Of the recruited schools, 46 percent agreed to participate, and 38 percent submitted completed sets of food production records. Based on the Diffusion of Innovation Theory and supported by data collected during the project (e.g., high support scores), the managers who chose to participate might be described as the opinion leaders in the field, who have high tolerance for taking risks associated with improvement of their respective child nutrition programs.

The theory also suggests why approximately slightly more than 50 percent of the schools approached to participate, refused. For example, a manager who did not want to participate may have had a lower tolerance for risk, perceived a lack of resources needed to support new strategies, and may have observed the project as too complex. While no data was collected directly from the schools refusing to participate, an informal post-project survey of Cooperative Extension Educators, aimed at identifying lessons learned from the project, was conducted. Information gained from the Educators revealed several themes including complexity of the new USDA NSLP requirements and lack of resources (e.g., time, money and staff). Forty-eight percent of Educators reported managers indicating “time” as a perceived barrier in implementing the project. The themes and representative statements are presented in Table 5.2. Although BE strategies are generally easy to implement and require little or no costs (e.g., less than \$50) managers not participating may have associated the Smarter Lunchroom Project with the new USDA meal patterns which are complex and require additional resources to implement (USDA, 2012b; Just & Wansink, 2009).

Table 5.2 Reasons for Lunchroom Managers' Resistance Described by Educators

Theme	Representative Quote(s)
Managers' felt pressure to transform lunch to fit new NSLP requirements and could not undergo another change in the lunchroom	<p>"They were all frustrated by all of the new requirements and did not want to do anything else to their plate."</p> <p>"I do feel like most of the schools were not following the guidelines and were also afraid I was going to report them."</p>
There was a pre-conceived notion that the project would take too much time to implement	"Many of the schools just don't have the time or man power to spend on the project,"
Short of staff	"They all told me the same thing-they were short of staff- not just one person, and didn't see how they could do it and get the food out."

Under the previous USDA NSLP meal pattern requirements, schools were only required to serve a total of $\frac{3}{4}$ cup of fruits and vegetables combined for reimbursement (USDA, 2012d). Findings from this study illustrate that schools participating in this project were serving the $\frac{1}{2}$ cup of fruit per day and $\frac{3}{4}$ cup of vegetables per day that are required under the most recent USDA NSLP meal pattern requirements, that went into effect in the fall of 2012 (USDA, 2012d). Since the schools were indeed serving the adequate amounts, which increased fruits and vegetables from the previous year by $\frac{1}{2}$ cup, students might not have wanted to take extra, or more, fruits and vegetables. The new NSLP meal pattern requirements themselves are a BE strategy, in that schools now are serving larger quantities and more variety of fruits and vegetables with no increase in the cost of the meal. As such, ability to measure the effect of additional strategies may have been minimized.

Another example of a BE strategy already in place before implementing the Smarter Lunchroom Project was the high percentage of schools (72 percent) offering

students a fruit and vegetable bar. Students at these schools may have been familiar with a variety of fruits and vegetables and therefore may not have been influenced by the BE strategies to take more fruits and vegetables. Availability of the fruit and vegetable bars further demonstrates the innovative characteristic of the schools agreeing to participate in the Smarter Lunchroom Project.

Rather than the expected increase in fruit servings, the data reflects a decrease in overall fruit served after using BE strategies. This might be explained by the timing of the intervention, inventory concerns, and fruit served as an ingredient in a fruit and grain dessert not being included in the analyses. For example, schools were participating in the intervention at the end of the school year (six weeks ranging from March through the beginning of May), a time when best practices support depletion of inventories. To achieve this, schools may have changed the way they menued fruit, from plain or whole fruit to fruit based desserts (e.g., cobblers and crisps). The seasonality of the type of fruit on the menu may also have played a role, where late winter, and early spring fruits are different. For example, the researcher observed fruit being used in fruit and grain based desserts more in the spring semester.

An alternate explanation of the decrease in fruit servings after the implementation of the project could be due to the BE principle of “reactance.” With the new NSLP meal pattern requirements, students were being required to take an increased amount of fruits and vegetables. Based on this principle students may have reacted to these new meal patterns by choosing to take less fruits and vegetables, choosing to eat something else that was not being “forced” upon them, and/or under “offer versus serve” students do not have to take all of the fruit and vegetable components of the meal, as long as they are

meeting the minimum requirements. Therefore, the observed decrease in fruit may be due to the students' reaction of these new meal pattern requirements.

The purpose of the cafeteria environment measure was to determine if there may have been factors influencing students' participation in the school meal program, thus limiting exposure to the fruits and vegetables being offered. With the exception of the snack area, scores for each scale (i.e., approach, serving area, dining area) were high at the beginning of the project compared to the maximum possible. (It should be noted that only eight of the thirty-two schools reported having a snack bar.) At the end of the study period, there was no observed difference in cafeteria environment scores. This may be due to the beginning high scores as well as limited scale response options (i.e., positive, neutral, negative, N/A) and thus not very sensitive to detecting changes.

Limitations

The limitations of this study included a smaller than expected sample size, in which the findings do not reflect the whole population. This is especially true based on the positive cafeteria managers' support scores. Another limitation was the use of food production records, in that not all managers filled them out correctly, and managers using different templates, etc. The use of food production records was used because it was the most feasible way to collect data on student fruit and vegetable servings and to detect change, since all schools participating in the NSLP are required to fill them out. Further, previous work had shown the use of food production records as being a viable tool to detect changes in students' of fruits and vegetables (Bangs, 2012). Although this study did not see an increase in fruit and vegetable servings served after the intervention, the food production records did detect a change (decrease). Therefore, the use of food

production records supports previous work is a sensitive enough tool for detecting changes in fruit and vegetable servings.

