NUTRITION, CHOICE, AND THE SCHOOL CAFETERIA: AN ECOLOGICAL APPROACH TO ENCOURAGING CONSUMPTION OF FRUITS AND VEGETABLES

A Dissertation by

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AN ECOLOGICAL APPROACH TO ENCOURAGING CONSUMPTION OF FRUITS AND VEGETABLES

The following faculty members have examined the final copy of this dissertation for form and content, and recommend that it be accepted in partial fulfillment of the requirement for the degree of Doctor of Philosophy, with a major in Psychology.

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DEDICATION

To my Mom, who, without knowing it, raised me as a
Community Psychologist from the very beginning –
Your memory lives on in my everyday;

To Matt, whose unwavering support and patience
helped carry me through graduate school –
I can't imagine this experience without you;

and last but not least,

To the rest of my family – Dad, Greg, Scott, Sean –
and everyone else at home,
who never really understood why I needed to go to Kansas
for graduate school, but encouraged me anyway.
You all are the best family a girl could ask for

The doctor of the future will give no medication, but will interest his patients in the care of the human frame, diet and in the cause and prevention of disease.
- Thomas A Edison

Let food be thy medicine, thy medicine shall be thy food.
- Hippocrates

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ABSTRACT

Growing rates of childhood obesity continue to be a major public health issue for this country. In order to impact childhood obesity at the population level it is necessary to shift our focus away from individual behaviors and towards the critical examination of the role that settings have in promoting or discouraging healthy eating.

One relevant setting in the fight against childhood obesity is the school cafeteria. Since 1946, the National School Lunch Program has worked to ensure that schools can provide their students with affordable daily access to nutritional, well-balanced meals. However, "food served" does not necessarily equal "food consumed;" high rates of waste, especially of fruits and vegetables, are well documented.

The current, mixed-method study examines the effectiveness of a low-cost intervention designed to increase student consumption of fruits and vegetables by altering the choice architecture of the cafeteria. This was done through the introduction of an active, forced choice into the school lunch service.

Consumption was measured by observing (n=2,064) and weighing (n=84) student plate waste over two ten-day periods pre-intervention and during implementation. Results show an average daily 15% increase in consumption of both fruits and vegetables during the intervention period. Qualitative interviews (n=34) were conducted in order to better understand the environment of the school cafeteria and identify any barriers to healthy eating that may exist within the setting.

Both quantitative and qualitative findings suggest that local schools can actively encourage students to take advantage of fruits and vegetables offered through the NSLP by implementing setting-level changes to the cafeteria environment.

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CHAPTER I

INTRODUCTION

The current generation of American children could be the first in modern history to experience lower life expectancies than their parents (Olshansky, et al., 2005). A major contributing factor to this startling decline in life expectancy is obesity, which now more than ever is prevalent in childhood.

Obesity is clinically defined as living with a higher than recommended "body mass index" (BMI). BMI is an indirect measure of body fat percentage, and a BMI value greater than or equal to 30 is considered obese (Centers for Disease Control and Prevention, 2011; Pubmed Health, 2011). For children and adolescents aged 2-19, whose bodies are still growing and developing, obesity is defined slightly differently. The label of obesity in childhood is related to where a child falls within the recommended height/weight distribution for children of his or her age and gender; children at or above the 95th percentile are considered obese (Barlow & Committee, 2007). Obesity as a health issue is much more than just "weighing too much." In medical terms, obesity is a multi-system condition associated with elevated risks of type 2 diabetes, coronary heart disease, gallstones, cancer, and various additional medical complications; it also brings an increased risk of death (over non-obese peers) regardless of an individual's age (Field, 2001; Must, et al., 1999; Thorpe, Florence, Howard, & Joski, 2004).

In America today, obesity is "common, serious, and costly" (Centers for Disease Control and Prevention, 2012a). Because obesity has reached epidemic proportions in this country (more than 1/3 of adults and almost 17% of youth were obese in 2009-2010), its negative effects are being felt at the societal as well as at the personal level (Ogden, Carroll, Kit & Flegal, 2012). Rising healthcare costs, loss of productivity, and premature death are all obesity-related issues

that the United States is currently facing (Finkelstein, Trogdon, Cohen & Dietz, 2009; Michaud, Goldman, Lakdawa, Gailey, & Zheng, 2009; Mokdad, Marks, Stroup, & Gerberding, 2004; Seidell, 1998; Thorpe, et al., 2004). To put this current health crisis into context, in the year 2000 alone, poor nutrition and lack of physical activity were responsible for 400,000 American deaths; these obesity related deaths were second only to those deaths attributed to tobacco (Mokdad, et al., 2004).

Understanding Childhood Obesity and its Impact

Nested within the larger obesity epidemic is the smaller, more alarming, problem of childhood obesity. While obese adults (34% of all adults) still outnumber obese children, childhood obesity is growing at a faster rate (Felgal, Carroll, Ogden, & Curtin, 2010; Levi, Segal, St. Laurent, & Kohn, 2011). In the past thirty years, rates of childhood obesity have nearly tripled (Felgal, et al., 2010). In 2008, the most recent year that data was collected and analyzed, 20% of children between six and eleven years old, 18% of adolescents, and even 10% of children two to five years old were considered obese (Centers for Disease Control and Prevention, 2010; Ogden, Carroll, Curtin, Lamb, & Flegal, 2010). These estimates do not count the 11 million overweight children (14.8% of children in the United States; "overweight" is defined as a BMI between the 85th and 90th percentile for their age, height, and gender), whose weight is not within a healthy range, and who are therefore at an increased risk of becoming obese and experiencing the related health issues (Barlow & Committee, 2007; Levi, et al., 2011).

Childhood obesity is not evenly distributed throughout the population; certain children are more at risk to becoming obese than others. These include children with disabilities (Levi, et al., 2011), children whose parents are obese (Whitaker, Wright, Pepe, Seidel, & Dietz, 1997), children of lower socioeconomic status (Caprio, et al., 2008; Wang, 2001), and children living in

rural areas especially in the southern states (Centers for Disease Control and Prevention, 2010). Among children and adolescents aged 2-19, boys are more likely than girls to be obese (Ogden, et al., 2012). Rates of childhood obesity are also higher among non-white groups, specifically in Mexican American, African American, and Native American children and adolescents; of these ethnic groups, African American girls and Mexican American boys have the highest rates of overweight and obesity (Haas, et al., 2002; Caprio, et al., 2008; Ogden, et al., 2010).

Both obese and overweight children are likely to experience many "adult" risk factors for cardiovascular disease, such as high cholesterol and high blood pressure (Deckelbaum & Williams, 2001; Freedman, Zuguo, Srinivasan, Berenson, & Dietz, 2007). Data collected during the Bogalusa Heart Study, a long-term community-based study conducted from 1972 to 2005, illustrates this point — approximately 60% of overweight children five to ten years old had at least one cardiovascular risk factor, including high blood pressure, high cholesterol, or elevated insulin levels (Freedman, Dietz, Srinivasan, & Berenson, 1999). In addition, obese children have a greater risk of developing diabetes than their non-obese peers (Levi, et al., 2011). Further, nutritional deficits of vitamins and minerals, along with surpluses of dietary fat during early childhood, a critical period of brain development (Thompson, 2000), can adversely alter the neurochemistry of the brain and have long-term influences on cognitive functioning (see also Gibson & Green, 2002; Greenwood & Craig, 1987).

Additionally, research suggests that obesity in children is strongly associated with adverse psychological effects, such as low self-esteem, depression, and anxiety. Obese children and teenagers are often the victims of "weight bias" from their peers, teachers and even their parents (Puhl & Heuer, 2009). Obesity therefore not only contributes to a shorter lifespan through increased medical risks, but it can also have a negative effect on a child's overall quality

of life as well. Medical complications limit obese children's opportunities for mobility and recreation, and discrimination, when internalized, can negatively affect their self-perception.

Implications of the Childhood Obesity Epidemic

Rising levels of childhood obesity, and the related, often lifelong medical conditions that accompany obesity, have dangerous implications for the future health and prosperity of our nation (Dietz, 1998; Levi, et al., 2011). This is especially true because obese children are likely to become obese adults (Freedman, et al., 2007; Guo & Chumlea, 1999). Various studies have shown that childhood obesity persists into adulthood; higher levels of BMI in childhood (especially in children three and older) can be used to predict overweight and obesity later in life (Goran, 2001; Whitaker, et al., 1997).

Even in cases where obese children are able to achieve a healthy body weight as adults, their bodies do not always recover, medically. Must et al. (1992) found that individuals who were obese in childhood or adolescence had higher rates of cardiovascular and other chronic diseases than their peers; this was true even if the individuals had attained a healthy weight during adulthood. Thus, childhood obesity can have adverse negative effect on an individual long after he or she sheds the excess weight; although this evidence is new, it suggests that obesity during one's early years can activate "triggers" associated with negative risk factors for the individual as an adult (Deckelbaum & Williams, 2001). Taking this into account, it is clear how addressing the childhood obesity epidemic will likely contribute to reducing adult obesity, and improving the health status of the population as a whole.

At the most basic level, obesity is caused by an energy intake that exceeds energy expenditure; a simple imbalance. The excess calories consumed, and not spent, are stored in the body as fat. While various genetic, hormonal and chemical substances can influence this

process, and predispose individuals to obesity, the majority of the treatments used to combat obesity focus on the behavioral aspects of the condition: diet and exercise (Swinburn & Egger, 1997). Individuals seeking to maintain or attain a healthy body weight are instructed to pay equal attention to both factors (Minkler, 1989). Research suggests that the best anti-obesity interventions are comprehensive, and address both, combining positive changes in diet with increases in physical activity and declines in sedentary time.

However, a recent systematic review of comprehensive behavioral interventions that target both children's diet and exercise habits in an effort to prevent obesity, showed only small changes in behavior and no significant effect on BMI in comparison to non-intervention control groups (Kamath, et al., 2008). This non-significant result highlights the uphill battle of behavior change programs while "so many forces in the social, cultural, and physical environment conspire against such change" (Institute of Medicine, 2000). Behavioral changes must be addressed within a larger context; failure to consider the environments individuals are living in, while attempting to make behavioral changes, is an example of the "context minimization error," and sets intervention programs up for failure in the long term (Shinn & Toohey, 2003). With this in mind, this current research project seeks to reduce childhood obesity by focusing on the necessary dietary changes in children, as well as the mechanisms, both personal and environmental, that will allow these positive changes to occur and be maintained over time. In order to do this, we will examine one specific dietary behavior: fruit and vegetable intake.

The Role of Fruit and Vegetable Consumption in Childhood Obesity

A substantial body of literature exists in support of the health benefits of daily fruit and vegetable consumption (Van Duyn & Pivonka, 2000). Although different types of fruit and vegetables vary in their nutritional makeup, they are commonly treated as one combined entity

(Bazzano, 2004). Health benefits of fruit and vegetable consumption include providing essential vitamins, minerals and nutrients, increasing satiety, and ensuring adequate fiber intake; these benefits are especially important for optimal growth and development throughout childhood (U.S. Department of Health and Human Services, 2000).

Additionally, a review of the literature suggests a protective role for fruits and vegetables in the prevention of certain diseases such as coronary heart disease, diabetes, hypertension, and specific types of cancer (Bazzano, 2004; Centers for Disease Control and Prevention, 2012c; Ford & Mokdad, 2001; Reddy & Katan, 2004; Van Duyn & Pivonka, 2000). Components of fruits and vegetables thought to be responsible for these protective mechanisms include fiber, potassium, folate, and antioxidants (Bazzano, 2004). A recent cohort study (n= 11,940) demonstrated an overall inverse relationship between fruit and vegetable consumption and total mortality (Steffen, et al., 2003). This studies also show a positive relationship between fruit and vegetable consumption and other healthy behaviors such as not-smoking, high educational attainment, daily physical activity and consumption of whole-grain foods.

Besides its demonstrated benefits for overall health, fruit and vegetable consumption is crucial in combating obesity and maintaining a healthy body weight (Centers for Disease Control and Prevention, 2012c). Diets that meet the recommended levels of daily fruit and vegetable intake have been shown to be associated with successful weight management (Rolls, Ello-Martin, & Tohill, 2004). Since fruit and vegetables have lower energy density than other dietary staples, adding them to one's daily diet can lead to a reduction in overall energy intake without increasing hunger (Rolls, et al., 2004). Therefore, not only does fruit and vegetable consumption play a role in overall health, it is also a key behavioral strategy in the prevention of obesity.

Unfortunately, national data indicates that children today do not meet the suggested intake for fruit and vegetables (U.S. Department of Agriculture & U.S. Department of Health and Human Services, 2010). The National Health and Nutrition Examination Survey (NHANES) shows that, on average, children ages four to eight, consume 0.9 cups of vegetables, and 1.1 cups of fruit daily. Children and teenagers ages nine to thirteen consume 1.0 cups of fruit, 1.15 cups of vegetables. Teenagers from 15 to 18 consume .9 cups of fruit and 1.25 cups of vegetables (females in this age group are consuming significantly less than males; .8 cups as compared to 1.0 cups of fruit, and 1.1 cups of vegetables as compared to 1.4 cups; National Cancer Institute, 2010). As seen in Table 1, these reported levels fall short of recommended daily consumption rates for children and teenagers.

TABLE 1

RECCOMENDED DAILY SERVINGS OF FRUITS AND VEGETABLES FOR CHILDREN, BY AGE AND GENDER

	4-8 Years	9-13 Years	14-18 Years
Fruits			
Male	1.5 Cups	1.5 Cups	2 Cups
Female	1.5 Cups	1.5 Cups	1.5 Cups
Vegetables			
Male	1 Cup	2.5 Cups	3 Cups
Female	1.5 Cups	2. Cups	2.5 Cups

Source: *Dietary Guidelines for Americans, 2010*

Experts agree that that increasing the daily fruit and vegetable consumption of children will have positive health implications, and can serve to reinforce a healthy weight status (United States Department of Agriculture, 2010). In fact, increasing both vegetable and fruit consumption in the population at large represents two of the major nutritional objectives of the "Healthy People 2020" campaign (U.S. Department of Health and Human Services, 2010).

Determinants of Fruit and Vegetable Consumption in Children

The health benefits of fruit and vegetable intake, coupled with the fact that food consumption patterns in childhood track into adolescence and adulthood (and may even decline later in life), make fruit and vegetable consumption among children a prominent public health issue (Biro & Wien, 2010; Harris, Gordon-Larsen, Chantala, & Udry, 2006; Rasmussen, et al., 2006; te Velde, Twisk, & Brug, 2007). Thus, it is important to look at the types of environments that actively encourage fruit and vegetable consumption (Story, Kaphingst, Robinson-O'Brien, & Glanz, 2008). Two recent reviews of the literature, separated into qualitative and quantitative studies, provide a detailed picture of the environmental and behavioral factors associated with fruit and vegetable intake in children.

In 2006, Rasmussen and colleagues conducted a substantial review of quantitative studies (n=48) exploring the determinants of fruit and vegetable consumption among children and adolescents. In general, the literature shows that younger children have both higher and more frequent intake of fruits and vegetables than older children. Determinants that were consistently and positively associated with higher intake of fruits and vegetables included higher socio-economic position, expressed personal preference for fruit and vegetables, parental intake, and home availability/accessibility. Other identified determinants such as nutritional knowledge,

self-efficacy, frequency of family meals, hours watching television, and school-related factors had mixed or incomplete support.

The 2006 review highlighted a conceptual framework (see Figure 1) for understanding children's fruit and vegetable consumption developed by the Pro Children Project (Klepp, et al., 2005). This model divides determinants into four categories: cultural and environment, physical environment, social environment, and personal factors. Within each category, determinants vary on how proximal or distal they are to the individual and his or her behavior.

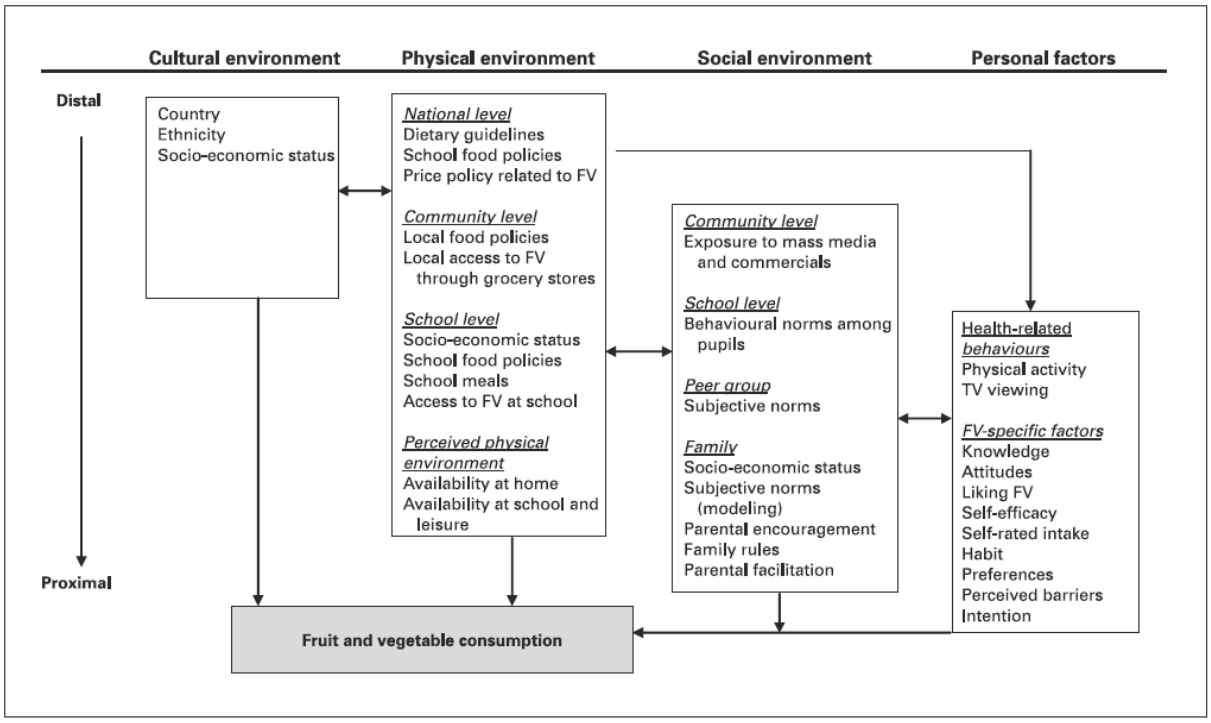

Figure 1. Theoretical framework for looking at factors influencing children's consumption of fruit and vegetables developed for the Pro Children Project (Klepp, et al., 2005)

For example, within the "social environment" variables exist at the community, school, peer-group and family level. The usefulness of this model includes encouraging researchers, public health advocates, and healthcare workers to see health behaviors, such as fruit and vegetable

consumption, as having multiple "layers" of cause. The model urges them to look beyond the characteristics and beliefs of the individual whose behavior they are attempting to modify.

A second review of the literature on determinants of fruit and vegetable consumption in children was conducted by Krolner and colleagues in 2011; this review examined 31 qualitative studies in order to put forth a more complete, multi-dimensional understanding of the factors that encourage or discourage fruit and vegetable intake. In general, the studies reviewed reported that taste preference was important to children, and both children and adolescents report a higher preference for fruit than vegetables. This finding is consistent with other intervention-based research that shows that it is easier to increase fruit consumption than vegetable consumption in children (French & Stables, 2003).

Further, these qualitative studies together suggest that perceived health benefits of eating fruit and vegetables were not a major influence on children when making food choices; rather other factors such as taste, convenience and sensory appeal mattered more (Krolner, et al., 2011). This is consistent with the current understanding that increases in nutrition education and awareness does not necessarily lead to increases in healthy eating (Dietz, 2012). The qualitative data also provided an explanation of the socio-economic discrepancies in consumption; it seems like children from families of higher socioeconomic status are exposed to a larger variety of both fruit and vegetables at a young age, and as a result may develop a wider taste preference. Additionally, children's responses show that the disparity in consumption between younger and older children can be potentially understood as a result of decreasing parental support for fruit and vegetable consumption; parents are less likely to cut up vegetables for older children, or monitor their eating habits as closely.

Two clear environmental factors contributing to consumption behaviors emerged from the review: the convenience and availability of fruit and vegetables. These qualitative studies suggest that even when children have a previously developed taste preference for fruit and vegetables, they will not eat them if it is not convenient (e.g. bringing a piece of fruit to school could lead to the fruit becoming damaged, or creating mess in their lunch box; at home, washing and slicing carrots for consumption is more work than eating a non-nutritious pre-packaged snack). Traditionally, availability has been understood as the simple presence of fruit and vegetables in the home. The concept of availability has been linked with perceived price barriers and the ability to access fresh fruit and vegetables. However, qualitative data examined in this review suggests that "availability" in the mind of children is better understood as a multidimensional construct, including variety, visibility, quality, texture, cost, convenience, time, access to unhealthy food, and methods of preparation.

Understanding and acknowledging the various factors both personal and environmental that affect fruit and vegetable consumption in children is the first step in increasing these desired behaviors. While some of the determinants reviewed, such as personal preference or socio-economic status, cannot be targeted or changed by health related interventions, it is important to recognize that there are multiple layers of inter-relating factors that influence consumption of fruits and vegetables beyond individual characteristics. Additionally it is crucial to understand that in different environments, such as school and home, determinants may have differing levels of significance (Krolner, et al., 2011).

Traditional Approaches to Combating Obesity

Historically, the problem of obesity has been both defined and addressed at the individual level (Swinburn & Egger, 1997; Minkler, 1989). This approach reflects society's collective

attributions of the cause of obesity as personal behavior, as something that is completely within an individual's control (e.g. people are obese because they lack self-discipline, do not know how to eat properly, or are lazy; Puhl & Heuer, 2009). Traditional approaches to preventing and treating obesity have almost exclusively focused on changing the behavior of the individual (Nestle & Jacobson, 2000). In the service of this goal, there exists a plethora of nutritional guidance information directed at individuals. As a society, our understanding of a "healthy diet" has no doubt developed and expanded over time; the first governmental and agency sponsored guidelines for healthy eating surfaced in 1952, with the American Heart Association's publication of "Food for Your Heart" (Nestle & Jacobson, 2000). Since then, both the number of organizations providing nutritional guidance, and the frequency of these guides have increased. For example, the latest nutrition research suggests not only emphasizing fruit and vegetable consumption, but including it as part of a diet rich in plant-based foods, as a way to both prevent and combat obesity (Deckelbaum & Williams, 2001; U.S. Department of Health and Human Services, 2000). This is not the same advice that was given to Americans 10 to 20 years ago.

Behavior change programs, informed by nutritional guidelines, put the responsibility for obesity completely on the obese person, and in the case of obese children, on the child and his or her parents (Perryman, 2011; Schwartz & Puhl, 2003; Wilson, 1994). Behaviorally based interventions are considered the standard treatment for overweight and obese children and adolescents (Whitlock, O'Connor, Williams, Beil, & Lutz, 2010). These interventions, aimed at increasing exercise and modifying diet, often contain cognitive aspects such as goal-setting and healthy thinking about food (Spear, et al., 2007). For young children especially, interventions can be inclusive of parents and other family members as well.

In a recent review of behavioral interventions for overweight and obese children, 13 intervention trials were examined treating 1,258 children ages 4 to 18; the majority of these trials occurred during or after the year 2005. The review found that comprehensive, medium to high-intensity behavioral interventions produced short-term improvements in weight; weight loss, however, was modest (Whitlock, et al., 2010). Interventions were considered "comprehensive" if they included counseling on both diet and exercise, as well as behavioral management techniques to help make and sustain lifestyle changes. Intensity was measured by the hours of time the patients spent with intervention specialists, medium intensity was defined as 25 - 75 hours, and high intensity as over 75 hours. Thus, the behavioral change programs that did work required both a comprehensive approach and a significant amount of time; they are resource heavy, and although they show positive results, less data is available on whether or not benefits are maintained long term (Whitlock, et al., 2010).

Literature was inconclusive on whether low-intensity or less comprehensive programs produce significant results, although it is generally agreed that programs which encourage healthy behavioral changes do not have much risk of harm to the patient. When behavioral changes fail, however, pharmaceutical interventions can be utilized as a "last chance effort" in addressing the condition. Drug treatment options and weight loss surgery, in combination with behavior change efforts, do have the potential to show weight loss above and beyond behavior programs change alone, and may work in more seriously obese patients; however, these more medically based treatments are not without potential side effects and complications to the child (Whitlock, et al., 2010).

Limitations to Traditional Approaches

Although the sheer amount of advice can be confusing for some individuals, there is a substantial amount of evidence backing these dietary guidelines; they are well-published, distributed and publicized. The question for those concerned with the obesity epidemic is not, "Do these guidelines have credibility?" or "Will these lifestyle changes have a positive impact on obesity?" or even "Do individuals know how to eat healthily?". Rather, at this point in time, the more important question is "In an age of growing obesity rates, is education aimed at individual behavior change our most effective tool?" Most public health professionals would agree that it is not (Dietz, 2012).

Although nutritional education, awareness and behavior change efforts are important, by themselves they are insufficient to overhaul individual behavior in an environment that promotes large and frequent consumption of unhealthy foods (Caprio, et al., 2008; Mikkelsen, Erickson, Sims, & Nestle, 2010). A true public health prospective actively considers the environment surrounding individual behavior when making health-related recommendations. As Biro and Wien (2010) stated, "the most important factors underlying the obesity epidemic are the current opportunities for energy intake coupled with limited opportunities for energy expenditure." The emphasis they place on the word "opportunity" in this quote distinguishes the public health approach from the traditional clinical-care, medical-model view. It recognizes that the environment, especially our current "toxic" environment that promotes high caloric intake and a sedentary lifestyle, has a strong influence on individual behavior (Perryman, 2011). This environmental perspective views dietary recommendations as both "banal" and "woefully inadequate" in making progress against obesity; without looking critically at the places that individuals live, work, play and learn in, the advice put forth by national institutes is nothing but

"wishful thinking and individual admonition" (Nestle & Jacobson, 2000). Instead, what is needed are comprehensive strategies that would promote healthful lifestyles at the population level; changes need to be made to the everyday settings in order to make it easier for individuals to make healthy choices.

Evidence for a more comprehensive, community-based approach is found in the data. Despite the plethora of nutrition information and increased physiological understanding of obesity over the last 50 years, obesity has continued to increase at the population level (Ogden, et al., 2010). A new approach is needed. If we as a society want to make progress, than the obesity problem can no longer be defined as "personal" or the result of purely "individual failings" or "individual choices." In order to reduce childhood obesity in this country it is necessary look at the larger context in which childhood obesity is occurring and examine the social and environmental factors that contribute to it (Schwartz & Puhl, 2003; Swinburn & Egger, 2004). Defining growing obesity rates as a societal problem with personal and medical implications, instead of a personal or medical problem with societal implications, allows us to focus on and address a full range of contributing factors.

An Ecological Perspective on Obesity

Public health practitioners and lawmakers are not the only ones working towards reframing the obesity problem and refocusing efforts from the individual, to the population at large. The American Psychological Association, under President Suzanne Bennett Johnson, Ph.D., is calling on Psychology as a discipline to take a larger role in combating obesity (Johnson, 2012). Within psychology, the field of Community Psychology aligns itself with the public health approach to preventing and treating obesity. Community Psychology is the study of people in context; it recognizes the reciprocal relationship that exists between individuals,

communities, and the larger social, cultural, political and physical settings in which they exist (Dalton, Elias, & Wandersman, 2001). One of the seven core values of the field is "individual and family wellness;" this value is understood as ensuring that all individuals have the chance to live healthy, productive lives. Community Psychologists are not clinicians, nor are they nutritionists or doctors. Rather, they pursue the goal of individual and family wellness from an environmental approach, helping to ensure that the settings individual people live in support and encourage health. Community Psychologists emphasize the prevention of obesity, along with health promotion, recognizing the chronic nature of obesity, and that it is a problem much easier "solved" before it begins.

The Ecological Model

One of the main tenants of the Community Psychology approach is the ecological model. The ecological model recognizes that as individuals, we live within multiple social systems, the smaller settings nested within larger ones (Nelson & Prilleltensky, 2010). Urie Bronfenbrenner, a psychologist concerned with developmental psychology, is one of the originators of this model, as well as the concept of "multiple levels of analysis." Psychologists, like nutritionists, had long been concerned with and focused on the individual. Bronfenbrenner, however, argued that we needed to look outside the individual as well. He described the layers of contexts that surround people using the image of a "Russian stacking doll" (Bronfenbrenner, 1979). According to this metaphor, as each doll exists with many larger dolls, so does each individual exist within layers of contexts which influence individual behavior. These layers of contexts, called levels of analysis, start with the smallest and most proximal systems to any individual, such as family and close friends, and grow larger and more distal as they progress away from the center (Dalton, et al., 2001).

The most common understanding of the ecological model involves five levels of analysis. Starting with the individual and moving outward, these layers include: micro-systems such as families, friends and colleagues; formal organizations such as schools, workplaces, and religious organizations (also known as meso-systems); localities and geographic locations, such as communities or regions of the country; and finally macro-systems such as cultural norms, societal values and laws and systems of government. This model, shown in Figure 2, presents each "setting" as embedded within another, larger setting; these settings are interdependent and effect one another (Maton, 2000).

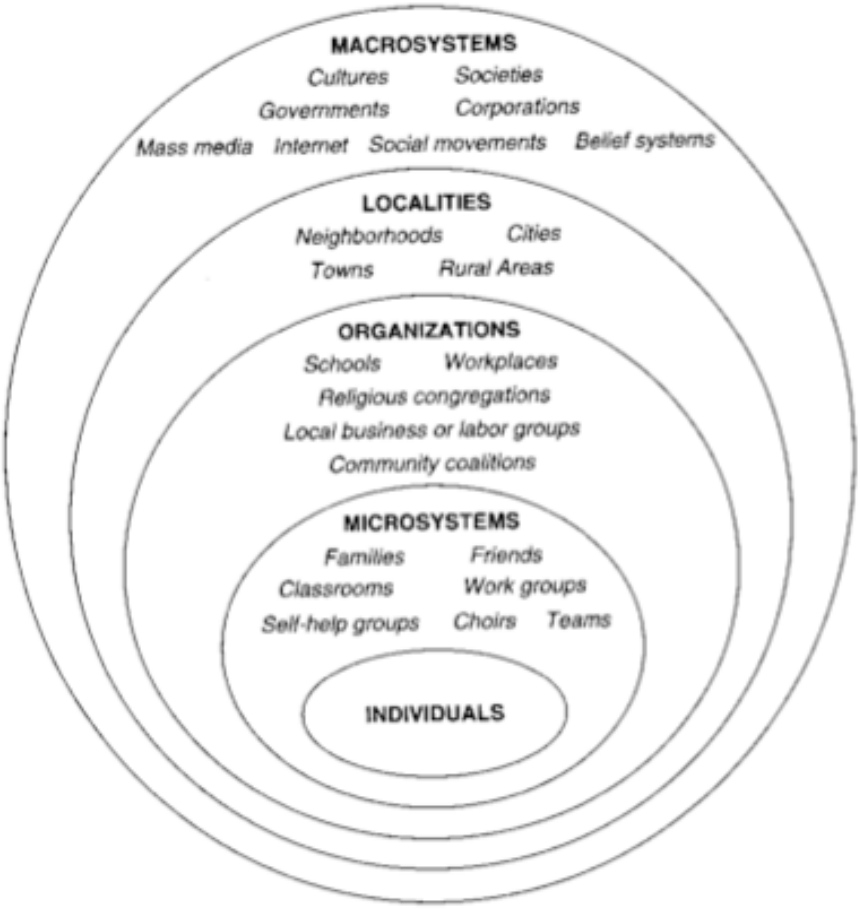

Figure 2. Diagram of the Socio-Ecological Model (Dalton, et al., 2001)

The purpose of diagramming the ecological model is to direct one's attention to the multiple layers of any issue, be it bullying, depression, poverty or obesity. People that seek to solve social problems can be assisted in their work through an understanding of how the problem exists and is reinforced at various levels of the ecological model. Too often individuals, psychologists included, have a tendency to minimize the role of context in understanding human behavior (Shinn & Toohey, 2003). For example, we view obesity as a negative character trait, attributing it to a lack of willpower, or just plain laziness. We hold the individual solely responsible for his or her weight, citing that it was their behavior that directly contributed to the condition; no one was forcing them to eat unhealthy food. However, when we view obesity through this individually-focused lens, we fail to recognize that an individual's eating behavior is nested within various contexts that themselves can support/discourage healthy eating. As mentioned earlier in this paper, this failure to see problems as complex, multi-layered issues is called the "context minimization error" (Shinn & Toohey, 2003). The context minimization error has clearly influenced the way in which obesity has been approached and treated, with the majority of efforts going towards individual behavior change rather than addressing, or even acknowledging, the role of the larger setting the individual is living in.

If a problem has components and contributing factors which exist at multiple levels of the ecological model, a successful intervention, or transformation of the situation, needs to address the issue at multiple levels as well (Maton, 2000). To apply the ecological model to the current obesity crisis would be to recognize how the various settings in which we work, learn, live and play in impact children's eating behaviors.

An Ecological Understanding of Childhood Obesity

In both defining and addressing the problem of childhood obesity, it is necessary to see individuals, including children, as existing within a larger socio-ecological context (Bronfenbrenner, 1977, 1979). Despite the tendency to focus on the individual, research has repeatedly demonstrated that the family a child grows up in, the specific neighborhood he or she lives in, and public policy measures that elected officials enact have a direct impact on the amount of exercise and the nutritional quality of food a child has access to (Adelman, 2008; Robert Wood Johnson Foundation, 2011; Schwartz & Puhl, 2003).

Currently, the vast majority communities in the United States can be described as "obesogenic" — "promoting high levels of consumption and sedentary lifestyles" (Lake & Townshend, 2006; Swinburn & Egger, 1997). The Centers for Disease Control and Prevention (2012b) recognize that American society has become characterized by community environments that promote unhealthy eating habits and physical inactivity, a deadly combination when it comes to obesity. In order to reduce the levels of childhood obesity it is necessary to ensure that the various social and physical environments children experience have the resources needed to help them adopt and maintain healthy behaviors (Dixon & Broom, 2007). Settings vary on two basic dimensions in terms of whether or not they promote health. First, they must have the resources necessary (e.g. access to healthy food, safe places to exercise) for individuals to maintain healthy lifestyles. Second, they must make these healthy options the "easy choice" by removing barriers to access. By making the healthy option the easier option, settings can actively work to encourage healthy behaviors.

Changes at higher ecological levels tend to take a significant amount of time and resources; recognizing this fact, it is important to note that American communities were not

always this way. Various societal changes over the last half of a century have led to this "perfect storm" of childhood obesity — settings that encourage over-consumption and discourage activity and a generation of adults that model obesogenic behavior (Schwartz & Puhl, 2003). By looking at all of the components of childhood obesity that exist at different socio-ecological levels, and further investigating how they interact with one another, a better, more comprehensive ,understanding of the crisis can be obtained.