Summary

Research indicates use of BE strategies in school lunchrooms may nudge students to chose healthier foods, such as fruits and vegetables (Godfrey, 2012). The aim to use this community-based approach to broaden the use of BE strategies in Oklahoma middle school settings was achieved. Managers who participated in this study were supportive of the project before they began and continued their support throughout the intervention. While the positive attitudes toward the project may have served as a mediating factor in agreeing to participate, factors such as the recent implementation of the new USDA NSLP meal pattern and dietary specifications, and timing of the project, may have limited the ability to evaluate the full impact of BE on students' fruit and vegetable selections.

Conclusion

The overall purpose of the Smarter Lunchroom Project was to expand the use of BE strategies across the state of Oklahoma and to better understand what supports and prevents implementation, and how implementation affects middle-school age students' fruit and vegetable selections.

Null hypothesis 1 states that there will be no difference between the use of BE strategies before and after implementing the Smarter Lunchroom Project. Based on the finding of increased use of BE strategies, researchers reject the null hypothesis.

The second null hypothesis states that there will be no relationship between managers' attitudes at the beginning of the project and the change in use of BE strategies.

Findings from this study indicate some variance in managers' support for use BE strategies, ranging from strong positive to positive. There was a trend toward a moderate positive correlation between attitudes and use of BE strategies. As such cafeteria managers' attitudes, may serve as a moderating factor in broadening the use of BE strategies. Researchers reject the null hypothesis.

Null hypothesis 3 states there will be no changes in middle school cafeteria environment scores before and after implementing the Smarter Lunchroom Project. The data shows that school cafeteria environments stayed statistically the same before and after implementation of the project, therefore, researchers fail to reject the null hypothesis.

Null hypothesis 4 states that there will be no increase in the number of fruits and vegetables served before and after implementing the Smarter Lunchroom Project. The findings exhibit that there was a decrease in total fruit served post intervention, as well as "other vegetables". Researchers fail to reject the null hypothesis.

Hypothesis 5 states there will be no relationship in the increase in number of fruit and vegetable servings before and after implementing the Smarter Lunchroom project with changes in 1) cafeteria managers' support for the use of BE strategies, and 2) the school cafeteria environment. This hypothesis was not statistically tested because there was no significant increase in fruit and vegetable servings from before the intervention to after the intervention, as well as no significant changes in managers' support for the use of BE strategies, and changes in the school cafeteria environment.

Implications for Future Research and Practice

Further research is needed to better understand the reasons why managers and schools were reluctant to utilize the BE strategies. The Diffusion of Innovation Theory suggests that continued support of “early adopters” and “early majority” may also be useful in creating the social norm for using BE needed to reach the “late majority” (Rogers, 1995). Examples for future practice include: 1) more training for school lunchroom managers on how to introduce and expand Smarter Lunchroom practices; 2) allowing managers to have access to peer support by offering managers to get in touch with other managers’ who have had success implementing the Smarter Lunchroom Project; 3) providing managers with creative ideas for naming fruit and vegetable side dishes; 4) promotion of the National Extension Healthy Food Choices in Schools Community of Practice. Other efforts include continued advocacy for school wellness policies to require use of BE strategies throughout the school environment, and use of social media to gain support from school boards, administrators, teachers, parents, and community members.

Future research methods should include a more rigorous analysis of food production records to better detect changes in students’ food selection choices. For example, include recipes containing fruits and vegetables as an ingredient (e.g., fruit and grain-based desserts). In addition to investigating students’ selection of fruits and vegetables, plate waste studies should be included to determine if students are consuming the menu items. This would provide the basis for studies using BE strategies to encourage not only selection of fruits and vegetables, but also consumption.

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APPENDICES

Appendix A Smarter Lunchroom Forms

Page | 1

Create a SMARTER LUNCHROOM Action Plan

Complete the SMARTER LUNCHROOM Action Plan before using new practices.

Date of Action Plan _____

Date school plans to start using new SMARTER LUNCHROOM practices _____

School Demographics

School district name and contact person will remain confidential and will only be used if there is a need to clarify information. The information reported below will not be associated with either the school district, middle school, or contact persons.

School District Name _____

Child Nutrition Director _____

Middle/Junior-high School _____

School Kitchen Manager _____

Does the school participate in the National School Lunch Program?

☐ Yes

☐ No

What percentage of students was eligible for free and reduced-price meals at the middle/junior high school site as of October 31?

☐ Less than 50%

☐ 51-79%

☐ More than 80%

Which type of food service management system is used by the school district?

☐ Self-operated

☐ Contract management

Create a SMARTER LUNCHROOM, 2012-2013

Grades levels at the middle school/junior-high school.

- ☐ 5th grade
- ☐ 6th grade
- ☐ 7th grade
- ☐ 8th grade
- ☐ 9th grade

Does the school district or school site have a Student Nutrition Advisory Council or Committee?

- ☐ Yes
- ☐ No

How many students are enrolled at the middle school/junior-high school site?

- ☐ Less than 300 students
- ☐ 301 to 699 students
- ☐ 700-999 students
- ☐ More than 1000 students

What is the percentage of students in each of the racial/ethnic groups at the middle/junior-high school site?

- ____ % American Indian / Alaska Native
- ____ % Asian
- ____ % Black / African American
- ____ % Hawaiian / Pacific Islander
- ____ % White
- ____ % Hispanic
- ____ % Other

What was the Average Daily Participation (ADP) for lunch at this school site during the last month for which reimbursement was claimed?

ADP ____ % Month _____

What is the length of the scheduled lunch period for middle/junior-high school students?

____ minutes

Halfway through the lunch period, what % of students was still in the line, if any? _____%

Create a SMARTER LUNCHROOM, 2012-2013

What is the approximate age of the school kitchen or most major recent renovation?

- ☐ Less than 10 years
- ☐ 11 to 25 years
- ☐ 26 to 40 years
- ☐ More than 41 years

How many serving lines are in the meal service area?

- ☐ 1
- ☐ 2
- ☐ 3 or more

Does the school have a separate "snack" line?

- ☐ Yes
- ☐ No

Does the school have a fruit/vegetable bar?

- ☐ Yes
- ☐ No

What types of a la carte items (or competitive foods) are offered in the school site's serving lines or snack line?
Mark all that apply.

- ☐ Sugar-sweetened beverages (tea, fruit drinks, sports-drinks, energy drinks)
- ☐ 100% fruit juice
- ☐ Milk (12 ounce or larger containers)
- ☐ Pastries (cookies, cakes, sweet rolls, etc.)
- ☐ Granola or energy bars
- ☐ Ice cream and frozen desserts
- ☐ Other _____
- ☐ Other _____
- ☐ Other _____
- ☐ Other _____

Create a SMARTER LUNCHROOM, 2012-2013

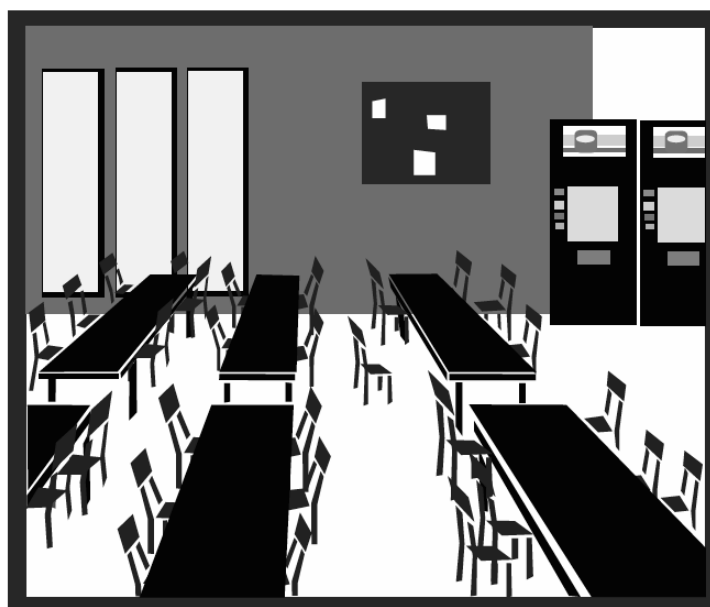
1. Observe the School Cafeteria Environment

Observe the meal service line from the perspective of a student. Consider the height and reach of the kids. You may need to bend over and look at the line from their point of view and imagine how far they can reach.

Rate each aspect of the school nutrition environment “as is”. Mark “+” for a positive impression, “n” for neutral; “-” for a negative impression, or “n/a” for not applicable.

	Impression			
	+	n	-	n/a
Approach to lunchroom:				
Lighting comfortable				
Attractive, healthy food posters				
Menu clear and neat				
Noise level				
Cleanliness: garbage				
Cleanliness: supplies				
Odor				
Clear traffic pattern				
No traffic jams				
Serving Area:	+	n	-	n/a
Menu clear and neat				
Noise level				
Cleanliness				
Orderly flow				
Greeted by lunchroom staff				
Cheerful lunchroom staff				
Efficient cash register				
Snack Area:	+	n	-	n/a
Menu clear and neat				
Noise level				
Cleanliness				
Orderly flow				
Greeted by lunchroom staff				
Cheerful lunchroom staff				
Lunchroom staff provide verbal prompts to take fruit and or vegetable				
Variety of fruits offered				
Variety of vegetables offered				
Efficient cash register				
Continued on next page.				

Dining Area:	+	n	-	n/a
Clear traffic pattern				
Lighting comfortable				
Attractive, healthy food posters				
Tomorrow's menu clear and neat				
Noise level				
Orderly conduct				
Cleanliness: garbage				
Cleanliness: tray return				
Cleanliness: recycling				
Odor				
Cheerful lunchroom staff				
Monitors' rapport with students				
Teaching staff present				
Teaching staff supportive of school nutrition program				
Administrators present				
Administrators supportive of school nutrition program				



Create a SMARTER LUNCHROOM, 2012-2013

2. SMARTER LUNCHROOM Level

Some schools are already using SMARTER LUNCHROOM practices to help nudge students' fruit and vegetable choices. For each practice, read through the levels of implementation and decide the level that best describes your cafeteria's practices. Record the score under each respective practice in the top row.

Action Levels	Convenience Level _____	Appeal Level _____	Variety Level _____	Verbal Prompts Level _____
A	Fresh fruit is under the sneeze shield in stainless steel pan	Vegetables are difficult to identify / see on the lunch line.	Only 1 fruit and 1 vegetable are offered.	Food service staff does not interact with students.
B	Fruit is under sneeze shield. Fruit is in an attractive bowl or in clear portion cups.	Vegetables are moved to a highly visible area on the lunch line.	Two or more fruits and 2 or more vegetables are offered each day.	There is a menu posted.
C	Fruit is in an attractive bowl or in clear portion cups, and in an easily reached location.	Vegetables have been given creative and age-appropriate names and are moved to a highly visible area on the lunch line.	Two or more fruits and 2 or more vegetables are offered each day and attractively displayed (simply garnished, arranged by color, portioned into clear cups, etc.).	There is a menu posted with creative, age appropriate food descriptions.
D	Fruit is in an attractive bowl or in clear portion cups, in a highly visible and easily reached location on the lunch line.	Creative and age-appropriate names are displayed next to the respective vegetable in a highly visible area on the lunch line.	Two or more fruits and 2 or more vegetables are offered each day, are attractively displayed and students can self-select as much as they want.	There is a menu posted with creative, age appropriate food descriptions, and students are greeted by food service staff.
E	Fruit is in an attractive bowl or in clear portion cups, and in 2 highly visible and easily reached locations on the lunch line.	Creative and age-appropriate names are displayed next to the respective vegetables in a highly visible area on the lunch line and on menu boards in the cafeteria.	Two or more fruits and 2 or more vegetables are offered each day, are attractively displayed and students can self-select as much as they want.	There is a menu posted with creative, age appropriate food descriptions, and students are greeted by food service staff who provide students with verbal prompts encouraging selection of fruit and / or vegetable.
F	Fruit is in an attractive bowl or in clear portion cups, in 2 or more highly visible and easily reached location with one location being near the cash register.	Vegetables are displayed in at least 2 highly visible, easily accessible / highly trafficked areas and have creative and age-appropriate names displayed next to them and on menu boards.	Two or more fruits and 2 or more vegetables are offered each day, are attractively displayed and students can self-select as much as they want. Competitive snack foods are moved to a less convenient location in the meal service area.	There is a menu posted with creative, age appropriate food descriptions. Students are greeted by food service staff who provide students with verbal prompts, and dining area monitors who acknowledge fruit & vegetable choices.