Multiple Levels of Childhood Obesity. Starting at the micro level, changes in the family structure over the past half of a century have impacted what children eat and how much they exercise. The increase in two career families led to more "latch key kids," less parental supervision at home, and an increase in the amount of meals prepared and eaten outside the (Bureau of Labor Statistics, 2012; Skinner, 1980). Meals prepared outside of the home, at restaurants, fast food chains, and commercially prepared meals at supermarkets, tend to be less nutritional and have larger portion sizes than homemade meals (Barlow & Committee, 2007; Nestle & Jacobson, 2000; Nicklas, Baranowski, Cullen, & Berenson, 2001). Children who stay home by themselves after school are often encouraged to watch television, play video games, or use the computer; options which are seen as the "safer" than playing outside. The increase of time children spend on those sedentary, inside activities, especially media-related activities, takes away from time spent being active and has been shown to have a strong link with obesity (Crespo, et al., 2001; Hersey & Jordan, 2007).

Additionally, it is possible to go so far as to say that the increase in obese adults, and more specifically obese parents, has contributed to an increase in obese children. The association between parental weight status and children's BMI has been consistently documented in the literature (Dowda, Ainsworth, Addy, Saunders, & Riner, 2001). When we examine this

relationship in light of the ecological model, various possible causal factors exist for the correlation including shared genetics, common home food environments, the transmission of parental dietary habits to their children, and the effects of parents modeling certain eating behaviors for their children.

For children, the most significant organization that they interact with outside of the family is the school. Although public health advocates have done much to restrict the sale of "foods of minimal nutritional value," such as sodas and some snacks found in vending machines, these items are still prevalent in many schools (Mikkelsen, et al., 2010). Even if foods of minimal nutritional value are not being sold to children during school time, their presence is still felt, with companies such as Coca-Cola sponsoring sports teams, or advertising on Channel One (an educational television channel available in many schools). While this ongoing battle continues around access to snack foods and the presence of snack food advertising in school buildings, schools have had to become much more consciousness about the food they serve to students at breakfast and lunch; meals are required to meet rigorous health and nutrition guidelines (recently updated for the 2012-2013 school year) in order to qualify for federal funding.

On the other side of the equation, schools have increasingly been forced to cut physical education due to funding or time constraints. A majority of students in the United States do not get daily physical education class and the amount of time dedicated to physical education decreases as students reach high school (Stanford University, 2007). Estimates claim that less than 50% of the nation's high school students currently participate in physical education classes (Dowda, et al., 2001). Further, since 1969, the percentage of children who walk or bike to school (an excellent opportunity for daily physical activity) has declined from 41% to 13% in

2001 (Robert Wood Johnson Foundation, 2008). This decline in "active transportation" to school indirectly correlates with the rise in childhood obesity. The decline is attributed to the changing structure of public schools (the disappearance of the neighborhood school), the increased distance children live from their schools, and the perceived safety of walking and biking to school.

At the community level, the built-environment (the physical features of the community, land use patterns, and transportation systems) contributes to the level of activity of its residents for better or for worse (Frumkin & Dannenberg, 2010; Lake & Townshend, 2006). Communities that have well maintained and lit sidewalks, a network of walking or biking trails, and pedestrian accessible public destinations (local stores, parks, etc.) promote physical activity. If a child is not permitted to play outside or go to the neighborhood park, because there are too many streets to cross, or there is fear of crime, the amount of physical activity he or she partakes in will be limited. Resources devoted to the "walkability" (a measure of how friendly an area is to walking as a mode of transportation) of communities have declined as reliance on the car in American society has increased. Recently, the Centers for Disease Control and Prevention have launched a "Healthy Community Design" initiative, which recognizes the role of community design on the physical activity level, and thus the health, of its residents (2012b). This initiative is pushing lawmakers and city managers to take a "health in all policies" approach and consider the impact of community planning, transportation, and land-use decisions on the health status of residents.

Just as with physical activity, the built environment of a community shapes the local food systems and impacts what individuals living within its boundaries eat. Individuals select their diets in the context of their social, economic, and cultural environments; eating behavior is affected by what and where foods are available, the price of foods, and the advertising and

promotion of foods as well (Mikkelsen, et al., 2010). "Food desert" is the term used to describe areas where healthy, affordable food such as fruit, vegetables, lean-meat, and milk-products are hard to obtain. Residents in these areas have low access to grocery stores. The majority of areas classified as "food deserts" are located in low-income communities (USDA, 2012a). It is hard to plan a well-balanced, healthy meal if healthy food is either inaccessible or too costly. Supporting this idea, lack of access to a supermarket in terms of location, transportation, and affordability, has been linked to higher rates of obesity (Story, et al., 2008).

To understand the role that the community or locality has on individual behavior, we must accept the fact that not all communities have the same "risk factors" and "resources" when it comes to encouraging healthy lifestyles. The effects of obesogenic environments are disproportionately experienced by members of minority and poor populations (Centers for Disease Control and Prevention, 2012b). Fast-food restaurants and other unhealthy choices are concentrated in poorer communities; this hyper-availability of non-nutritional food contributes to the weight status of these communities (Inagami, 2009). A lack of grocery stores and farmer's markets in low-income and multi-ethnic neighborhoods has been documented as well (Larson, Story, & Nelson, 2009). Across school districts, the proportion of students eligible for free and reduced lunch (an indicator of poverty) is a reliable predictor of obesity (Caprio, et al., 2008). Further, low-socioeconomic communities tend to have under developed common spaces to support physical activity.

Policy represents the macro-level of the ecological model; various state and national policies continue to contribute to the current childhood obesity crisis. For example, after World War II, the suburbanization of America cemented the role of the car in American life and discouraged the development of walkable towns and cities (Frumkin & Dannenberg, 2010). On

the eating side of the equation, various agribusiness and food policies, discussion of which is beyond the scope of this paper, determine the cost of food and what is available in neighborhood supermarkets. Currently cheaper, more affordable foods are usually the processed, unhealthy foods. Further, advertising laws, while restricting ads for tobacco targeted at children, did not do the same for ads related to high-fat, high-sugar foods.

Considering the way that factors at multiple levels of the ecological model contribute to the obesity epidemic, it can be understood how interventions that focus only on individual behavior modification are unsuccessful, especially over the life course. While individual behavior change does have a role in combating obesity, the sheer number of people living with or at risk for obesity speaks for itself; fighting the condition one individual at a time is not practical or effective, and it does nothing to recognize the other, extra-individual "contributing factors." In order to effectively deal with this public health crisis it is necessary to broaden our scope, and examine not just individual behavior, but the way in which various contexts in which individuals work, live, learn and play promote or constrain healthy living.

A really strong intervention would address various root, contributing factors across all levels of the ecological model. However, as previously noted, changes at the "higher levels" (e.g. levels that are further away from the individual) take a significant amount of time and resources upfront. Community-based interventions that want to adopt the ecological perspective can do so by focusing on adjusting local environments in a way that better supports healthy behavior, whether it be a company allowing workers to go on 15 minute "walk breaks" or a restaurant offering a healthy side dish as the default option with its "meal deals." Small changes at the environmental level can mean big results for many individuals.

Informing an Ecological Approach: Theoretical Groundings

Recognizing that action at the environmental/setting level of the ecological model is necessary is the first step to combating childhood obesity at the population level. The second step is grounding the proposed setting-level changes in appropriate theoretical approaches so that any intentional adjustments to a chosen setting will have the sought-after results.

The specific setting chosen for this anti-obesity research project is the school cafeteria. The cafeteria was selected for a number of reasons. First, cafeterias exclusively serve our target population, children. Second, cafeterias are a prominent feature of almost every school in the country. They are easily accessible to local community members and parents who want to make a change. Third, because of the number of students who eat there daily, changes to the cafeteria environment that support healthy eating can have a positive effect on many children. And fourth, because school cafeterias are such a common setting across the country, information learned in particular cafeteria setting has the power to be applied to cafeterias across the country, magnifying any health-related impacts.

In order to design an effective setting level intervention aimed at enhancing the consumption of nutritious food within the school cafeteria, it is first important to understand the context of the cafeteria, and view it in a multidimensional way: as a setting that is effected by various factors at different levels of the ecological model. At the interpersonal level, other students as well as the lunch room staff and any teachers present, can influence an individual student's eating behaviors. Group eating behaviors, comments, and actions contribute to the norms that govern eating within the setting: for example, is it acceptable to throw out food because others are doing it? At the organizational level, school policies and rules can influence the cafeteria setting as well. These include the scheduling of lunch, what grade levels are present

during each period, and school wellness policies that dictate which foods students are allowed to bring into the cafeteria from home. The specific local community that the school sits in will influence the cafeteria setting as well, although in a more distal manner. Geographic location affects what fruits and vegetables are available and when; the values and opinions of the community influence how much money is given to schools and school lunch programs. At the macro level, school cafeterias are influenced by the United States Department of Agriculture (USDA) policy governing what can and cannot be served, as well as other food preparation/safety guidelines.

School cafeterias are generally doing a good job of providing healthy meals to children; in fact, they are mandated to do so by federal policy if they participate in the National School Lunch Program. Under the Healthy, Hunger-Free Kids Act passed in 2010, federal guidelines for school meals were revamped in an effort to make school lunches even healthier. Under this act, schools must now serve students at least one vegetable and one fruit serving each day. Previously, under "offer vs. serve" (OVS) guidelines, schools could give students the choice as to whether or not they wanted to take fruits and vegetables. Under the new guidelines which went into effect tin the 2012-2013 school year, students must take either a fruit or a vegetable serving in order for the meal to qualify as a federally reimbursable meal (United States Department of Agriculture, 2012).

The issue, however, is that "served food" does not equal "consumed food," especially not in the cafeteria setting. Students do not benefit from healthy meals if they do not consume these meals. Plate waste is common and costly to schools, the national school lunch program, and the students themselves. Various studies and observations show that fruit and vegetables are the most wasted parts of the school lunch (Buzby & Guthrie, 2002; Ralston, Newman, Clauson,

Guthrie, & Buzby, 2008). Observations from different cafeterias across the country document up to 42% of fruits and vegetables served ending up in the trash (Just & Price, In Press). It does not matter how healthy a meal is on paper, if it is not consumed by a child, it serves no nutritional purpose.

Half of the battle is won, in terms of the cafeteria setting — healthy food is present. Proposed changes and adaptations to the setting need to involve theoretical understanding of current eating behaviors, and insight on how to adjust the cafeteria setting to positively influence behaviors (e.g. increase student fruit and vegetable consumption). For this review, four separate, complimentary theoretical perspectives will be woven together in order to inform the proposed setting-based intervention. These theories, discussed in detail below, are: behavior setting theory, judgment and decision making theory with a focus on choice architecture, cognitive dissonance, and empowerment theory.

Behavior Setting Theory

Developed by Roger Barker and his colleagues, behavior setting theory provides a theoretical framework for understanding children's eating behavior within the cafeteria setting (see Barker, 1968). It is important to acknowledge that Roger Barker was not the first psychologist to look "outside the individual" when explaining behavior (Sansone, Morf, & Panter, 2003). Much earlier, in 1936, German social scientist Curtis Lewin published what is now known as the "Lewin Equation, $B = f(P,E)$," which states that "behavior is a function of person in their environment" (Altrichter & Gstettner, 1993). Barker was influenced by Lewin's early work when establishing the behavior setting theory.

A "behavior setting" is a fixed environmental location, defined as having a place, time, and a standing pattern of behavior. Behavior setting theory is a lens through which to understand

human behavior in a specific environment, in this case, it is used to illuminate student's eating behaviors within the setting of the cafeteria. The school cafeteria can be understood as a fixed and distinctive behavior setting, different than the kitchen at one's home, a local restaurant, or even the recess yard at school.

Behavior settings combine physical and social elements in a way that exerts an influence over individual behavior (Scott, 2005). Individuals enter and exit various distinctive behavior settings on a daily basis, ranging from the lobby at a bank, to a fast food restaurant, or a house of worship. Within any particular behavior setting, individuals, considered "participants" in the setting, behave more similarly to each other than one would expect; the setting, rather than variances in personalities and characteristics, influences and dictates their behavior.

This high and unexpected level of conformity in a specific behavior setting is usually not achieved by force; typically individuals self-regulate and adopt to the "extra-individual" power of the setting (Scott, 2005). Settings have both formal and informal rules governing behavior, in settings such as the school cafeteria certain behavioral rules and expectations are made explicit for students (Wicker, 1987). In addition to rules, people themselves play a role in establishing distinct behavior patterns and norms within a setting; they react to how others are acting, adjust their behavior, and also then serve as a model for newcomers, emitting clues on how others should act (Barker, 1968). Students eating lunch within the cafeteria setting are effected by the informal rules established by other students, as well as those explicitly stated by the school administration; these informal rules are especially powerful in dictating what served food items are "okay" to eat.

In order to encourage individuals within a specific behavior setting to engage in a desired behavior, in this case, encouraging students to eat the fruit and vegetables served to them at

lunch, it is essential to understand the setting as a whole. Once one understands the established patterns, tweaks can be made to the interaction between various elements in the setting (e.g. between students and the food they are served). When it is clear how established patterns govern individual behavior, positive changes to that setting can be made more effectively.

Understanding the Role of Judgment and Decision Making: A Cognitive Perspective

Health is more than healthcare; the majority of health related behaviors occur outside of doctors offices and away from hospitals. Every day individuals make hundreds of decisions that whether or not they realize it, impact their health, from what to eat for breakfast to whether to take the stairs or the elevator to the second floor (Wansink & Sobal, 2007). If Community Psychologists could better understand the processes involved in how individuals make daily decisions and how these decisions are impacted by the environment that they are made in, we could work towards designing everyday settings that actively supported healthy decision making at the individual level. Improving the outcomes of individual decisions has the potential to not only positively impact the decision makers themselves but also to improve the overall status of communities and the nation as well.

Decision making involves selecting one option from among a number of alternatives (Wickens, Lee, Liu, & Gordon Becker, 2004). Although information is often available to the decision maker, the specific outcomes of each alternative are not always clear (Kahneman & Tversky, 2000). However, research suggests that even when presented with sufficient information about their choices, humans are often prone to errors in logic and judgment. Human decision making frequently violates key assumptions of logic and rationality, both in the laboratory and in real life situations (De Neys, 2006; Stanovich & West, 2000; Wickens, et al., 2004). Often times, it is assumed that individuals will make the "right choice" if given the

information to do so; the recent public health, anti-obesity initiative to place nutritional information on restaurant menus is a reflection of this assumption. Insight into actual decision-making processes, however, shows that this assumption is not necessarily true; information is not always acted upon in a manner we would predict.

Currently, the field of judgment and decision making supports a "dual-process" framework of understanding decision making (De Neys, 2006; D. Kahneman, 2003; Sloman, 1996). This framework suggests that human beings have two separate reasoning systems. The first, System 1, relies on heuristics, associations, and beliefs. It operates implicitly, quickly, and automatically and thus is difficult to control or modify (Kahneman, 2003; Stanovich & West, 2000). Decisions based on a "gut reaction" or an intuitive feeling are the product of System 1 (Thaler & Sustein, 2008). System 2 is characterized by more analytic, logic-based, and rule governed reasoning. Decisions made with System 2 are deliberate, thought out, more effortful, and can be controlled. System 2 is more cognitively demanding than System 1 (De Neys, 2006; Wickens, et al., 2004).

The majority of everyday decision making, the "small decisions" humans engage in daily that end up having a large cumulative effect on health and well being (such as fruit and vegetable consumption), occur within System I. Heuristics are rules of thumb that enable decision making to be quick and efficient. Heuristics (and other System 1 methods of decision making) take advantage of sophisticated, well-engrained cognitive processes such as pattern identification and memory recall (Gilovich & Griffin, 2002; Newell, Lagnado, & Shanks, 2007). Although heuristics leave the user susceptible to systematic errors (called biases), they can also provide quick, accurate and mentally "cheap" responses (Kahneman, Slovic, & Tversky, 1982). While a wide range of heuristics exist and have been demonstrated (e.g. anchoring and adjustment,

availability, representativeness), their discussion is beyond the scope of the paper. Instead, the default heuristic, deemed most applicable and relevant to the topic of healthy eating behavior, is discussed in detail below.

The Default Heuristic. The default heuristic leads individuals to accept pre-set default options and choices; it actually creates a situation where people refrain from decision making and go along with a decision that has essentially already been made for them (Gigerenzer, 2008). Cognitive processes suggest that if certain option is set as the default, it must be because it is the "best" option. To understand how the default heuristic works, imagine a popular restaurant, serving a meal combination of a hamburger with a side of fries. This restaurant allows individuals to customize the meal, offering salad, onion rings, a baked potato, or even desert in place of the fries with no added charge to the customer. Regardless of the option for the change, the large majority of people will end up with the fries simply because it is the default option.

The default heuristic leads to what is known as the default or "status quo" bias. It has been shown that individuals disproportionally choose an option if it has been given "default" status, or stick to decisions that they themselves have previously made (maintaining the "status" quo means changing nothing; Samuelson & Zeckhauser, 1988). Status quo bias shows up regardless of the benefits or the "cost" (mental, physical or monetary) of switching. For example people tend to keep watching the same television station after their selected shows are over, despite the small cost of switching channels (Thaler & Sustein, 2008). What is behind this status quo bias? First, staying with the default option requires less mental energy than actively making a decision. Second, it is strongly related to the tendency for humans to be risk averse (Kahneman, Knetsch, & Thaler, 1991). Research shows that regret is higher from errors that

occur from rejection of the status quo than errors that occur from keeping the status quo (Nicolle, Fleming, Bach, Driver, & Dolan, 2011).

Recently, health advocates across the country have shown an understanding and application of the default heuristic in helping individuals eat healthier. For example, although McDonald's "happy meals" have long come with the option of apples instead of fries, the company has now been persuaded to serve both apples, along with a smaller portion of fries, as their standard meal. More children will end up with apples at McDonalds because it is now the default option. The recent changes in the National School Lunch Program capitalize on the default bias as well, requiring students to place either fruit and vegetables on their tray each day. This reflects a change from the current "offer" system, in which students are allowed to decline fruit and vegetables if they so choose. Developing research shows that the default of having the fruit and vegetable servings on the students' tray does increase consumption, but leads to higher rates of food waste as well; a point that will be discussed in detail later (D. Just & J. Price, In Press).

Although the study of the default heuristic is well established, the application of the default bias to everyday eating decisions is newer. This area still needs to be explored as many of the research based examples for the default bias are items that require infrequent and unfamiliar decisions, such as choosing a savings plan or a life insurance policy. The default bias could be weakened by the frequency and personal nature of eating decisions, or there theoretically could be some type of interaction between food preference and default status when selecting one's meals. For example, in one small, unpublished study by Cornell University scholars, students given the default of "salad" and offered the choice to switch to french fries, more often than not switched.

These questions are yet to be answered in the literature, however, what we do know is that insight into the types of biases and heuristics that characterize System I decision making will lead to a more complete understanding on how to encourage healthy eating behaviors. Specifically, the decision making literature highlights the shortcomings of an anti-obesity strategy reliant on providing people with information and hoping that they make the right decisions for themselves (Nestle & Jacobson, 2000). For example, the last three to four years have been characterized by a push to put calorie and nutrition information on menus. However, this approach to public health does not recognize the way in which people actually make decisions and has yielded only mixed results in getting people to modify their behavior (Albright, Flora, & Fortmann, 2012; Finkelstein, Strombotne, Chan, & Krieger, 2011; Tandon, et al., 2011).

Understanding human decision making processes, specifically the processes that surround everyday decisions about diet and nutrition, can help inform setting transformation efforts implemented by Community Psychologists. The overarching goal in reforming behavior settings such as the cafeteria is not to restrict choice or mandate healthy behaviors, rather to create settings that "nudge" individuals toward making the healthy choice (Thaler & Sustein, 2008). "Nudges" are any change to the decision making environment that alters people's behavior in a predictable or intended way. We aim to create settings where the healthy choice is the easy choice, settings that nudge individuals towards healthy behaviors; judgment and decision making theory can help us reach this goal.

The Role of the Physical Setting in Decision Making: Choice Architecture. Choices are not made in a vacuum, there are various elements of the environment, noticed and unnoticed, that can influence how decisions are made (Thaler, Sustein, & Balz, 2010). In the field of

decision making the way that the environment affects decision making (supporting or discouraging certain choices) is called the "choice architecture" (Thaler & Sustein, 2008). Decisions, especially System I decisions, are influenced by context and shaped by how they are presented to the decision-maker. The term "choice architecture" recognizes that there is no neutral; the way that products are placed for example, or choices worded, affects decision making, whether or not the decision maker is aware of this environmental influence. Integrating this concept into the understanding of heuristics, if something is the "default option," then the choice architecture of the situation is setup in a way that nudges people to select that option, even though they have the ability to choose between it and other options.

Acknowledging this interplay, we can modify the existing choice architecture in our communities so that a cognitive heuristics and biases could actually lead to better health outcomes for the individual. One of the ways this can be done is by introducing choice in situations where there currently is none. An understanding of choice architecture allows a choice to be setup that either A) steers people towards the healthier option, or B) presents options that are equivalent in terms of health. Community Psychologists and others who are interested in environmental-level changes to promote health, should make an effort to be cognizant of the choice architecture of the settings in which they work.

Cognitive Dissonance Theory

Human beings seek a certain degree of consistency between their experiences, beliefs and actions; this "self-check" process is used as a method of making sense of the world (Gleitman, Fridlund, & Reisberg, 1999). Within an individual, identification of inconsistency between one's beliefs, experiences or actions, can trigger as strong urge to restore internal consistently. This

process involves cognitively reinterpreting the situation to minimize incongruence, to "set the world right," and rid the individual of anxiety the discrepancy has caused.

Leon Festinger (1957) developed a thorough understanding of this process of cognitive reinterpretation and our reasons for engaging in it. He described the state of unpleasantness that occurs when individuals realize there is an inconsistency between their beliefs, attitudes, and behavior as "cognitive dissonance." Anytime there is a gap between our self-declared attitudes and our actions it creates discomfort. Individuals remedy this gap by changing their behavior or adjusting their attitudes to fit the situation.

It is important to note, however, that behavior or attitude changes only occur when dissonance is strong; in situations where coercion is used, the individual might be forced to do something outside of his or her belief system, but will be able to justify their actions because of this external force. In situations like these, minimal dissonance exists as there is no need to "set the world right;" individuals are not threatened by this easily accounted for inconsistency between their behavior and beliefs.

Once understood, this theory can be applied when attempting to improve students' eating behavior within the cafeteria setting. In general, students can be observed throwing out food served to them for lunch, especially fruit and vegetables, at the end of the lunch period. Although students may in fact like fruits and vegetables, or feel strongly about not wasting food, their behavior, while contradictory to their personal beliefs, can be justified by the fact that they did not ask for the fruit or vegetables; they were simply served these items. While this is not coercion in the extreme sense, it does represent a lack of control on the part of the students. If students were given the choice of what fruit and vegetables to put on their plates, they would no longer have this "external force" to use to justify throwing out the fruit and vegetables. Instead,

depending on their individual beliefs, they may be motivated to eat these healthy sides. Examples of this type of thinking could include, "well I put it on my plate, so I must like it and want to eat it." An introduction of "active choice" into the cafeteria behavior setting should theoretically help draw on the processes underlying cognitive dissonance to encourage healthy eating.

Empowerment Theories

While empowerment theories are not the central focus of this intervention approach, they are an important influence to cite. Empowerment is about producing or enabling power at various levels of the ecological model (Nelson & Prilleltensky, 2010). At its most basic level, empowerment can be understood as a process by which "people, organizations and communities gain mastery over their lives" (Rappaport, 1981). Another way to view empowerment is gaining control over one's life and environment; including the ability to take part in decision-making in the institutions, programs, and environments that affect them (Maton, 2008; Wandersman, 1984). Settings can act to both empower or disempower their participants.

Although this has been changing in some locations, schools have traditionally been seen as settings in which students have little power. Their behavior, learning objectives, and time are structured by adults; they are given a set of rules that they need to conduct themselves by. This structured setting, while necessary to maintain an environment conducive to learning, spills over into the students' lunch period. Their behavior in the lunch room is as strictly monitored as their behavior in the classroom; at the intervention school, students are told how to line up, the order in which to purchase their lunch, where to sit, and when to finish eating. Although this structure helps ensure that the large number of students can be fed, efficiently, it can leave students feeling powerless. Further, students in the particular school of interest for this study, and in many

schools across the country, do not have a say in what they are eating for lunch. This is especially true because the intervention school adheres to the "serve" model of the school lunch program.

If they (or their parents) have elected to eat school lunch, they will be served a standard pre-determined meal that meets federal nutritional guidelines. If they do have options, these options usually involve swapping a main-course item for a standard "backup" item such as a peanut butter and jelly sandwich. While the intentions of the standard meal are appropriate, they want to ensure students are getting the calories and nutrients they need, this paternalistic approach leaves students without a voice in a process that is very personal, and clearly directly affects them. It should be noted that the lack of choice is probably not designed to disempower students, but rather to cut costs and make the food service process more efficient, especially in the younger grades.

Giving students a say in what they eat for lunch will not only allow them to have some control over their day to day lives within the school, but it will help teach them healthy behaviors. School systems have the students' health in mind when they serve them complete, balanced meals. However, in this system where students are passive recipients of the meal, they are robbed of the opportunity to practice healthy decision-making, and lose out on valuable habit-building experiences. With an understanding of choice architecture and decision-making, changes can be made to the food service process that both empower students to make healthy decisions, as well as ensure that students receive a healthy meal. This approach is a form of "libertarian paternalism" or "asymmetric paternalism" and will be used in the current intervention (Lowenstein, Brennan, & Volpp, 2007; R. Thaler & Sustein, 2008). Both of these concepts refer to ways that decisions can be structured to help individuals make positive, healthy choices; they are "asymmetric" in that the structure is designed to help steer those who may have

made a poor choice, to a healthier one, but it does not interfere with those individuals who would have made healthy choices anyway.

Setting the Groundwork for Intervention: Understanding the School Lunch Program

School lunches have their share of critics; over the years school meals have been characterized as unpalatable, unhealthy, and overly processed. Regardless of unfavorable public opinion, the National School Lunch Program, established in 1946 and overseen by Food and Nutrition Services of the Department of Agriculture, strives to ensure that school meals are, at minimum, healthy meals. In order for a school to receive the federal funding that enables it to provide low or no-cost lunches to its lower-income students, meals need to meet specific nutritional guidelines. These guidelines regulate the percentage of calories that can come from fats and mandate that the meals provide students with one-third of the recommended dietary allowances of protein, Vitamin A, Vitamin C, iron and calcium; however individual schools or districts are responsible for choosing foods and planning meals (USDA, 2011).

Individual schools or school districts do have some influence over the way in which their school lunch program is run. The main decision school districts traditionally were able to make is whether to have a "serve" or an "offer" program. "Serve" programs are required in the younger grades, and optional in middle schools and older. "Serve" programs require students to take every component of the meal, as it was planned out for them; this includes both fruit and vegetable servings. In "serve" programs there is often only one meal choice available to students. The student needs to take the whole meal in order for the meal to qualify for federal reimbursement. The idea behind the serve model is that if nutritious food is in front of students, they are likely to eat it. The "offer" option was introduced in response to the large amount of food that students were discarding; it cuts costs by not requiring students in the older grades to

take the entire meal. Instead, students can deny any two components of the meal, and only take what they intend to eat (Buzby & Guthrie, 2002).

Federal standards for school meals are constantly being updated in order to ensure that students' health is being looked after. The most recent and significant changes to the National School Lunch program were passed in 2010, through the Healthy, Hunger-Free Kids Act. These changes were informed by the Institute of Medicine, and are aimed at making sure kids eat fruit or vegetables daily, consume more whole grains, and are being served portion sizes designed to maintain an ideal weight (United States Department of Agriculture, 2012). Although these revisions to the school lunch menu will indeed make meals healthier, they do nothing to address actual student eating behavior.

When school meals meet federal guidelines, they are considered healthy meals on paper. However, "food isn't nutritious until it is eaten." Regardless of how much preparation or planning goes into a meal, if the student decides not to eat it, the meal is not meeting its intended purpose. If we hope to use the school lunch program as a vehicle for improving childhood nutrition and combating obesity, we need to look at ways in which we can encourage students to actually consume the meals they are served, especially the fruit and vegetable components.

Understanding how the school cafeteria environment influences eating behaviors, and how it can be tweaked to encourage healthy eating, is an essential step in winning the battle against childhood obesity. Each individual school cafeteria may be small, but together they serve over 31 million children each day (USDA, 2011). Thus, if we can shape this setting in a way that encourages healthy eating behavior, it the potential impact is enormous, especially in light of the growing childhood obesity epidemic. With this in mind, let us examine the various cafeteria based interventions which have been conducted over the past decade that attempt to

influence student eating behaviors by changing the cafeteria food environment and/or choice architecture within the cafeteria.

Designing Cafeterias that Support Healthy Eating

Schools across the country have implemented various multicomponent programs aimed at improving student eating behavior; these programs often contain educational components (e.g. nutrition education in the classroom), behavioral change elements (e.g. verbal prompting by food service employees), and environmental changes to the cafeteria (e.g. price incentives for fruit and vegetables; French & Stables, 2003). Although multicomponent programs often produced the largest impact on eating behavior, French and Stables draw our attention to the fact that environmental interventions to the cafeteria environment have the power to change food choices and eating behavior even in the absence of classroom based education or attitude change programs. The simplicity of environmental changes, combined with their low cost, makes them favorable options. Recent developments in healthy eating research, therefore, switches the focus from informing and educating children about making healthy eating decisions, towards altering the choice architecture and environment of the cafeteria to encourage healthy eating.

The Center for Behavioral Economics in Childhood Nutrition at Cornell University is one of the leaders in researching the intersection of the cafeteria environment with judgment and decision making. Their initiative, "designing smarter lunchrooms," attempts to alter the choice architecture of the cafeteria in order to encourage children to make healthy lunch selections (Just & Wansink, 2009). They work predominantly with schools that operate under the "offer" food service model, where students have a choice on what to take for lunch; their initiatives are geared at nudging students to choose the healthy food options, including fruit and vegetables, and take these items back to their seats (in the hope that once there, students will consume these items).

Brian Wansink, Ph.D. and his colleagues at Cornell have investigated how the placement of food, lighting, and even the names of food influence students' decisions. When fruit is placed in well-lit baskets or containers, instead of hidden behind sneeze guards, more is consumed. When fruit is the first option in the cafeteria line it is taken by students more often, even when all options (healthy and unhealthy) are available (Wansink & Just, 2011). Names and signage matter too; younger students take and eat more "X-Ray" carrots than they eat of "cooked carrots," even though the dish is exactly the same. Further, when healthier food is made more accessible and more convenient than the unhealthy choices, through things such as pre-packaging and express lines, it is chosen and consumed by students more often (Hanks, Just, Smith, & Wansink, 2012). These studies provide evidence to the existence of choice architecture and speak to the fact that students are indeed influenced by how food items are being presented.

Other researchers across the country have also demonstrated that small adjustments to the cafeteria environment can produce favorable results; most of these interventions have also been done on schools that use the "offer" model, where researchers are attempting to get students to accept and take fruit and vegetables. The Cafeteria Power Plus program showed that by both increasing the variety of fruits and vegetables available in the cafeteria, and having lunch aids verbally encourage students to try fruits and vegetables, consumption of fruits and vegetables increased (Perry, et al., 2004). Schwartz (2007) demonstrated that a simple verbal prompt by food service workers, in the lunch line, asking students if they want fruit or juice, led to both increased purchase of fruits or fruit juices, and increased consumption as well. The USDA recommends its own changes to the cafeteria environment aimed at improving student eating behaviors. Their research suggestions include scheduling recess before lunch, moving lunch to a later time in the day, minimizing the availability of competitive foods in the cafeteria (foods not

part of the School Lunch Program), giving students more time to eat, and having teachers and cafeteria staff model desired eating behaviors (Buzby & Guthrie, 2002; Ralston, et al., 2008).

Within the National School Lunch Program, less has been done in cafeterias that use a "serve" model of food service delivery. The "serve" model requires students to take the entire meal, as it was planned by the school district. The traditional "serve" model of food service delivery produces undesired plate waste; however it has the advantage of ensuring that the healthy foods are in front of each and every kid, every day. The upcoming federally legislated changes to the school lunch program will create a hybrid serve-offer model, where all students in every school, regardless of whether the school is designated a "serve" or an "offer" school, will be required to take a serving of fruits or vegetables (students in "serve" schools will have to take both fruits and vegetables). In "offer" schools, students will still have a choice among all meal components (not just fruits and vegetables.) Because of this change in legislation, research looking at "serve" models of cafeteria food service is becoming more necessary and relevant.

A recent study by Just and Price (in press) was designed to start filling this gap in the literature. The purpose of their study was to examine whether requiring students to place fruits and vegetables on their lunch trays increased their consumption. They considered this a direct test of the impact of the default bias, and these new changes to the federal guidelines, on eating behaviors. Results from this study suggests that requiring students to take fruit and vegetables, as the new legislation will do, does increase fruit and vegetable consumption. However, this increase is accompanied by a much larger increase in the amount of fruits and vegetables that are wasted. Their conclusion is that the new guidelines, which require students to take fruits and vegetables, will promote healthy eating behaviors. However, Just and Price advise that these

guidelines, based on the default bias, should not be implemented without additional interventions to insure that these portions of fruits and vegetables are being consumed rather than wasted.

The Current Study

Informed by an understanding of the ecological model and behavior setting theory, as well as judgment and decision making processes, the current study introduced a cafeteria-based intervention aimed at increasing fruit and vegetable consumption among students participating in the National School Lunch Program. The "choices" cafeteria intervention directly altered the choice architecture of the lunch room by introducing a bounded, forced-choice into the school lunch at a designed "serve" school. During the intervention period students were required to take servings of both fruits and vegetables each day (as they were in the Just and Price study). However, this intervention gave students an active choice – they had to take a fruit and a vegetable, but were empowered to make their own decision from among nutritionally equivalent alternatives. The percentage of fruit and vegetables that students actually ate was monitored both before and during the "choices intervention."

The purpose of this two-phase, sequential, mixed methods study was to examine the possible effects that the "choices" cafeteria intervention has on student consumption of fruits and vegetables, while better understanding the general factors that influence student eating behavior in the cafeteria. In the first phase, quantitative data collection addressed the effectiveness of the "choices" intervention in increasing consumption of fruit and vegetables. In the second phase, qualitative interviews (with students themselves, as well as with various adults who influence the cafeteria environment) were used to shed light on various aspects of the cafeteria environment that may be influencing eating behaviors. Additionally, interviews allowed students and staff the chance to express their reactions to the "choices" intervention, enabling researchers to more

deeply understand its effects from the participants' perspective.

CHAPTER II

METHODS

Setting and Context

The setting for the "choices" cafeteria intervention, and the accompanying qualitative interviews, was a dual-language (English/Spanish) public school, located in a medium sized, Midwestern city. The school serves students in kindergarten through eighth grades, and had a total enrollment of approximately 586 students during the study period. The student body at this school was more ethnically diverse than the surrounding community; at the time of the study, 74% of students were Hispanic, 18% were Caucasian, 5% were Biracial, and 3% were African American (National Center for Education Statistics, 2011).

The school participated in the National School Lunch Program (NSLP), a federally subsidized meal program which provides nutritionally balanced, low-cost, or free lunches to students while they are in school (United States Department of Agriculture, 2011). During this study, 81% of students in the school met federal guidelines to qualify for free and reduced lunch, and an average of 85.6% of the student body (502 students) ate the school lunch each day. In this particular district, meals were prepared off-site by a district wide Nutrition Services Department, delivered daily to the school, and once there, re-heated and served to students.