Create a SMARTER LUNCHROOM, 2012-2013

3. Create a SMARTER LUNCHROOM

Look at the SMARTER LUNCHROOM levels (step 2) with the middle school cafeteria staff.

Decide which scores you would like to improve. Choose from the following list the practices that will work best in your school cafeteria. Choose as many as you like.

Provide training, if needed, on how the practices will be implemented. Set a date to start, then DO IT!

SMARTER LUNCHROOM PRACTICES	ACTION PLAN Practices we will use:
1. Offer a fruit and vegetable bar. (variety)	€
2. Verbal encouragement for fruit and vegetables. (verbal prompts)	€
3. Allow unlimited amounts of fruits & vegetables with a reimbursable meal. (variety)	€
4. Place vegetables as the first item on the serving line. (convenience & appeal)	€
5. Offer fruit and vegetables in multiple locations. (convenience & variety)	€
6. Offer monthly taste-testing of unfamiliar fruits and vegetables, then incorporate into the menu. (appeal)	€
7. Move the salad or fruit and vegetable bar to a convenient, high-traffic area. (convenience)	€
8. Offer a variety of fruit and vegetable options each day. (variety)	€
9. Change the default options for fruit and vegetable side dishes. (non-verbal prompt)	€
10. Place fresh fruit at the cash register or point of service. (convenience)	€
11. Place fresh fruit in colorful basket or bowl. (appeal)	€
12. Cut up fruit and arrange by color. (appeal & convenience)	€
13. Place snack foods in less convenient areas in the cafeteria.	€
14. Use creative, age-appropriate names for vegetables on menus and sign-age. (appeal)	€
15. Offer "Grab & Go" fruit and vegetable snack options. (convenience)	€

Create a SMARTER LUNCHROOM, 2012-2013

5. Support for a SMARTER LUNCHROOM

As the cafeteria manager, please rate how strongly you agree or disagree with each statement about SMARTER LUNCHROOMS.

	Strongly agree	Agree	Disagree	Strongly disagree
Using SMARTER LUNCHROOM practices is within my job description.	€	€	€	€
SMARTER LUNCHROOM practices will help our school achieve wellness goals.	€	€	€	€
There is enough funding to implement SMARTER LUNCHROOM practices.	€	€	€	€
The design of the serving area is flexible enough implement one or more SMARTER LUNCHROOM practices.	€	€	€	€
The length of the meal period does not limit the SMARTER LUNCHROOM practices that can be used.	€	€	€	€
Food service staff has the skills needed to implement SMARTER LUNCHROOM practices.	€	€	€	€
Food service staff has adequate time to implement SMARTER LUNCHROOM practices.	€	€	€	€
Using SMARTER LUNCHROOM practices will help meet community expectations for school nutrition services.	€	€	€	€
Using SMARTER LUNCHROOM practices will not reduce school nutrition revenues.	€	€	€	€
Food service staff is open to using SMARTER LUNCHROOM practices.	€	€	€	€
Students are interested in choosing healthy foods.	€	€	€	€
Students enjoy eating in the school cafeteria.	€	€	€	€

Thank you for your time to complete a SMARTER LUNCHROOM Action Plan.

NOTE TO EDUCATOR: Please mail, fax, or scan and email the following documents to:

€ SMARTER LUNCHROOM Action Plan	Deana Hildebrand 301 Human Sciences Oklahoma State University Stillwater, Oklahoma 74078 Deana.hildebrand@okstate.edu FAX: 405-744-1357 Telephone: 405-744-5059
€ Food production records for 6 week period prior to beginning SMARTER LUNCHROOM project	

The SMARTER LUNCHROOM plan was adapted with permission using materials from the Center for Behavioral Economics in Child Nutrition, Food and Brand Lab, Cornell University. For more information visit www.smarterlunchrooms.org
Create a SMARTER LUNCHROOM, 2012-2013

Create a SMARTER LUNCHROOM Follow-Up Report

Complete the follow-up report 2 months after starting use of the SMARTER LUNCHROOM practices.

Date started using SMARTER LUNCHROOM practices _____

Date of follow-up report _____

School Demographics

School district name and contact person will remain confidential and will only be used if there is a need to clarify information. The information reported below will not be associated with either the school district, middle school, or contact persons.

School District Name _____

Child Nutrition Director _____

Middle/Junior-high School _____

School Kitchen Manager _____

What was the Average Daily Participation (ADP) for lunch at this school site during the last month for which reimbursement was claimed?

ADP _____ % Month _____



Create a SMARTER LUNCHROOM, 2012-2013

1. Observe the School Cafeteria Environment

Observe the meal service line from the perspective of a student. Consider the height and reach of the kids. You may need to bend over and look at the line from their point of view and imagine how far they can reach.

Rate each aspect of the school nutrition environment “as is”. Mark “+” for a positive impression, “n” for neutral; “-” for a negative impression, or “n/a” for not applicable.

	Impression			
	+	n	-	n/a
Approach to lunchroom:				
Lighting comfortable				
Attractive, healthy food posters				
Menu clear and neat				
Noise level				
Cleanliness: garbage				
Cleanliness: supplies				
Odor				
Clear traffic pattern				
No traffic jams				
Serving Area:	+	n	-	n/a
Menu clear and neat				
Noise level				
Cleanliness				
Orderly flow				
Greeted by lunchroom staff				
Cheerful lunchroom staff				
Efficient cash register				
Snack Area:	+	n	-	n/a
Menu clear and neat				
Noise level				
Cleanliness				
Orderly flow				
Greeted by lunchroom staff				
Cheerful lunchroom staff				
Lunchroom staff provide verbal prompts to take fruit and or vegetable				
Variety of fruits offered				
Variety of vegetables offered				
Efficient cash register				
Continued on next page.				

Dining Area:	+	n	-	n/a
Clear traffic pattern				
Lighting comfortable				
Attractive, healthy food posters				
Tomorrow's menu clear and neat				
Noise level				
Orderly conduct				
Cleanliness: garbage				
Cleanliness: tray return				
Cleanliness: recycling				
Odor				
Cheerful lunchroom staff				
Monitors' rapport with students				
Teaching staff present				
Teaching staff supportive of school nutrition program				
Administrators present				
Administrators supportive of school nutrition program				

Did you make changes to your school cafeteria environment as part of your action plan?

€ No

€ Yes. If yes, please use the space below to list the changes that were made.

Changes to school cafeteria environment included:

2. SMARTER LUNCHROOM Level

For each practice, read through the levels of implementation and decide the level that best describes your cafeteria's practices. Please circle the level at which each strategy is being used in cafeteria.

Action Levels	Convenience Level _____	Appeal Level _____	Variety Level _____	Verbal Prompts Level _____
A	Fresh fruit is under the sneeze shield in stainless steel pan	Vegetables are difficult to identify / see on the lunch line.	Only 1 fruit and 1 vegetable are offered.	Food service staff does not interact with students.
B	Fruit is under sneeze shield. Fruit is in an attractive bowl or in clear portion cups.	Vegetables are moved to a highly visible area on the lunch line.	Two or more fruits and 2 or more vegetables are offered each day.	There is a menu posted.
C	Fruit is in an attractive bowl or in clear portion cups, and in an easily reached location.	Vegetables have been given creative and age-appropriate names and are moved to a highly visible area on the lunch line.	Two or more fruits and 2 or more vegetables are offered each day and attractively displayed (simply garnished, arranged by color, portioned into clear cups, etc.).	There is a menu posted with creative, age appropriate food descriptions.
D	Fruit is in an attractive bowl or in clear portion cups, in a highly visible and easily reached location on the lunch line.	Creative and age-appropriate names are displayed next to the respective vegetable in a highly visible area on the lunch line.	Two or more fruits and 2 or more vegetables are offered each day, are attractively displayed and students can self-select as much as they want.	There is a menu posted with creative, age appropriate food descriptions, and students are greeted by food service staff.
E	Fruit is in an attractive bowl or in clear portion cups, and in 2 highly visible and easily reached locations on the lunch line.	Creative and age-appropriate names are displayed next to the respective vegetables in a highly visible area on the lunch line and on menu boards in the cafeteria.	Two or more fruits and 2 or more vegetables are offered each day, are attractively displayed and students can self-select as much as they want.	There is a menu posted with creative, age appropriate food descriptions, and students are greeted by food service staff who provide students with verbal prompts encouraging selection of fruit and / or vegetable.
F	Fruit is in an attractive bowl or in clear portion cups, in 2 or more highly visible and easily reached location with one location being near the cash register.	Vegetables are displayed in at least 2 highly visible, easily accessible / highly trafficked areas and have creative and age-appropriate names displayed next to them and on menu boards.	Two or more fruits and 2 or more vegetables are offered each day, are attractively displayed and students can self-select as much as they want. Competitive snack foods are moved to a less convenient location in the meal service area.	There is a menu posted with creative, age appropriate food descriptions. Students are greeted by food service staff who provide students with verbal prompts, and dining area monitors who acknowledge fruit & vegetable choices.

Create a SMARTER LUNCHROOM, 2012-2013



Extension and Engagement
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3. How we created a SMARTER LUNCHROOM

Check all of the SMARTER LUNCHROOM practices you started using.

SMARTER LUNCHROOM PRACTICES	FOLLOW-UP PLAN Practices we used:
1. Offer a fruit and vegetable bar. (variety)	€
2. Verbal encouragement for fruit and vegetables. (verbal prompts)	€
3. Allow unlimited amounts of fruits & vegetables with a reimbursable meal. (variety)	€
4. Place vegetables as the first item on the serving line. (convenience & appeal)	€
5. Offer fruit and vegetables in multiple locations. (convenience & variety)	€
6. Offer monthly taste-testing of unfamiliar fruits and vegetables, then incorporate into the menu. (appeal)	€
7. Move the salad or fruit and vegetable bar to a convenient, high-traffic area. (convenience)	€
8. Offer a variety of fruit and vegetable options each day. (variety)	€
9. Change the default options for fruit and vegetable side dishes. (non-verbal prompt)	€
10. Place fresh fruit at the cash register or point of service. (convenience)	€
11. Place fresh fruit in colorful basket or bowl. (appeal)	€
12. Cut up fruit and arrange by color. (appeal & convenience)	€
13. Place snack foods in less convenient areas in the cafeteria.	€
14. Use creative, age-appropriate names for vegetables on menus and sign-age. (appeal)	€
15. Offer "Grab & Go" fruit and vegetable snack options. (convenience)	€

Create a SMARTER LUNCHROOM, 2012-2013

5. Support for a SMARTER LUNCHROOM

As the cafeteria manager, please rate how strongly you agree or disagree with each statement about SMARTER LUNCHROOMS.