This school was selected as the site of the "choices" intervention for a number of reasons. First, because of the way that the district Nutrition Services Department staffing was set up, changes could be made to how lunch was served at the intervention school without hiring additional personnel (something that could not have been accomplished at other schools within the district). Second, the administration of the school has long tried to promote healthy behaviors in their students, and was therefore willing to work with the Nutrition Services

Department and the researchers to implement this intervention. Third, a large majority of the students ate the school lunch, and thus there was a substantial amount of participants to observe each day. Fourth, as a combined elementary and middle school, the local school board designated this school's lunch program as a "serve" program under federal guidelines (United States Department of Agriculture, 2004). This designation means that in order for a student's lunch to qualify as a federally reimbursable meal, the student must take the entire meal; he or she cannot refuse any of the components (e.g. grain, meat/meat alternative, fruit and vegetable). This designation ensures that students are taking meals that meet their age-appropriate nutritional needs; in terms of data collection, it standardized the meals and gave researchers a baseline from which to judge any changes in student eating behavior. Fifth and finally, the school was selected because of the demographics of its student body. Research has shown that in the United States, lower socioeconomic status is associated with less frequent intake in fruit and vegetables (Rasmussen, et al., 2006). The high percentage of students at this school qualifying for free or reduced lunch is an indicator that many students come from impoverished homes. Researchers wanted to focus on this "at risk" subpopulation of children.

Design

This study used a mixed-methods approach in order to more fully understand the environmental factors that affect the fruit and vegetable consumption of children participating in the National School Lunch Program.

Phase one of the study featured the "choices" cafeteria intervention. Baseline data of fruit and vegetable consumption was initially recorded before the intervention began. The "choices" intervention was aimed at increasing student consumption of fruit and vegetables during lunch. It featured an environmental level change to the behavior setting of the cafeteria;

the intervention modified how the fruit and vegetables were served to students each day. Implementation of the "choices" intervention followed a quasi-experimental design and used a repeated-measures approach for data collection; fruit (DV1) and vegetable (DV2) consumption of students was measured both before and during the implementation of the "choices" cafeteria intervention (IV). The two observation periods were close in time to reduce threats to internal validity, including changes of the student population or of the larger, community context. The intervention was in place for a month, however, no data was collected during the first week of the intervention in order to avoid recording any effects due to the "newness" of the intervention.

Phase two of the study consisted of semi-structured qualitative interviews with students and other key informants (e.g. cafeteria staff, Nutrition Services employees, administration). The goal of the interviews was to paint a more complete picture of the cafeteria as a behavior setting, and emphasized an insider's point of view on the experience of eating the school lunch in the cafeteria. The intention was to understand the reality of the cafeteria setting from the perspective of those who lived it. Specifically, the researcher was interested in elements of the cafeteria environment affecting whether or not students consume the fruit and vegetables served to them with the school lunch

In order to attain this level of access to participants, the researcher spent over fifty hours in the cafeteria as a non-participant observer before the study was even developed. Time spent in the setting pre-intervention accomplished two major things: first, it allowed the researcher to establish entry into the setting, and second, it provided observationally-based insights from which to craft the qualitative interview questions.

The majority of the interviews were conducted in the week immediately after the "choices" intervention was finished, however, a few interviews were done concurrently, during the last days of the "choices" intervention.

Participants

Students (K-8) who ate the school lunch during the five week data collection period (two weeks pre-intervention to establish a baseline, and three weeks during the month-long intervention period) served as participants in Phase One of this study. For Phase Two, the follow-up qualitative interviews, a purposive sample of students (n=22), cafeteria staff (n=3), district Nutrition Service Employees (n=2), teachers (n=5), and administrators (n=2) was recruited. Of the 22 students interviewed, 12 were male and 10 were female; 68% self identified as being of Hispanic/Latino origin. Participants who participated in the interviews all signed an informed consent document (Appendix A); in the case of students (under the age of 18), one of their parents signed the informed consent document and they signed a youth ascent form (Appendix B).

Intervention

Understanding The Cafeteria as a Behavior Setting

The lunch period begins daily at 10:35am with the kindergarteners. After the kindergarteners leave at 10:55, there is a constant ebb and flow of grade levels coming in and out until 12:10pm (the school does not use distinct "lunch periods"); students have twenty minutes to get their lunch, sit down, and eat before they are dismissed. Students are not allowed to pick where in the cafeteria they eat their lunch; rather their single-file lines are directed from the food stations to seats by the cafeteria staff. For the younger grades (K-4), these lines are strictly alphabetical order, to ensure smooth meal checkout. For the older grades, students can line up as

they wish, at the discretion of their instructor, before they enter the lunch room; however, once in the lunchroom there is no "switching" the order.

Pre-intervention, students entered the lunchroom, picked up their milk carton (choice between chocolate, strawberry, and vanilla shake flavors), followed by a pre-assembled lunch tray containing a main course/entree, and three sides: a fruit, a vegetable, and a desert/snack type item, before proceeding to their seats. The only choice the students had, besides the flavor of their milk, was whether they want the entree of the day (posted on the wall outside of the cafeteria) or a pre-packaged peanut butter and jelly sandwich in its place (on Wednesdays, middle-schoolers also had the option of a chef salad instead of the main course). Regardless of whether students chose to eat the daily entree or the peanut butter and jelly sandwich, they were served the same side dishes. Students pay for their meals by entering a personal code at the cashier station, located at the end of the lunch line. This system does not distinguish between students who are receiving free or reduced lunch and students whose parents pay for their meals.

Many hours of observational data collection were conducted within this setting before the intervention was designed. The intention of this observational data collection period (approximately 75 hours) was to mimic the process that Barker and colleagues employed to understand specific behavior settings; non-participant observational data collection methods were used to identify patterns in behavior that occur in participants "natural settings" (Creswell, 2007). Initial observations showed that students were throwing out a large majority of the fruit and vegetables they were being served at lunch. By throwing this food out, they were, 1) not benefitting from the food's nutritional qualities, 2) not getting the recommended intake of calories at lunch each day, and 3) wasting a large amount of food (and the money associated with purchasing and supplementing that food). Research shows that this phenomenon was not unique

to this particular cafeteria (Buzby & Guthrie, 2002; Just & Price, In Press; Ralston, Newman, Clauson, Guthrie, & Buzby, 2008). These observations provided both justification for the current study, as well as important insight into possible changes to the cafeteria environment that could be implemented during the intervention period.

Changes to the Behavior Setting

The "choices" cafeteria intervention changed one thing about the school cafeteria: the process by which lunch was served to students. During the intervention period, instead of picking up pre-assembled trays, students were given the ability to choose the fruit or the vegetable that they wanted from three daily options. Only one item (the fruit or the vegetable) was the "choice item" each day; on days when students had a choice of what fruit they wanted to eat, a standard vegetable side would be waiting for them on their tray, with their entree. The item that was the "choice item" changed daily, as did the options offered. For example, on a "fruit choice" day, students could decide between apple slices, pineapple, or mixed fruit, and had broccoli served onto their tray (similar to the pre-intervention method of serving lunch). The daily vegetable or fruit choices were posted on the wall, in both pictures and words, outside the kitchen where students waited in line to purchase lunch. This was to allow students to see the choice and make up their minds before they entered the serving area. The serving process remained similar to the pre-intervention process; students first picked out their milk, however, before they picked up their tray, they selected a "choice item," which were set out in small, see-through plastic containers. This setup is illustrated in Figure 3.

Figure 3: Setup of cafeteria line during the "choices" intervention

Regardless of their particular choice, all students were required to leave the lunch line with a full tray: a milk, one fruit, one vegetable, one entree, and one desert. Cafeteria staff maintained a presence behind the counter at the "selection station" in order to ensure that students understood the process and that all possible choices were constantly stocked and always available to each student. Further, students had to walk past a cashier on their way to their seats; the cashier, where students entered in their pin codes to pay for lunch, served as a final checkpoint to ensure that each child has taken the appropriate meal components, nothing more and nothing less. Thus, this intervention was designed to directly test the effect of active choice, within a default serving setup, on student consumption of fruit and vegetables.

The "choices" intervention was implemented for a month, and started immediately after students returned from their winter break. In order to prepare students for the changes in how their lunch was served, the intervention was announced two days before the students left for December break. On their first day back after the break, students were reminded of the changes by their homeroom teachers. The announcements and reminders were made to ensure that the lunch line moved smoothly, and that students did not need a significantly greater amount of time to get their lunch and find their seats. Researchers wanted to make sure that data reflected

changes in student eating behavior, not reactions to a "new system" or any hiccups that came along with implementing it; therefore, data was not collected during the first week of the intervention period.

Theoretical Roots of the Intervention

Behavior setting theory, an understanding of judgment and decision making processes, the concept of cognitive dissonance and empowerment theories were all invoked in designing this intervention, as were the initial non-participant observations conducted by the researchers. By adjusting the setting through the introduction of an active choice, the intention was to alter the students' behavior patterns and introduce some variance in behavior (vs. the standard take the plate, sit with the plate, throw out the plate equation).

Specifically, the choice architecture of the lunch line was modified to encourage consumption of fruit and vegetables; before the intervention students had no choice as to what they were eating, their only "choice" was whether or not to actually eat it. It is important to note, however, that the choice provided for students in the "choices intervention" was a bounded choice. Students were not given an unbalanced choice, for instance, between "French fries" or "apples;" rather, all the available options were healthy equivalents. Additionally, students had to make a selection, they could not choose "none of the above." Choice of fruit and vegetable was introduced with the idea that if students selected the fruit and vegetable of their choosing, they would be more likely to actually consume it. The act of choosing based on preference, combined with the cognitive processes that occur when active decision making happens (e.g. the tendency to want to resolve any cognitive dissonance), were used to encourage them to consume the healthy food on their plate. For example, if a student choose "apples" for lunch one day, he may

engage in cognitive self-talk to the effect of, “well I put it on my plate, so I must like it and want it,” and might be more likely to eat it than if he was forced to put it on his plate without a choice.

Additionally the intervention drew on empowerment theory, noting that students will have to make daily food related decisions for the rest of their life. If we want them to grow up making healthy choices, we need to give them the chance to practice these healthy choices, rather than making all of their decisions for them. The cafeteria environment is a safe environment to provide students with this decision making experience, especially because foods of “minimum nutritional value” are not offered as options within the school lunch.

Data Collection and Analysis

Plate Waste - Observational Data

The first data collection period, the “pre-intervention” period, took place in December 2011; the second data collection period, the “intervention” period, took place in January 2012. Both observation periods consisted of ten school days; the observations were evenly spread across the week to avoid any “day-of-the-week” effects. School administrators gave permission for trained graduate students to observe and record fruit and vegetable consumption in the cafeteria during these two timeframes.

Observers were trained before data collection took place; they were informed about the school cafeteria setting and participated in practice rounds of visual portion size estimation. Two observers were present at each data collection session; observers went to the school before the students arrived for lunch in order to familiarize themselves with the size portions of fruit and vegetables that students were being served. Observers stood by the trash can and recorded the percent of fruit and vegetable left on students’ plates at the end of the lunch period. Forms were provided to observers in order to standardize the observations (see Appendix C).

At the beginning of the data collection period, observers were instructed to rate the same students, on the same meal component (either fruit or vegetable). This was done in order to establish interrater reliability. Once interrater reliability was established for the team of observers using Cohen's Kappa, observers were able to split up in order to collect a greater number of data points (*Kappa* = .80 for vegetable observations, *Kappa* = .87 for fruit observations, $p < .05$). Interrater reliability was reestablished after the "choices" intervention started, (*Kappa* = .85 for choice items, $p < .05$). In order to ensure a random sample, every third student was analyzed, with a random starting point each day. On average, researchers recorded 286 student-day observations each day; approximately half of these observations were on fruit waste and half on vegetable waste. Important to note here is that the same students may or may not be included in both the fruit and vegetable samples each day. The setting did not allow us to "match" subjects for vegetable and fruit consumption observations; although we did this to establish interrater reliability, forcing fruit and vegetable observers to look at the same students created many research issues as observers did not have the same vantage point, often one of the two items was obstructed (e.g. fruit serving covered with a napkin), and the volume of the lunchroom made communication/coordination between researchers difficult. Therefore, once interrater reliability was established, observers were working independently.

On site visual estimation of discarded food was chosen as the primary method for data collection because of its previous validation in other studies, as well as its unobtrusive nature (Graves & Shannon, 1983; Williamson, et al., 2003). Observational data collection was used in order to minimize the effect of research on the eating behavior of students. This setting supported observational data collection in two ways. First, the school has an "open volunteer and visitor" policy for lunch. This means that students are used to a variety of adults serving as

patrols for the lunchroom and recess yard. Second, because of the orderliness of the lunchroom, students carry their trays of trash with them as they exit in a single file line. This procedure allowed observers were able to collect data after students had finished eating, while they were carrying their tray to the trashcan. If asked what they were doing, observers were instructed to say they were "interested in learning about this school." Observers were specifically told not to mention fruit or vegetables in their responses to students. This data collection process is a commonly accepted way of observing student eating behaviors and has been employed by others doing similar cafeteria research (see: Just and Price, In Press).

Plate Waste - Weight Data

As a secondary method of data collection used to evaluate whether or not the "choices" intervention had an effect on students' consumption of fruits and vegetables, actual measures (weights) of uneaten fruits and vegetables left on students' plates were taken. Because this process is more disruptive to the setting than then observational data collection, it was only done four times during the data collection period, two days during the pre-intervention period and two days during the intervention. Measures were taken by researchers in order to both ensure that a random sample of student plates was collected, as well as to keep students blind to the purpose of the experiment.

Random selection of students was achieved by placing small, orange stickers on 50 of the Styrofoam serving trays used each day. The trays with stickers on them were then mixed in with the larger stack of trays before the lunch service began. Stickers were placed in an area that was undetectable to students as they picked up their trays. A sample size of 50 was used on each of the weigh days, representing approximately 10% of the students eating lunch that day. At the end of the lunch period, as students prepared to take their trays to the trash, they were asked to

search their plates for an orange sticker. Those with the sticker were told that they had won a contest, and were given a pen or pencil on the spot, in exchange for their "winning ticket" — the plate with the sticker, and all of their discarded food on it. The cafeteria staff helped in the collection process. On average, 43 out of the 50 trays (86%) were located and entered into the sample at the end of lunch. Missing trays were due to a number of factors: teachers and visitors purchasing the school lunch, students taking trays out of the cafeteria for various club meetings, and the nurse picking up trays for ill students.

Knowing that the data collection process would span five weeks, extra precaution was taken to minimize the effect of the observers and the data collection on student eating behavior. Instead of weighing students plates before and after they ate, pre-weights were determined for the fruit and vegetable entrees by weighing ten samples of each, before students arrived in the cafeteria, and establishing an average weight for each item. This average serving size of each fruit and vegetable gave us a "standard portion size" which we were then able to compare with actual students' plate waste. Weighing of the plates took place only after the students had left the cafeteria. Vegetable and fruit servings were weighed separately, and compared against the appropriate pre-weight to determine the percentage the student left on his or her plate.

On weigh days, visual observations of the weighed plates were also conducted, in a similar fashion to the rest of the visual observations. These observational scores were correlated with the weight scores in order to provide another means of validating the data.

Qualitative Interviews

Phase two of the study featured qualitative interviews conducted in order to better understand the factors influencing the eating environment in this particular school. Interviews served as a follow-up to the "choices" intervention, the goal was to further understand how the

intervention affected student eating behavior in the cafeteria, as well as to identify any barriers that might be place during school lunch that discourage students from eating healthily.

A purposeful sample of students, teachers, school administrators, cafeteria staff, and district Nutrition Services Employees were involved in this process. Sampling was done with the goal of representing and hearing from individuals who contribute to the school cafeteria environment at all levels; this sampling strategy was influenced by the "360 Degree Assessment" used frequently by businesses and industrial organizational psychology to ensure that feedback is gathered from all possible sources.

Interviewees were approached and asked to participate jointly by the researchers and a member of the school administration; this was done in order to create trusting relationships and encourage participation. All interviews took place either on the school grounds, or at nutrition services' offices (for their employees only). Interviews averaged 11 minutes in length for younger students (K-4), 18 minutes for older students (5-8) and 39 minutes for adult participants; all interviews were audio-taped with participants' consent. Interviews with students began during the last week of the "choices" intervention, overlapping with the intervention itself, and continued for a week afterwards in order to maximize student recall. Interviews with the adults were completed within the following month. Interviews with the younger students (K-4) were structured, while a semi-structured approach was used with both the older student and the adult participants. A list of interview questions, divided by subgroup, can be found in Appendix D.

Qualitative Data Analysis

The qualitative data analysis process went as follows. First, interviews were transcribed, and transcriptions were checked for accuracy. Second, the researcher developed a list of significant statements from the interviews. Significant statements are passages within the

transcript where a participant is speaking directly to our current research questions; the process of identifying significant statements is known as horizonalization of the data (Creswell, 2007; Moustakas, 1994). From the examination of transcripts from the 34 participants, a total of 362 significant statements emerged. In the third step, significant statements were assigned preliminary meaning codes.

To ensure validity and reliability, two additional coders familiar with qualitative methods were brought into the process at this point. Each coder, along with the researcher, independently reviewed each of the significant statements and developed meaning codes directly from the statements. After all of the statements had been reviewed, meaning codes for each significant statement were discussed until agreement and common understanding was reached by all coders. Fifty-five of the 362 statements were assigned a secondary meaning code in addition to the primary one.