	Strongly agree	Agree	Disagree	Strongly disagree
Using SMARTER LUNCHROOM practices is within my job description.	€	€	€	€
SMARTER LUNCHROOM practices will help our school achieve wellness goals.	€	€	€	€
There is enough funding to implement SMARTER LUNCHROOM practices.	€	€	€	€
The design of the serving area is flexible enough implement one or more SMARTER LUNCHROOM practices.	€	€	€	€
The length of the meal period does not limit the SMARTER LUNCHROOM practices that can be used.	€	€	€	€
Food service staff has the skills needed to implement SMARTER LUNCHROOM practices.	€	€	€	€
Food service staff has adequate time to implement SMARTER LUNCHROOM practices.	€	€	€	€
Using SMARTER LUNCHROOM practices will help meet community expectations for school nutrition services.	€	€	€	€
Using SMARTER LUNCHROOM practices will not reduce school nutrition revenues.	€	€	€	€
Food service staff is open to using SMARTER LUNCHROOM practices.	€	€	€	€
Students are interested in choosing healthy foods.	€	€	€	€
Students enjoy eating in the school cafeteria.	€	€	€	€

Thank you for your time to complete the SMARTER LUNCHROOM Follow-up Report.

NOTE TO EDUCATOR: Please mail, fax, or scan and email the following documents to:

€ SMARTER LUNCHROOM Follow-up Plan	Deana Hildebrand 301 Human Sciences Oklahoma State University Stillwater, Oklahoma 74078 Deana.hildebrand@okstate.edu FAX: 405-744-1357 Telephone: 405-744-5059
€ Food production records for weeks 2 through 8 of the SMARTER LUNCHROOM project.	

The SMARTER LUNCHROOM plan was adapted with permission using materials from the Center for Behavioral Economics in Child Nutrition, Food and Brand Lab, Cornell University. For more information visit www.smarterlunchrooms.org

Create a SMARTER LUNCHROOM, 2012-2013



Do you want to “nudge” students toward healthier food choices *and* have less food waste?

Create a SMARTER LUNCHROOM!

Oklahoma Cooperative Extension Service, in partnership with the School Nutrition Association of Oklahoma & OSDE Child Nutrition Service, is studying smarter ways to present foods to students in the school cafeteria to “nudge” them toward healthier food choices.

Benefits of Using SMARTER LUNCHROOM

Best Practices

- ♦ Uses no cost/low cost methods.
- ♦ Encourages healthier food choices without restricting foods.
- ♦ Reduces food waste—students eat the foods they choose.
- ♦ So simple, every school can make at least 1 change.

Benefits of participating in the SMARTER LUNCHROOM

Project

- ♦ Free training...learn how to present healthy foods in ways that students will WANT to choose them.
- ♦ Free on-site consultation visit...work with a trained Cooperative Extension Educator to develop a SMARTER LUNCHROOM Action Plan.
- ♦ Share *your successes* in creating a SMARTER LUNCHROOM.

School's Commitment

- ♦ Complete a SMARTER LUNCHROOM Action Plan and Follow-up Report.
- ♦ Implement one or more SMARTER LUNCHROOM practices for at least 2 months.
- ♦ Provide Cooperative Extension with 12 weeks of food production records to measure changes in students' food choices.

Cooperative Extension's Commitment

- ♦ Provide training.
- ♦ Maintain school's confidentiality.
- ♦ Provide feedback on successes.

Who can participate?

- ♦ Any school district serving middle school age students, grades 6-8.

For more information

Contact:

deana.hildebrand@okstate.edu

405-744-5059

Deana Hildebrand, PhD, RD, SNS
Oklahoma State University



SMARTER LUNCHROOMS:

Behavioral Economics
in School Nutrition Programs



Nutritional Sciences
COLLEGE OF HUMAN SCIENCES

Inventory of SMARTER LUNCHROOM Practices

(Just, 2006; Just et al., 2008; Just & Wansink, 2009; Kahn & Wansink, 2004; Perry et al., 2004; Schwartz, 2007; Spill et al., 2010; Wansink et al., 2005)

1. Offer a fruit and vegetable bar.

Fill a salad bar with a variety of fruit and vegetables. Allow students who purchase a reimbursable meal to freely take fruits and vegetables from the bar.

Rationale: The bar appeals to the students because they are getting more for their dollar.

2. Verbal encouragement for fruits and vegetables by cafeteria staff.

Cafeteria employees act friendly with the students and ask questions like, "Would you like a piece of fruit with your lunch?", "What vegetable do you want today?"

Rationale: These verbal cues work the same way as marketing techniques. Example: A fast food employee asks, "Do you want fries with your sandwich?"

3. Allowing unlimited amounts of fruit and vegetables with a reimbursable meal.

Students who purchase a reimbursable meal are allowed as many fruits and vegetables as they want from the lunch area.

Rationale: "Unlimited amounts" allow students the opportunity to get more food for the same meal price, increasing price value.

4. Place fruit and vegetables as the first item on the service line.

The first item students pass by in the lunch line should be a fruit or vegetable. Examples include a relish tray of raw vegetables, whole fruit, or portioned servings of canned fruit.

Rationale: Hungry students are eager to fill their empty tray.

5. Offer fresh fruit and vegetables in multiple locations on the service line.

Instead of having one area designated for fruits and vegetables put them in several different areas.

Rationale: Increases opportunities for students to choose a fruit or vegetable and increases the perception of greater variety.

6. Offer a monthly taste test of unfamiliar fruits and vegetables, then incorporate them into the menu.

Prepare small samples of new fruits or vegetables for students to try at no cost, then serve them as part of the school menu.

Rationale: Exposure to new foods can be fun for students and they will be more likely to choose the new fruit or vegetable if they have tried it before.

7. Move the reimbursable salad bar to a convenient, high-traffic area.

Put a salad bar in a place where the students have to walk around it instead of off to the side

Rationale: The salad bar becomes more convenient, increasing the chance that busy students will make a healthful meal choice.

8. Offer vegetable options as opposed to requiring one vegetable.

Offer students two options of a vegetable side dish rather than a single option.

Rationale: When students have opportunity to make a choice between options they are more likely to consume the chosen food item.

9. Change the default options for fruit or vegetable side items.

Make the default fruit or vegetable side dish a healthier item, such as a fresh vegetable, rather than automatically serving a less healthier option, such as French fries.

Rationale: Some students will keep the default item because it is easier than asking for the substitute item.