Fourth, the coded significant statements were grouped into larger units, called themes. Fifth, within each theme, statements were read, analyzed, and reflected upon in order to identify Associated Formulated Meanings. In Phenomenology, Associated Formulated Meanings are included to add clarity and structure to main themes, as well as to reflect the intent of the participants' statements. This method of data analysis was adapted from the procedure set forth by Creswell (2007) and Moustakas (1994) regarding Phenomenological data analysis, to fit the needs of the current research project. Sixth and finally, a "member audit" was conducted to examine the organizational structure which emerged from the data. This process involved the researcher, a second coder, and a member of the dissertation committee and was done in order to ensure validity and reliability of the results and accompanying interpretations of meaning.

CHAPTER III

QUANTITATIVE RESULTS

Overall Analysis of Fruit and Vegetable Consumption

Direct comparisons of student fruit and vegetable consumption between the pre-intervention (no choice) and intervention (choice) periods demonstrate that the introduction of an active, forced-choice into the school lunch program produced significant increases in consumption of fruits and vegetables and decreases in plate waste. The unit of analysis for these results is the student-day observation, represented by the percentage of a fruit or vegetable serving that the student consumed over the course of one day's lunch period.

A chi-square test was performed to determine if student consumption of fruit and vegetables was different across the two conditions; specifically we examined the frequency in which students ate either: A) 50% or more of their fruit/vegetable servings, or B) less than 50% of their fruit/vegetable servings. The test indicated a significant difference — a greater proportion of students ate 50% or more of their daily fruit/vegetable servings during the intervention period than did pre-intervention, $X^2(1, n=3,449) = 188.94, p<.01$. Based on these results, it can be understood that the intervention altered the behavior setting in a way that significantly influenced student eating behavior. For further analysis, it will be helpful to address fruit and vegetable consumption as two separate entities.

Overall Analysis: Fruits

In the pre-intervention/no-choice condition, only half (50.83%) of students observed (n=1,086) ate more than 50% of the fruit serving each day. During the intervention period that percentage increased to 68.3% (n=978). A chi-square goodness-of-fit test was performed; the test showed that the shift in student consumption of fruit during the intervention period does represent a real

change in overall eating patterns, $X^2(1, n=2,064) = 65.00$, $p<.01$. Additionally, that data show that when given a choice of which fruit to put on their plate, students were twice as likely to consume over half of that fruit serving, than they were when they are not given the choice (OR=2.09, CI=1.74-2.50).

Overall Analysis: Vegetables

Pre-intervention only 19.55% of students (n=965) were eating more than half of the vegetable servings each day. During the intervention period that number increased to 38.57% (n=420). These figures represent a significant shift in the vegetable consumption of students, $X^2(1, n=1,385) = 63.21$, $p<.01$, during the intervention period. Further, when given a choice of which vegetable to put on their plate, students were almost three times more likely to consume more than 50% of the vegetable serving than they were when they are not given a choice, (OR=2.74, CI=2.14, 3.56). Quantifying the Difference: Plate Waste Data by Visual Observations

Quantifying the Difference: Visual Waste Weight Data

Visual Plate Waste Data: Fruit

Pre-intervention, students consumed an average of 48.26% (*SD* = 44.9%) of the fruit serving at lunch (n=1086). During the intervention period, where students were allowed to select the fruit of their choice out of three rotating options, students increased the amount they ate by 15.0%; when given a choice, students, on average, consumed 63.28% (*SD*=43.46%) of the fruit serving each day (n=978). This change represents a significant increase in the amount of fruits consumed, per child, during the lunch period, $t(2,062)=7.71$, $p <.01$.

Visual Plate Waste Data: Vegetables

Pre-intervention, the average student consumed only 18.61% (*SD*=33.84%) of vegetables served each day (n=965). During the intervention period, where students were allowed to select

the vegetable of their choice out of three different options, the amount students ate increased by 15.6%; when given the choice students consumed, on average, 34.2% of the vegetable serving each day (*SD*=42.1%, n=420). This change represents a significant increase in the amount of vegetables consumed, per child, during the lunch period, $t(1,383)=7.3$, $p < .01$.

Quantifying the Difference: Plate Waste Weight Data

This smaller data set, consisting of plate waste that was physically weighted by the researchers, supports the analyses done with data from the visual estimation techniques; the weight data also shows increases in both fruit and vegetable consumption during the intervention period. As described below, weight data shows slightly larger increases than the visual data does; however, variation between the visual method and the weight method of plate waste assessment is bound to exist related both to the preciseness of the measures, as well as the sample sizes.

Plate Waste Data by Weight: Fruit

Data from the weighed plates in the no-choice condition shows that students, on average, ate 39.66% of fruit servings (*SD*=37.7%, n=133). During the intervention period, students consumed 27.53% more fruit, eating on average 67.2% of fruit servings (*SD*=36.8%, n=37). This represents a significant increase in student consumption of fruit, $t(168)=3.95$, $p<.01$. In the case of fruit, the weight data supports a significantly larger increase in consumption than the visual data does.

Plate Waste Data by Weight: Vegetables

Pre-intervention, the weight data suggests that students consumed an average of 23.47% (*SD*=29.82%) of vegetable servings (n=170). During the intervention period, student

consumption rose by 18% to 41.47% (*SD*=45.41%, n=47). This shows a significant increase in student consumption of vegetables during the intervention period, $t(215)=3.23$, $p<.01$.

TABLE 2

AVERAGE PERCENTAGE OF FRUIT AND VEGETABLE CONSUMPTION

	Average Fruit Consumption (%)	*n*	Average Vegetable Consumption (%)	*n*
Observational Data				
Pre-Intervention	48.26% *(44.9%)*	1086	18.61% *(33.84%)*	965
Intervention	63.23% *(43.46%)*	978	34.2% *(42.1%)*	420
Weight Data				
Pre-Intervention	39.66% *(37.7%)*	133	23.47% *(29.82%)*	170
Intervention	67.2% *(36.8%)*	37	41.47% *(45.41%)*	47

CHAPTER IV

QUALITATIVE RESULTS

The primary goal of the qualitative interviews was to better understand the eating environment at the school and shed light on the barriers that exist within the cafeteria environment that may act to discourage kids from consuming the fruit and vegetable portions they are served daily. Additionally, qualitative interviews with students, staff, and administration were used to provide a closer look at the effects the "choices" cafeteria intervention had on student eating behaviors; researchers specifically designed these interviews to occur immediately after the "choices" intervention ended so an "insider's perspective" of the intervention could be obtained.

Transcripts from 34 interviews were analyzed independently by three researchers to ensure reliability. Three hundred and sixty-two significant statements were identified in the transcripts. Analysis of these 362 statements led to the emergence of six themes, all of which describe how participants interacted with the "choices" intervention. Associated Formulated Meanings were then developed for each theme in order to provide the reader with a better picture of the theme's inherent meaning. A summary of the themes has been provided in Table 3. Following the table is a detailed breakdown of each theme, including the Associated Formulated Meanings related to each theme; descriptions of the themes are supplemented with direct, participant quotations. These quotes add detail and richness to our understanding of the themes that emerged from the qualitative data analysis.

TABLE 3

THEMES RELATED TO UNDERSTANDING STUDENT EATING BEHAVIOR WITHIN THE SCHOOL CAFETERIA

	Theme
1	Motivation for Buying Lunch at School
2	School Food is Different Than Home Food
3	Issues Related to the National School Lunch Program
4	Food Served Does Not Equal Food Consumed
5	Setting Level Influences on Eating Behavior
6	Effects of "choices" cafeteria intervention

Theme 1: Motivation for Buying Lunch at School

The first theme to be discussed is *"Motivation for Buying Lunch at School*" (see Table 4); it has 38 mentions in the dataset. In this theme, participants talked about their reasons for eating the school lunch instead of bringing food from home. High rates of participation in the National School Lunch Program were the norm at the intervention school. Mentions in this theme provide critical insights into why students are buying the school lunch in such high numbers, even though, as our quantitative dataset and observational data show, students may not be consuming much of what they are purchasing. This theme was further broken down into four Associated Formulated Meaning units.

TABLE 4

THEME 1: MOTIVATION FOR BUYING LUNCH AT SCHOOL

Theme 1	Associated Formulated Meanings	*f*
Motivation for Buying Lunch at School	Cost of school lunch (9/38) Convenience (8/38) Not enough time to make lunch at home Getting lunch at school is "easy" How the decision is made (14/38) Student Input Parent Input Popularity of School Lunch Program (7/38) Peer pressure to eat school lunch High rates of participation in school lunch program	38

Cost of School Lunch

The first Associated Formulated Meaning, "*Cost of School Lunch*" (9/38 mentions), highlights the role that financial issues have in deciding whether or not a student gets his or her lunch in the school cafeteria. For many lower-income families whose children receive free or reduced-price lunches through the National School Lunch Program, price breaks were an influential factor in deciding that their children would eat the school lunch. Comments below are from students as well as Nutrition Services employees, and describe the financial aspects of the school lunch.

> "We tend to have higher rates of participation among the free and reduced than we do the paid. So you'll get a free child who will pack a sack lunch, but ultimately if resources are tight mom and dad are going to say eat at school. They may pack a lunch occasionally, but if they're going to get a free meal at school or buy things to pack a lunch, I think we'll go with the free meal." – Nutrition Services Employee

> "My mom decides [whether I take my lunch from home or not] so sometimes she doesn't have to pay for food for me." – Student

> "For students who do not qualify for free or reduced lunch, the cost of buying lunch at school could be prohibitive, especially for families that have multiple children." – School Administrator

> "I buy my lunch every other week. It's so the money we put in the account doesn't run out quickly. One week I eat lunch at school every day, and one week I bring it every day. Each lunch costs money." – Student

> "If Mom can pack a lunch, it's cheaper. They're full pay so its it's $2 something for lunch, and there's three of them [students in the school] in that family, next year there will be four." – Cafeteria Aid

Convenience

The second Associated Formulated Meaning unit, *"Convenience"* (8/38 mentions), emphasizes the fact that for many families it is easier to have their student eat the school lunch than to pack a lunch for them at home. In these statements, participants described the burden of planning for and making lunch at home, both in terms of time and effort. Additionally, from these statements an interesting observation emerges: most of the students interviewed were responsible for making their own lunch, if they took one from home, as opposed to their parents preparing and packing it for them. This is supported by the statements which reflect students' feelings that making their lunch at home is inconvenient for them, personally. All of the comments below are from students, referring to why they choose to get lunch at school.

> "It's more of a hassle to make my lunch at home. I could if I wanted to, but I don't."

> "I eat it [the school lunch] most of the time because I usually don't have time to pack a lunch. I don't have time to do it, and it's not my fault or my parents fault, I just don't have time."

> "I just think it's too much work, and I'm a lazy person. My mom might help me, but if I'm bringing it to school, I'd want to pack it."

> "I never bring lunch from home. I can't because I don't have enough time — in either the morning or night."

How the Decision is Made

The third Associated Formulated Meaning, "*How the Decision is Made*" (14/38 mentions), encompasses statements participants made about the decision-making process surrounding lunch: who decides that the student is eating lunch at school? How is this decision made on a daily basis? Statements within this meaning group enable us to see how relevant factors (mentioned in the first two Associated Formulated Meanings) are weighed and on whose authority the final decision rests. Comments below are all from students.

"My mom prefers us to make our lunch at home but I don't."

"Usually I decide, but sometimes my mom decides whether we have enough on our check or not. My mom checks it every week."

"I pretty much eat the school lunch every day. Probably I bring packed lunch maybe two days each month. I don't like their Mac and Cheese and their Cheese Quesadilla, they send out a schedule every month. Our family always in the morning my dad gets dressed and he makes lunch when we get dressed and he checks the menu and asks us."

Popularity of School Lunch Program

The final Associated Formulated Meaning within the theme "*Motivation for Buying Lunch at School*" is "*Popularity of the School Lunch Program*" (7/38 mentions). When discussing their motivations for eating the school lunch, participants often mentioned the fact that other students were also eating the school lunch. The perceived popularity of the school lunch program seems to have led to a social norm dictating not bringing your lunch from home. This phenomenon was observed by students themselves, as well as by the teachers and cafeteria staff, and could be related to the high percentage of children at the intervention school who qualified for free and reduced lunch. The following comments are from cafeteria staff, students and school administrators; they describe the *"Popularity of the School Lunch Program."*

> "More kids usually bring their lunch in kinder and it tapers off. Probably because they want to be like their friends, and eat what their friends are eating. I think we have one middle school student that still brings his lunch." – Cafeteria Aid

> "Most kids eat there [in the cafeteria] — most kids do not bring their lunches. For some people I guess the lunch is free or reduced." – Student

> "They just don't like the food. However, because of peer pressure, and you're going to think this is funny, they will not make their own food to bring because most of the students here are low SES and get free reduced lunch. They want to fit in with that." – School Administrator

Theme 2: School Food is Different than Home Food

The second theme to emerge from the analysis of the data was "*School Food is Different than Home Food"* (see Table 5); it had 39 mentions in the dataset. In this theme, student comments emphasize the differences between food they are served at school and food they are used to eating at home. Differences in the type and preparation of food are discussed, as well as differences in the availability of certain food items. Additionally, in these mentions, participants hint that the gap between "home food" and "school food" can be understood as a significant contributing factor to their less than ideal eating behaviors within the school cafeteria. This theme is broken down into two Associated Formulated Meanings

TABLE 5

THEME 2: SCHOOL FOOD IS DIFFERENT THAN HOME FOOD

Theme 2	Associated Formulated Meanings	*f*
School Food is Different Than Home Food	Differences (23/39) Food served with school lunch is not "lunch food" Food looks different "Home food" vs. "School food" Preferences for how vegetables are prepared or consumed Exposure/Availability (16/39) Exposure to food not eaten at home Fruits and vegetables served at home are not served at school	39

Differences

The first Associated Formulated Meaning associated with theme two is "*Differences*" (23/39 mentions). The mentions in this meaning unit focus on the various factors that differentiate food students eat at school with food they eat at home. This includes differences in how food looks, how it is prepared, the type of food served, and the components of a typical meal. In this meaning unit, students describe the ways in which they saw the food they were served at school as fundamentally different from the food they were served at home. Comments below come from students and cafeteria staff.

> "Sometimes in the meat it's like hard and crunchy and the beans just taste gross. I eat beans at home, but they taste different." – Student
>
> "There's a lot of homemade foods that I don't understand why they [the students] don't like — I know they would like it at home." – Kitchen Staff
>
> "I maybe want some sandwiches. They don't have sandwiches here, sometimes they have hamburgers that are like sandwiches, but not really." – Student
>
> "[On Peaches] yes, these ones are circle shape but ours at home are moon shape." – Student
>
> "I eat apples at home but, not these, we eat the ones you bite into." – Student
>
> "I don't eat kiwi or peaches at home. Well we do have them at home, but not that kind. I don't think it's the same kind. We don't usually eat like a lot of fruit and when we do buy it it's like strawberries or pineapple. For vegetables we have green beans, sometimes we get spinach, lettuce, tomato, stuff like that....I don't eat peas at home, or baby carrots. We have broccoli at home though." – Student
>
> "We have a lot of fruits and stuff at home. We have some pineapple and pears. I love pears. We get the pears you bite into, not pear slices like at school." – Student
>
> "I love broccoli but I don't like cheese on broccoli, it tastes bad." – Student

Exposure/Availability

The second Associated Formulated Meaning of theme two is "*Exposure/Availability*" (16/39 mentions). Here we see students talking about specific fruits and vegetables they are

served with the school lunch and either A) do not eat regularly at home, or B) had not seen before/knew that they existed. Additionally, a few mentions in this category bring up certain fruits and vegetables that students do consume at home, but are not usually a part of the school lunch (mostly seasonal or tropical fruits). Essentially, this Associated Formulated Meaning unit is focused on the gaps. Comments below come from students and school administration.

> "I've never had apricots at home but I eat them at school. The first time I ate them in fifth grade I was like 'what is this?'" – Student

> "I love kiwis but we have never bought kiwis... I don't know... I'm going to ask my mom or dad today. I'm gonna tell them 'lets go buy some kiwis.'" – Student

> "We don't really eat Kiwi. I've had it before and the taste is kinda different to me, I had it here at Horace Mann. The one I ate I'm not sure if something was wrong with it, but the first thing that came to my mind was sour." – Student

> "I used to think Kiwi was the fruit version of an avocado because of the green, I never ate it before." – Student

> "I know a lot of our kids, because we have a high Hispanic population, they tend to like more of the Hispanic foods or even the pasta kind of foods within their culture. I know it's great to expose them, but some of them just don't have a taste for that. Now, I know how tailored you make it for a school within a larger district, that would take a lot of resources, but I know that plays a role." – School Administrator

> "I have never had apricot disks. I usually skip it at school because I'm not used to it. If it's on my plate, sometimes my friends want it. I've never tasted it." – Student

> "[On fruits and vegetables not served at school] Zucchini, apples, I don't know what it's called, it's like something green that's like a 'U' shape. Mango, that's it." – Student

Theme 3: Issues Related to the National School Lunch Program

The third theme that emerged from the data, "*Issues Related to the National School Lunch Program,*" encompassed all of the relevant components of the National School Lunch Program that are affecting student eating patterns at the local, cafeteria level. Specifically, mentions in this theme describe characteristics of the food that is provided, including its delivery to students (see Table 6). This theme is unique because it touches on elements of the cafeteria

environment and school lunch experience that are decided by individuals at a higher level than the local school. Although the focus of this study is how the cafeteria, as a behavior setting, influences students' eating habits, this theme ensures that we also step back and view the cafeteria as a behavior setting nested within many other levels of the ecological model. This theme is broken down into three Associated Formulated Meaning units.