10. Placement of whole fruit at point of service.

Use a decorative basket and fill it with pieces of whole fruit near the cashier kiosk

Rationale: Impulse buying that works the same way as the assortment of items before the cash register at the grocery store.

11. Cut up fruit and arrange by color to increase visual appeal.

Cut up fruit into smaller pieces and group them by color instead of only offering whole fruit.

Rationale: Cut up fruit is easier and more convenient to eat especially for students with dental braces.

12. Offer an additional option of one fruit and vegetable each day to increase variety.

Instead of only serving one type of whole/canned fruit or one vegetable offer several different varieties each day.

Rationale: Provides students with more options to choose from and increases visual appeal.

13. Place snack foods in less convenient areas within the lunchroom.

Move the chips, cookies, snacks, etc. to the side or to a less convenient area.

Rationale: Students will be less tempted to select less convenient items.

14. Creatively rename fruit and vegetable dishes.

Vegetable chili becomes "Grandma's slow cooked vegetable chili." Cut up oranges and grapes become "Fruity Citrus Salad"

Rationale: Creative, descriptive names appeal to students and are associated with taste appeal.

15. Offer "Grab & Go" fruit and vegetable snack options.

Have pre-packaged healthy snacks that include fruits and vegetables available for students to purchase so they can eat them after-school.

Rationale: These healthy food options will keep students away from the vending machines when they are looking for an after-school snack.

For assistance in assessing your school nutrition program to create a Smarter Lunchroom, contact the Oklahoma State University Cooperative Extension at 405-744-5059.

Using Behavioral Economics to create SMARTER LUNCHROOMS

Purpose: To achieve school nutrition wellness goals by improving student food choices in the school environment without significantly increasing costs, making radical changes, or restricting choices.

Goal: Present foods in ways that students willingly make the healthier choice.

Why it Works:

- Examines the way students think and how it influences food choices
- Uses marketing principles to “nudge” students’ food choices
- Students feel they have freely and consciously made the decision to choose the healthier foods without being forced to do so.

Advantages:

- Easy to implement
- Inexpensive
- Prepares students to make better food choices in the future



Do this!



Instead of this!

For more information visit
www.smarterlunchrooms.org

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Oklahoma State University, in compliance with Title VI and VII of the Civil Rights Act of 1964, Executive Order 11246 as amended, Title IX of the Education Amendments of 1972, Americans with Disabilities Act of 1990, and other federal laws and regulations, does not discriminate on the basis of race, color, national origin, gender, age, religion, disability, or status as a veteran in any of its policies, practices or procedures. This includes but is not limited to admissions, employment, financial aid, and educational services.

APPENDIX B

IRB Application

Oklahoma State University Institutional Review Board Request for Determination of Non-Human Subject or Non-Research

Instructions

1. **Principal Investigator Information:** Provide all information regarding the Principal Investigator. Provide the off campus address only if the PI does not have a reliable campus address.
2. **Faculty Advisor:** If the Principal Investigator is an undergraduate or graduate student OSU IRB requires that a Faculty Advisor be appointed to oversee the conduct of human research. Provide all information regarding the appointed Faculty Advisor.
3. **Study information:**

- A. Provide the title of the research.
- B. Give a summary of the proposed research to include: the research question; a brief description of the methodology; and a description of any interventions.
- C. Describe the subject population that will be studied or reviewed. This should include the age and number of the subjects and how they will be recruited. It is important to identify who your research subjects will be, as the IRB must follow specific guidance and regulations for certain populations. Also indicate the type of data or specimens. Describe the methods in which this data or specimens will be collected, stored, and how confidentiality will be maintained.

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.

- A. A systematic investigation is one that involves a predetermined method for studying a specific topic, answering a specific question(s), testing a specific hypothesis(es), or developing theory. Examples of systematic investigations include, but are not limited to, observational studies, interview (including those that are open-ended) or survey studies, group comparison studies, test development, program evaluation, and interventional research. Examples of activities that would not normally be considered systematic investigations include, but are not limited to, training activities (e.g., human subjects being trained to perform a certain technique or therapy such as art therapy or psychoanalysis), classroom exercises involving human subjects or human subject data where the objective of the activity is to teach proficiency in performing certain tasks or using specific tools or methods. Although, continuous quality improvement (CQI) and quality assurance (QA) activities often follow a systematic method of gathering information the findings are generally utilized for internal program improvements and do not meet the definition of "research." However, at any point if the CQI or QA activities are intended to be extended beyond a single individual or an internal program, e.g., publications or presentations, they would be considered "research" and an IRB determination would be required.
- B. To develop or contribute to generalizable knowledge requires that 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. Examples of activities that are typically not generalizable include biographies and service or course evaluations, unless they can be generalized to other individuals, services, courses or concepts **and there is an intention to do so**. In addition, classroom exercises solely to fulfill course requirements or to train students in the use of particular methods or devices would also not typically be considered generalizable. However, theses or dissertation projects conducted to meet the requirements of a graduate degree are usually considered generalizable.

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)

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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. A study does not qualify as "non-human subject" research if data or information is obtained about living individuals.
- B. The study does not qualify as "non-human subject" research if data is obtained through intervention and interaction with an individual. Interaction or intervention involves direct human contact with individuals or manipulation of an individual's environment. Examples of intervention and interaction include the performance of physical exams, obtaining blood samples, performing x-rays, altering light, temperature, or student course materials, etc.
- C. To qualify as "non-human subject" the data cannot contain any of the following 18 identifiers:
1. Names;
 2. Geographic subdivisions smaller than a State, including street address, city, county, precinct, zip code, and their equivalent geocodes, except for the initial three digits of a zip code;
 3. All elements of dates (except year) for dates directly related to an individual (e.g., date of birth, admission);
 4. Telephone numbers;
 5. Fax numbers;
 6. Electronic mail addresses;
 7. Social security numbers;
 8. Medical record numbers;
 9. Health plan beneficiary numbers;
 10. Account numbers;
 11. Certificate/license numbers;
 12. Vehicle identifiers and serial numbers, including license plate numbers;
 13. Device identifiers and serial numbers;
 14. Web Universal Resource Locators (URLs);
 15. Internet Protocol (IP) address numbers;
 16. Biometric identifiers, including finger and voiceprints;
 17. Full-face photographic images and any comparable images; and
 18. Any other unique identifying number, characteristic, or code.
- D. To qualify as "non-human subject", the Investigator must receive the data or specimens without any of the 18 unique identifiers described above.
- E. To qualify as "non-human subject", a code or link cannot exist that could allow the Investigator to establish identity.
6. **Signatures:**
The PI must sign the form. The Faculty Advisor must sign the form if the PI is a student.
7. **Submit to the IRB:**
Submit the original form and one copy to:

Beth McTernan, IRB Manager
University Research Compliance
219 Cordell North
Stillwater, OK 74078-1038

Questions? Please contact the IRB office at 405-744-3377 or irb@okstate.edu

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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: Deana		Middle Initial: A	Last Name: Hildebrand
Department/Division: Nutritional Sciences			College: Human Sciences
Campus Address: 301 Human Sciences			Zip+4: 74078-6141
Campus Phone: 744-5049	Fax: 744-1357	Email: Deana.hildebrand@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:		Title:
Department/Division:		College:
Campus Address:		Zip+4:
Campus Phone:	Fax:	Email:

3. Study Information:

A. Title

Broadening use of choice architecture strategies in middle-school nutrition settings and understanding the extent to which use of strategies impact middle-school students selection of fruits and vegetables.

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

Aim of project:

The aim of this project is to broaden the use choice architecture strategies in middle-school nutrition settings and evaluate the efficacy of the program on impacting on students' FV choices. Choice architecture utilizes behavioral economic principles to influence students' food choices. The project is part of a broader national project referred to as Smarter Lunchroom Movement. For the purpose of data collection, choice architecture strategies are referred to as Smarter Lunchroom practices.

Objectives:

- 1) Train Cooperative Extension educators to provide on-site consultation to school districts related to implementing choice architecture strategies;
- 2) Test the extent to which choice architecture strategies are implemented within a middle school setting before and after on-site consultations, and the extent to which students' FV selections change from pre to post consultation;
- 3) Assess differences in students' FV selections between schools implementing choice architecture strategies at a greater extent compared to those not implementing choice architecture or implementing choice architecture at a lesser extent.

Methods:

The study will use multi-site, action-research methodology in a convenience sample of approximately 100 middle-schools in Oklahoma. This methodology has been found useful with diverse stakeholders who are interested in exploring a common issue in a coordinated manner. It is appropriate for this study in that it allows participating school food authorities with diverse facilities and resources to select choice architecture strategies that are feasible for the local situation.

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Interventions:

One or more of 14 choice architecture strategies (the way in which food is presented to the consumer) designed to nudge students to select healthier food choices in the school cafeteria. An inventory of the interventions that will be provided to schools for selection is attached. Schools are being asked to implement the choice architecture strategy/s for a minimum of 2 months.

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

Subject population:

Approximately 100 school food authorities with middle/junior-high school sites serving grades 5th – 9th grades will be recruited. Inclusion criterion includes participation in the USDA-sponsored school lunch program and being a low-income school. Low-income is defined as having 50% or more of the enrolled students qualifying for free or reduced price meals on October 31, 2011.

Recruitment:

Schools will be recruited through School Nutrition of Oklahoma meetings and website and Oklahoma State Department of Education Child Nutrition website. A recruitment flyer is attached.

Data:

Data will be collected in regular middle/junior-high school cafeteria settings in Oklahoma that have agreed to participate in the project. There will be 2 sources of data: 1) existing school food service production records, including number of students served, amount and variety of fruits and vegetables offered, and amount of fruits and vegetables left over; 2) a Smarter Lunchroom action plan and follow-up forms, identifying school demographic information, characteristics of the school cafeteria environment, the Smarter Lunchroom practices being implemented and the extent of implementation, percentage of students eligible for free and reduced price meals, age of kitchen facility, number of serving lines, and length of meal service period (copies attached). Data will be collected at pre (action plan form) and post (follow-up report) intervention.

Confidentiality:

None of the 18 individual student identifiers will be part of the collected data. The names of the school district and middle/junior-high school site and contact person at each level will be collected for the purpose of clarifying data, if the need arises. Names of school districts, school sites and respective contact persons will remain confidential and only accessed by researchers. To maintain the confidentiality of the school district, schools will be numbered consecutively with school names matched on a master list that will only be accessible to the researchers and graduate research assistant. Original food production documents will be maintained by the school district. The researchers' will not have access to information specific to individual students. All records will be maintained in a file cabinet in HS 315, office of the principal investigator.

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

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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

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

- D. Are data/specimens received 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 _____ Date _____

Signature of Faculty Advisor _____ Date _____
(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

Date

VITA

Catherine Angela Meredith

Candidate for the Degree of

Master of Science

Thesis: EVALUATION OF THE SMARTER LUNCHROOM PROJECT:
BROADENING THE USE OF BEHAVIORAL ECONOMICS IN
OKLAHOMA MIDDLE SCHOOLS

Major Field: Nutritional Sciences

Biographical:

Education:

Completed the requirements for the Master of Science in nutritional sciences at Oklahoma State University, Stillwater, Oklahoma in May, 2014.

Completed the requirements for the Bachelor of Science in Dietetics, Nutrition, and Food Science from The University of Vermont, Burlington, Vermont, 2012.

Experience:

Intern at F-Factor Nutrition LLC in New York City

Intern at Hunger Action Network of NYC

Nutrition Education Volunteer for City Harvest NYC

Oral Presenter at ASN Experimental Biology Conference, April 2013

Professional Memberships:

Oklahoma State University Dietetic Intern

Academy of Nutrition and Dietetics Student Member