TABLE 6

THEME 3: ISSUES RELATED TO THE NATIONAL SCHOOL LUNCH PROGRAM

Theme 3	Associated Formulated Meanings	*f*
Issues Related to the National School Lunch Program	Characteristics of School Meals (37/82) On popular lunch days, main course often runs out Appreciation for ala carte options Limited beverages Quality of school lunch food varies day to day Inconsistent satisfaction with cafeteria food Leaving lunch hungry (portions) Nutritional value of school food Complaint about lunch food Ethnic foods aren't made correctly Student/Parent Awareness (18/82) Rumors about school lunch Awareness of USDA regulations Awareness of food preparation processes Use of cafeteria meal schedule Nutritional awareness Planning and Implementation Challenges (27/82) Reimbursement for school lunch School lunch issues are not unique to this district School lunch program fulfills a basic need for some students New federal guidelines Local schools do not have control over lunch menu Tableware waste Challenges of coordinating lunch in a large district Seasonal changes in food costs/availability	82

Characteristics of School Meals

The first Associated Formulated Meaning, *"Characteristics of School Meals"* (37/82 mentions), describes issues related to the type of food that is served at lunch, as well as the way in which it is served (e.g. portion sizes). In these mentions, students primarily express their frustrations related to the School Lunch Program; for example, limited beverage options (students are only offered milk) and inconsistent satisfaction with the "main dish" served at lunch (some days it is extremely popular and the cafeteria runs out of the main dish, other days, it seems like no students will touch it) are two issues that were commonly cited, in addition to complaints about the general quality of the food being served. Also in this Associated Formulated Meaning are comments about the preparation of ethnic foods within the National School Lunch Program. Comments below come from students as well as cafeteria staff.

> "In the past I've brought stuff from home to add on to lunch. Like a little bag of Doritos or some juice. And once I brought bottle of water.... Just to get something besides milk. There's not really variety in milk. I like water, but they never give it to us." – Student

> "Well it's okay, but not everyone likes milk. So it would be good to have water, or juice, apple juice. I love it. If you ask a teacher you can get a drink from a water fountain." – Student

> "The day we have Spanish rice or Asian rice, I order more peanut butters than hot lunches that day. Two-thirds at least, I order over 200 or 250 peanut butters. I understand that day with the rice, it's a little bland, but it doesn't taste bad. And I understand one kid goes by and says 'ooh I don't like it' then the next kid doesn't either." – Kitchen Staff

> "A lot of the lunches they make here are really good, like the soft taco, and quesadillas. I know two of my friends who don't eat at all. They just give their food away. But me, I could eat three of these plates." – Student

> "I understand some kids here might like the burrito and other schools might not like it, but no, it's the same everywhere. You can't make everyone happy. But there's a variety, of 30 days I'm sure they like at least 20 of them. There will be kids who come in and say 'ooh broccoli' or 'ooh salad' or 'ooh we love the crunch carrots.' Then there will be kids who say ;oh my gosh, why are you guys serving this.' Then things like nachos, that I think everyone likes, there will be some kids who say 'why are you serving this.'" – Kitchen Staff

> "Some of the primaries that they put out, like the Asian chicken and rice, with me being Filipino it kind of comes back on me, being one of the only Asians in the school, everyone eats that and automatically thinks that all of their food is bad. And I don't even like it that much." – Student

Student/Parent Awareness

The second Associated Formulated Meaning within this theme is *"Student/Parent Awareness*" (18/82 mentions). Comments within this Associated Formulated Meaning refer to knowledge: What do students and parents know about the School Lunch Program? Are they utilizing the schedules put out by the cafeteria? Are students aware of how their food is being prepared, and do they care? Additionally, this meaning unit deals with misinformation as well. Do rumors and gossip influence students' eating behaviors within the school cafeteria? Through these mentions one can begin to see tension between the students desires and the guidelines as put forth by the USDA and the National School Lunch Program; this is expressed through students comments on the "pointlessness" of taking food items they are not planning on consuming, just to fulfill a regulation. Quotes below are from students, cafeteria workers, and Nutrition Services employees.

> "I've heard the school lunch puts tofu into things to make them healthier. So some of the ingredients they put in are healthier than you would normally find." – Student

> "I talk to a lot of parents outside of here and they tell me, my son is so hungry every day. And I'm like, oh really, yeah they said it was really gross and this and that the food, it's hard to explain to parents that I work there and I serve the food and it's not gross." – Cafeteria Aid

> "The people who were making these guidelines [for the National School Lunch Program] don't spend any time in cafeterias. They don't. The original guidelines came from the Institute of Medicine. Then the USDA took IOM's recommendations and wrote a rule on it. And it's based off of the dietary guidelines, and of course the IOM had something to do with that too, but the reality is no matter what we put on the tray the kids are not getting this behavior reinforced at home, then they're not going to eat it." – Nutrition Services Employee

"I honestly don't drink the milk... but I have to take it. How about juice or water or something?" – Student

"No like a requirement. Like you have to get milk, and you have to choose a vegetable. I don't get why I have to. To me I think it's pointless to make us grab something if we aren't going to eat or drink it anyway. If what they serve is healthy, yeah — but if we don't eat it doesn't help us. It kinda goes both ways." – Student

"At my cousin's school everything they have there is actually made at the school. They don't ship it on a truck like we do. So I'd say I'd really like it if they made the food here." – Student

"In the announcements they say what we are going to have for the lunch - the day we will have it, in the morning." – Student

"They have a menu but I don't look at it." – Student

Planning and Implementation Challenges

The third and final Associated Formulated Meaning unit within the theme "*Issues Related to the National School Lunch Program*" is "*Planning and Implementation Challenges*" (27/38 mentions). All of the mentions in this meaning unit are from cafeteria staff, teachers, administrators, and district Nutrition Services employees. Mentions explore the behind-the-scenes issues surrounding the preparation and delivery of school lunch. Participants talk about district wide issues such as ordering food, planning lunches, and adapting to National Guidelines (which at the time of these interviews, were about to change).

From this data, one can see the push-pull relationship that exists between individual schools, the district Nutrition Services, and the National School Lunch Program; while control is held at the national level (e.g. dictating portion sizes, types of foods, reimbursement schedules) it is the local schools that have to deal with issues of implementation, and it is the local schools that are the "face" of the School Lunch Program to students and their parents. Local schools and districts are already preoccupied with the changes to the school lunch guidelines, and worried about implementing them.

“We get less revenue for a paid meal than we do for a free meal. All districts will have to implement the equity in school lunch pricing for next year because it’s now the law. It was last year too, and so we had to see increases. Basically we get almost three dollars a meal for a free meal, lunch, I should say lunch. For reduced we get almost $2.60 and then with the 40 cents the reduced student pays, we get almost three dollars.” – Nutrition Services Employee

“Possibly not having food at home makes some students more appreciative and more willing to eat. You can tell the kids who don’t have food at home because they eat not only theirs but other kids’ too.” – Cafeteria Aid

“And what we didn’t realize is now there’s a minimum/maximum. We can’t go over 10 grains a week. And milk. And now for lunch, I have to give a half of a cup of fruit. We were only giving a quarter of a cup, so we are doubling their fruit. Everyday they have to have half a cup. So that’s huge. We’re doubling our fruit budget, we’re doubling that wall of fruit out there.” – Nutrition Services Employee

“There’s provisions for a school to get 6 cents extra for lunch [after the new guidelines take effect].” But in order to get it the state agency, which for Kansas is the State Department of Education and Child Wellness. They have to review our menus and make sure we are meeting the new guidelines before we would be ever allowed the 6 cents. To get any funding we have to do it regardless, and that 6 cents isn’t available until October of next year. And the state has to review it first.” – Nutrition Services Employee

“They want healthy trashcans, because that’s what’s going to happen. And even if we did come up with a choice for them to choose from, the reality is that some of it is going to go in the trash, whether they choose it or not. If we did say the cold vegetable every day is a choice, they can either have a salad, broccoli or carrots, you know just because we give them that choice that doesn’t mean they are going to eat any of that everyday. To get to 3/4 of a cup I’m doing two vegetables. I would never want to serve a child 3/4 of a cup of baked beans. I was telling Vicki to get 3/4 of a cup on our tray, we need to add a bowl. Because now we do a number 12 dipper and it’s only 1/3 of a cup and it spills all over the tray. So I’m going to have to add a bowl to serve beans.” – Nutrition Services Employee

“Well when the really dislike something, I will tell Grace when we have our little gatherings at food service I’ll let her know that they do not like a certain item. Like if there’s a certain item that is just getting tossed, like at breakfast the maple pancakes, they’re whole grain and they have no syrup, it’s included in the mix, I think it needs more syrup, but you know calories. But I think that’s a waste of money there.” – Kitchen Staff

“It seems like most of the meals are the quick meals that they can make in the morning, stick in the ovens until they get shipped here. So there is not really much of a choice, outside of what can be held that long and keep warm.” – Teacher

> "The kids still think that I'm in charge of the lunch. They'll say things like 'hey can I get this again next week.' But I tell them the meals are planned out and the menu for the month is already made." – Kitchen Staff

> "Because it becomes more work if every school is doing their own thing. I mean we have 57 elementary schools, if every school is doing their own thing, it becomes very cumbersome to me to make sure each school is completing whatever it is they're doing. I have a hard enough time getting them to follow one policy." – Nutrition Services Employee

Theme 4: Food Served Does Not Equal Food Consumed

The fourth theme to emerge from the analysis of the data was "*Food Served Does Not Equal Food Consumed"* (see Table 7); it had 105 mentions in the dataset. This theme deals with a central issue of this study, the issue that spurred the study: there is high rates of waste in the cafeteria because students do not eat the food they are being served. Specifically they are prone to throwing out fruit and vegetables. In this theme, we are able to explore the factors relating to the large discrepancy between "food served" and "food consumed" from an insider's perspective. Hopefully, by better understanding why the gap exists, we can cut down on the waste in the future. Mentions in this theme are divided into four Associated Formulated Meaning units.

TABLE 7

THEME 4: FOOD SERVED DOES NOT EQUAL FOOD CONSUMED

Theme 4	Associated Formulated Meanings	*f*
Food Served Does Not Equal Food Consumed	The "Not Eating" Phenomenon (23/105) Refusal to Eat School Lunch / Going Hungry Finishing the School Lunch Waiting Until After School to eat Hunger Contributing Factors (59/105) Expressed Food Preferences Snacking Throughout the School Day Additional (non-nutritious) snacks from home Refusal To try New Foods Well Established Attitudes About School Lunch Peer Influence on Eating Behavior Difficulty in consumption of some fruits Shortage of the alternate menu items Home/School Connection (5/105) Fate of Food Not Consumed By Original Student (18/105) Food Waste Use of share table Students Trade Food Items	105

The "Not Eating" Phenomenon

The first Associated Formulated Meaning that emerged from within the *"Food Served Does Not Equal Food Consumed"* theme was labeled *"The Not Eating Phenomenon"* (23/105 mentions). In this meaning unit, students discuss what it feels like to not to eat at lunch, and describe how they select certain key items from their lunch trays to hold them over, while ignoring everything else. They do not mention many specific reasons for not eating in this Associated Formulated Meaning group, however, students do go into detail on strategies they use

to make it through the school day, hungry. Comments below are from students and cafeteria staff, observing student eating behavior.

> "Well some of us have to eat it because we're so hungry. And some of us just starve the whole day." – Student
>
> "One of my friends, he doesn't eat anything, all day everyday." – Student
>
> "All I'm going to eat today is carrots, bread and milk." [the rest of the lunch was corn dog and pineapple] – Student
>
> "I have a 7th grader and a 3rd grader. My 7th grader only drinks her milk and will eat when it's a soft taco, or bean and beef burrito, the chicken nugget, and I think that's probably eat. The other days she just drinks her milk only." – Cafeteria Aid
>
> "I've had kids that didn't eat at all. And those kids worry me. I mean those kids really did worry me sometimes." – Cafeteria Aid
>
> "My grandma takes me home, and she takes us to our house and I grab whatever I can and eat it all. Cereal, turkey sandwiches, fruits, vegetables." – Student
>
> "It feels like you want to throw up or pass out." [hunger] – Student
>
> "I'm too hungry to not eat the lunch, but there are some lunches that have gotten better." – Student

Contributing Factors

The second Associated Formulated Meaning within this theme is "*Contributing Factors*" (59/105 mentions). Mentions in this theme outline the various reasons that students have for not eating the food they are served at lunch. Reasons are manifold for not eating, and span personal, social, and institutional factors. Additionally, other food, whether snacks brought from home that are consumed at lunch or during the school day, can compete for students' appetite. Comments below are from students and cafeteria staff.

> "I like the pizza a lot. I also like the side that's broccoli with cheese, but not a lot of people like it. I also like the chicken nuggets, and the potatoes 'pudda de papa,' and I also like... I like a lot of stuff. Outside of school, my favorite food is tamales." – Student

"[on how students get through the school day without eating lunch] I mean, they manage to. They sell a lot of candies and, you know, teachers, sometimes they reward them with sweets and that's another thing." – Cafeteria Aid

"I usually bring snacks during classes, which we're not supposed to do. I take it from home and eat it whenever I want. When they're not looking I eat it real fast, that's how I can go all day without eating the school lunch." – Student

"Usually our friends bring big bags of chips and just snack on those for a long time and they don't eat any of the lunch. They bring the chips because they don't eat any of the extra stuff we get, so they eat the main course and snack on the chips." – Student

"They bring in these huge family size bags if chips and eat half of them a day, and they're not even eating the vegetables." – Cafeteria Aid

"Well they're throwing a lot of food out. That's mainly what we see. There's some kids, they hardly touch the food trays, you know, and they just, you know… sometimes they bring their own snacks from home, so they start with their snacks instead of starting with their real food." – Cafeteria Aid

"Leave it on my tray. Sometimes I take a little bite then I'm like 'ewe, no.'" – Student

"Lunch with students is always a difficult thing to get them to change their minds and attitudes about. A lot of times it's either they like it or they don't, and if they don't they won't eat it." – Cafeteria Aid

"They're not very willing to try new things. They already seem to have their minds made up if they're going to like it or not like it." – Cafeteria Aid

"It's a chain reaction also, one kid comes in and doesn't like it, the next two people don't like it either." – Cafeteria Aid

"I tried them [kiwis] here for the first time in kinder... It's hard to cut them up. I stick the fork in and then just eat it all. I cut myself once and started bleeding on my thumb." – Student

"We run out everyday of the peanut butters. I separate them to save them for each grade. I used to put them all out and then by 2nd grade they would be gone. So that way everyone gets a little bit." – Kitchen Staff

Home/School Connection

The Associated Formulated Meaning "*Home/School Connection"* has 5 of 105 mentions.

In this meaning unit, teachers and cafeteria workers acknowledge the fact that student eating

behaviors at school are influenced by their eating behaviors at home, and what their parents expect out of them during meals. Although this Associated Formulated Meaning group is small, it reflects the idea that good eating behaviors cannot be targeted by schools alone, they need to be issues that parents deal with at home as well.

> "Some kids just are just very picky, and they're allowed to be picky at home, and if they don't want to eat that, then they just don't." – School Administrator

Fate of Food Not Consumed By Original Student

The fourth and final Associated Formulated Meaning within the theme "*Food Served Does Not Equal Food Consumed*" is named the "*Fate of Food Not Consumed By Original Student*" (18/105 mentions). Through the comments in this theme we begin to get a clearer picture of what happens to the food that is served to students who have no intention of eating that food. (Remember, under the "serve" model of school lunch delivery, students have to take all the components). While it is easy to assume that most of this food ends up in the trashcan (students are not allowed to leave the cafeteria with uneaten items), our interviews shed light on a type of "trading economy" where students barter for desired items, and leave other items in public places for the taking.

> "I would say that there are certain foods that we know they throw away almost en masse. You know, they taste it, and then they trash and trash it, even if it tastes better for adults sometimes, or we think they should eat it. It's so hard to find foods that kids do eat." – School Administrator

> "They will bring like chips or Hot Cheetos. And then they start passing it around to the other kids on the other table, so that kind of takes not only that individual child away from the food on his tray but the rest of the kids around him because they would prefer to eat the chips if he's sharing those chips with them. I notice that they don't eat a lot of the food on their tray and a lot of the food goes to waste." – Teacher

> "Sometimes I feel like it's enough food for me, but sometimes there are things on my plate that I don't like, so I have to get an extra thing from the share table. And if I don't eat it, there are always a lot of other people who will definitely eat it if I put it in the middle of the table." – Student

> "I probably was struck by the share table right at the end of the door. You know how many just chose it and then plopped it. And they could do that because it was now self contained. Whereas in the past they couldn't use the share table for a fruit and vegetable because it was on their tray." – Nutrition Services Employee

> "They trade this one for that one. They can't trade in the lunch line because then the meal isn't complete. We have to see that that meal is complete and then they can share." – Cafeteria Aid

Theme 5: Setting Level Influences on Eating Behavior

The fifth theme we identified through the data analysis process was "*Settling Level Influences on Eating Behavior"* (see Table 8; it had 77 mentions in the dataset). This theme combines student, teacher, administrator, and cafeteria worker perspectives to understand the aspects of the cafeteria, as a behavior setting, that may be influencing student eating behavior. This theme attempts to explain the extra-individual factors that serve as either barriers or encouragements to students consuming their lunch, as served by the cafeteria. It is broken into five Associated Formulated Meaning units.

TABLE 8

THEME 5: SETTING LEVEL INFLUENCES ON EATING BEHAVIOR

Theme 5	Associated Formulated Meanings	*f*
Setting Level Influences on Eating Behavior	Eating Environment (19/77) Cafeteria tables are crowded Cafeteria is loud Cafeteria Environment changes based on if food is "good" Cafeteria feels good Multi-functionality of cafeteria room is a distraction Social Aspects (14/77) Cafeteria is social Socializing in the cafeteria competes with time spent eating Cafeteria environment isn't welcomed by all students Bullying behavior in cafeteria Timing/Scheduling (18/77) Lunch period is too short Scheduling of lunch periods Option to stay inside if student isn't finished with lunch Presence of Staff/Adults (12/77) Influence of adults on student eating behavior Not enough staff Past interventions to try and get students to eat more Parents bringing fast food Student behavior is highly regulated in the cafeteria (14/77)	77

Eating Environment

In this first Associated Formulated Meaning unit, *"Eating Environment"* (19/77 mentions), students describe physical and physiological aspects of the cafeteria that effect their ability to and desire to eat their lunch. The majority of the issues cited by students are factors that contribute to their comfort within the cafeteria; the premise here is that if the environment is uncomfortable for students, they are less likely to be able to relax and enjoy eating their lunch.

This Associated Formulated Meaning group sheds light on an interesting phenomenon, the environment of the cafeteria (e.g. noise level) seems to change based on how well students like the food that particular day. Additionally, it is here that we see for the first time that there are some students who elect to eat lunch upstairs, in their teachers' classrooms, rather than in the cafeteria.

> "Well I think the environment is… maybe there's too many kids at the same time. It gets very distracting for others. I noticed that when one class is coming in and the other ones are already eating, those kids are kind of distracting the kids that are already sitting down and ready to eat. So they stop eating, and they start talking. So having too many kids, you know, can be a big distraction for them especially when they have a certain amount of time." – Teacher

> "I don't really like it because everyone's all squished together. I would like it better if they put less people at the tables. Cause that way you gotta be eating like this. I think we need 5 or 10 more minutes to eat. It's not enough time." – Student

> "[in reference to student eating upstairs in Math room every day] It's not as noisy as the cafeteria. I don't like eating in the noise, everyone's talking at once and it's hard to hear, upstairs you can take your time and eat, and everything's quiet." – Student

> "They usually like the stuff, depending on what they are serving that day. We usually have a day system, some days no one eats it all and it's loud, or some days its really quiet and we are all eating. And you can notice by the sound level." – Student

> "It's very clean, and the lunch ladies or the lunch boys are very good cooks, and it's a great place. It feels good to eat there." – Student

Social Aspects

The second Associated Formulated Meaning that emerged from the data was named *"Social Aspects"* because it encompasses the social components which are at work shaping the cafeteria environment (14/77 mentions). This meaning unit touches on both the positive and the negative aspects of the cafeteria as an inherently social place; students enjoy the time between classes to socialize with friends, however, the "free time" can often turn into bullying behavior,

or simply compete with time that should be spent eating. Comments below are by teachers, students, and cafeteria staff.

> "The cafeteria is comfortable, it's a good time, it's kinda loud because you talk to everyone and it's kinda fun." – Student

> "It's kinda fun to eat there because it's a time we can actually talk, because when we go to recess we are playing. And they let us, up until the last five minutes, when they have to make announcements and stuff." – Student

> "[on why some kids bring their lunch upstairs to eat with the teacher, instead of in the cafeteria] And some of them are shyer kids. Some of them are kids that just don't, that socially would rather be here, and all their friends come up here too, so they are with their friends but they're not really with all the other chaos out on the playground. So I think a lot of it is a quieter place. They like having some place they can just come up and relax and have a quiet time with their friends without having some of the other things." – Teacher

> "People like to mess with you while you eat. You could get up and they could open your milk and spill it all over, or mix some of their stuff with yours, or take some of your stuff and hide it. And you could put something out and they throw it across the table." – Student

> "I mean, it is crowded I think, but you know… I think sometimes they like socializing but sometimes the socializing get in the way of them actually eating what they might have ate had there not been, they're friends not been around." – Teacher

> "They spend too much time talking instead of eating. So that's why we turn off the light sometimes and we say, 'Okay, this is eating time. You need to eat something.' But I think, you know, the ones that are more social, those are the ones that are not giving themselves the time to eat." – Cafeteria Aid

Timing/Scheduling of Lunch

The third Associated Formulated Meaning, focusing on the environmental aspects of the cafeteria, is the "*Timing/Scheduling of Lunch*" (18/77 mentions). In this meaning unit the temporal aspects of the lunch period are highlighted, including an emphasis on the length of time students are given to eat, the time of day that lunch is scheduled, and the order that lunch comes in the day (e.g. before or after recess). A few of these mentions refer to a policy implemented by the local school to deal with parent complains that their students do not have enough time to eat

lunch; students are allowed to elect to stay inside during recess and continue eating their lunch if they are not done eating when it is time for their class to be dismissed. However, this means forfeiting time out in the recess yard. Comments from students, staff, and administrators are provided below.

> "If I could change something I'd give a little extra time… the lights are on most of the time, so that means talking and less eating, so maybe longer lunch." – Cafeteria Aid
>
> "I've been getting bloated, probably from forcing myself to eat in the short amount of time that we have." – Student
>
> "And I think also if kids were allowed more time to eat instead of… because they know they can stay in to eat if they want to but what six year old is going to choose to eat carrots inside or go outside for recess." – Teacher
>
> "I think that they want- they'd rather go out and play. It's not like they're coming in from outside like the fifth graders. They've already played." – Cafeteria Aid
>
> "Well with Kinder, that's our first group, they eat first then they go outside. But if they're not finished they can stay, because that's taking their recess time, so they are given the opportunity to stay. With middle school, same thing. First, second and third same. The only group that doesn't really have that chance is the fourth and fifth grade, but they're bigger and they older and they know." - Cafeteria Aid
>
> "Very rarely will they stay, even if they are hungry." – Cafeteria Aid

Presence of Staff/Adults

Through our analysis we identified one aspect of the cafeteria environment that can actually help encourage students to eat the healthy food that is served to them each day. This fourth Associated Formulated Meaning focuses on that aspect, the "*Presence of Staff/Adults*" within the cafeteria (12/77 mentions). With the exception of some parents who bring in fast food during the lunch period, adult presence in the cafeteria can have a positive impact on students eating behaviors through modeling and encouragement. Perhaps this influence could be increased if more adults were in the lunchroom with the students (right now there are only four

cafeteria staff and a few parent volunteers; only the first grade teachers eat in the cafeteria with their classes).

> "I say I tasted it and it's good. Like the day we have rice, I'll serve Raquel some and she'll eat it, and the kids will see her eat it and say 'oh it's good for you, she's not dying.' The older kids won't go for that though." – Kitchen Staff

> "We tell them sometimes that it's yummy. Or give them ideas, like dipping it." – Cafeteria Aid

> "I often wonder if having a friendly adult presence at the table would get kids to eat better. I grew up in a small town where the teacher sat with you at lunch, they were at the table with you and you talked to the teacher, and you know - she did encourage you to eat. Whereas there is no such thing as that in this district; the teachers have their lunch and they are gone, out of there." – Nutrition Services Employee

> "Well even though we tell them, you know, 'you need to eat your food first; you need to put those Cheetos away for now; try to eat some food, you know, your tray is still full.' I mean, it's hard to have control over the whole group of kids, and you have to walk around to go to the next area." – Cafeteria Aid

> "Ms. Martinez had a little happy face stamp, and those kids who ate everything on their tray would get one. But no one was eating everything on their tray, so we moved it down to mostly everything on their tray. If it was a day like, where no one wanted to eat the Chinese rice, it was like 'finish one thing on your tray and you get a stamp.' The big kids wanted a stamp too." – Cafeteria Aid

> "[on parents who bring fast food to their children at lunch] the McDonalds every day or, you know… I know they're intentions are well. They want to give their kids more or you know- I know this because my parents were the exact same way. Because I buy you lunch from, you know, McDonalds or Taco Tico or wherever, you know, I'm giving you the best in a sense. Not realizing that, hey this is not really quality food; it's actually very detrimental." – School Administrator

Student Behavior is Highly Regulated in the Cafeteria

This fifth and final Associated Formulated Meaning within this theme, *"Student Behavior is Highly Regulated in the Cafeteria"* (14/77 mentions), refers to the ways in which students at this school are "trained" to follow certain procedures for picking up their lunch, sitting down, eating, throwing out trash, and dismissing; observing the cafeteria one can tell there is a certain system, a rhythm governing student behavior. Student behavior is also regulated with the lights;

lights on means students are free to talk, lights off means silence. These rules are well known and followed, and allow only a small staff (four people) to keep control over a large number of students who are coming in and out of the cafeteria. This level of regulation, however, may hinder students from eating; as we saw earlier, comfort is important when enjoying a meal. In the comments below, students describe the ways in which their behavior is regulated and the rules they are expected to follow; while the cafeteria staff share their efforts and techniques for getting students to follow pre-established rules.

> "They have rules when they turn off the lights if you talk they send you to the wall. You can't play with the food or else they'll make you eat it. You gotta have a pass to go upstairs or else you can't go. You can't throw food." – Student

> "When they turn off the lights we have to be quiet... I feel safe because all then all the noise stops." – Student

> "You come in line, we go get our lunch which is on a tray and has everything ready for us. We have to get milk and silverware. Then we have to go get it, type in our number, and sit down and eat." – Student

> "Well every year we train our kindergarteners, and that's the word I use, but we have them till 8th grade so they are awesome. First grade, second grade, third grade, they know what they are doing because they've been taught in first grade." – Cafeteria Aid

> "When you walk into the cafeteria to get your food, everyone has to go in that one line. When you walk through the line, after that you have to go sit down. And it's really weird because the first kid to get there is not the first one to go outside when it's recess. Because of the way you sit down you have to go down the table by the windows. So when you sit down and start eating people will come next to you, and they will start filling up the table, and you can get crowded, and if you are sitting in the end you can get pushed off a little. Everyone sits down and gets eating, and the last person even though they sat down last, they have the same amount of time as the first person. When they dismiss they do it table by table, the last person to sit down is the first person dismissed. The first person to sit down has the longest to eat, the last person has the shortest. That's why I try to be first." – Student

> "They are very strict about the talking, and if you get seconds it's based on how much you talk. It's very noisy, sometimes I like eating there. When you have a lunch and you don't want to be where you want to be in line, they don't let you stand on the wall and wait until you go in. Like if you are standing in line and there are two people that you don't like beside you, you can't go to the wall and stand and wait for the person who had

> lunch to come out, they make you sit down. It feels like being surrounded by a lot of noise, and when they turn off the lights, that's not fair to the people who weren't talking. It feels different from eating at home. It feels like you are eating at school, because at home you usually have... I don't know how to explain it. At home you have like the kitchen surroundings and you feel more at home, and when you're at school there's so many kids and there's so much noise, so many rules, it's not the same." – Student

Theme 6: Effects of "Choices" Cafeteria Intervention

The sixth and final theme that emerged from the qualitative interviews was named, *"Effects of 'choices' Cafeteria Intervention"* (76 mentions; see Table 9). In this theme, we hear feedback from students, cafeteria staff, teachers, administrators, and district Nutrition Services employees about the "choices" intervention. Specifically, mentions in this theme allow us to understand how the intervention was perceived by students, and how they interacted with the new system of lunch delivery, which included an active choice. Comments in this theme are especially important because they provide a qualitative context to help explain the quantitative results we reported previously in this paper. By attempting to experience the intervention through the students' eyes, we can begin to understand why the slight change in choice architecture was so effective at altering the behavioral norms of the cafeteria and increasing consumption of fruits and vegetables. It is through these interviews with staff and students that we see the ways in which the intervention has started to make room for student empowerment and students' voices. Additionally, included in this theme is a behind-the-scenes look at the intervention, which focuses on kitchen-related implementation issues and lessons learned for the future (e.g. in the beginning, they were worried about how long it would take students to make decision). This theme is divided into four Associated Formulated Meaning units.

TABLE 9

THEME 6: EFFECTS OF THE "CHOICES" CAFETERIA INTERVENTION

Theme 6	Associated Formulated Meanings	*f*
Effects of "choices" cafeteria intervention	Perceptions of Intervention (23/76) Positive student feedback Staff positive feedback for intervention Intervention food seen as "bonus" Preference for food in containers Related Behavioral Changes (15/76) Increased consumption Extra servings Intervention required students to adapt their behavior Positive peer interaction during the intervention Decision-making process Student Empowerment (29/76) Request for increased choice Preference for choosing Request for control/input/decision-making power Issues with Implementation (9/76) Behind the scenes work Lessons learned or improvements for delivery in future Container quality	76

Perceptions of Intervention

This first Associated Formulated Meaning, *"Perceptions of Intervention"* (23/76 mentions), deals with statements participants (students) and staff made about the "choices" cafeteria environment. Most of this feedback was positive (barring a few technical issues that the kitchen faced, which will be discussed in a later Associated Formulated Meaning) and encouraging. In addition, mentions in this Associated Formulated Meaning group show a unique phenomenon: the younger children involved in the "choices" cafeteria intervention viewed the

fruit and vegetable choice items as a "bonus." Even though they were technically receiving the same amount of food each day, the act of selecting a self-contained fruit or vegetable and adding it to their lunch tray led them to perceive the fruit or vegetable as an extra, add-on item.

> "I thought it was actually pretty cool. Because I know why you gotta do it. Because anyway you'll have fruit or vegetables on our plate. So we just got to choose." – Student
>
> "I think that's better. Instead of just getting what they want, you get to pick what you want and what you like. I think I eat more than what I was eating before because I get to pick it. I like making my decision because it's not based on what they think you like, it's based on your opinion and what you like." – Student
>
> "I've seen kids before they had this because when they got their fruit they wouldn't eat it, and they would only get the fruit that they like a certain time each month, but now that we have this they get many choices and the kids can choose the choices that they actually eat. Today I chose kiwi and I ate it first." – Student
>
> "I think it's cool. It's like getting ready for high school because they have their own decision to what they eat. I eat a lot more now." – Student
>
> "I actually really liked it, because I know with some of the lunches they give you a fruit or vegetable that either people don't like, or don't like to eat with that kind of meal. And I think giving a choice means you can get what you wanted with it. I thought it was really great for everyone. Some fruits I won't eat sometimes, but then when I got there I was able to pick it. And for those who eat nothing, I can have theirs too. A lot of the food that goes into the middle of the table doesn't get wasted." – Student
>
> "We all know that, you know, our gut feeling is give them a choice and they're going to be happier and give them a choice and they're more likely to eat one of the things they choose because we all have our preferences. So in terms of how the information would be helpful to us-… that information that shows increased participation and the logistics that it can work in terms of meal service times a.... And yeah, there are challenges, but it works and kids are happier because of it. They eat better. You meet their need better. So I believe choices are the way to go." – Nutrition Services Employee
>
> "I really liked the idea of being able to pick our fruit and vegetables because it makes me eat more of my lunch. Then I have something more to eat than the regular lunch; it's adding something." – Student
>
> "I liked choosing because they were in the little things [containers], and it wouldn't get all over the place. And we would also be able to choose… oh I like that…instead of just having it on your plate, gross." – Student

Related Behavioral Changes

The second Associated Formulated Meaning, *"Related Behavioral Changes"* (15/76 mentions), focuses on the self-reported behavioral changes that students voluntarily undertook in order to successfully interact with and adapt to the "choices" cafeteria intervention. Included in this meaning group are descriptions of behaviors that relate to the increased consumption we saw in the quantitative results, as well as insight into how students decided what fruits and vegetables to pick for themselves each day, and examples of how the interaction encouraged students to interact with one another around food (e.g. influencing one another's choices, exchanging fruits and vegetables which were made "mobile" by the intervention).

> "I liked it. I ate some of the grapes even though I wasn't buying the school lunch. My friend Sebastian ate 2-3 servings of grapes." – Student

> "This idea that you guys did [the "choices" intervention], was really good. Because whoever didn't want to eat what they had picked, someone else could eat it. That was healthy. But then other than that, there would always be some leftover so if kids wanted more they could have more." – Cafeteria Aid

> "After three days they were fine [with the intervention]. They came in and looked at the choices we had out. They were ready to pick. They learned. And they would sometimes ask 'what's tomorrow?' I think they enjoyed it 100%." – Kitchen Staff

> "Waiting in line, my friends will say something like 'I want carrots or grapes' and give me a high five." – Student

> "Some people thought the choice was 'get fruit or don't' but most people took it as 'what fruit do you want.' But that's what you are paying for." – Student

> "[on how she decides what fruit to select] I just sit there and snap, and think really fast and then I close my eyes and point to one and then I get it. If I don't like the ones that I pick I don't pick it." – Student

Student Empowerment

The third Associated Formulated Meaning to emerge was *"Student Empowerment"* with 29/76 mentions within this theme. It is best to understand mentions within this meaning group as

by-products of the "choices" cafeteria intervention; the act of choosing their own fruit and vegetables at lunch led students to request even more choice with their lunch, both on a daily and a menu-planning basis. Their quotes, shared below, highlight the ways in which they enjoyed making these decisions and their desire for an increased number of opportunities to use their voice and decision-making power.

> "I wish we could go down the line and have all the main dishes we could choose from, like a restaurant. I was surprised when they kept it [the "choices" intervention"] up for such a small amount of time." – Student
>
> "I like it, except, I think people would rather choose fruits AND vegetables instead of everyday it's either fruit or vegetables." – Student
>
> "I think it [the intervention] was a good idea. It's more exciting that it's fruits and vegetables, it switches off every day so I don't have to have the same one each day. I eat more when I eat them because its more food to eat, which is good. I like that you can choose the one you like the most, and you know it's the one you want." – Student
>
> "My least favorite [part of the school lunch] is that they get to decide what we eat instead of us choosing it. Like the cheese broccoli stuff, I've never seen anyone eat that. And they put it on our plates and it gets mixed with the other foods we do like to eat and that's just gross. Not that there's a problem with things touching, I eat other foods that are together, but that one's just gross." – Student
>
> "We should have more of a choice as to the kind of food we get. Like the beginning of the year we should have a vote, like should we have those quesadillas that are all wrapped up… I think that's kinda gross. My friends and I were talking to [the principal] about this the other day. We said we should have more of a choice, because whenever they had the things out that you could choose them, but like the apricot disks those are not a very good food. And you could choose between those and pineapple or something, and that was good." – Student
>
> "They are always like "why did you give us this again, we told you last time that we didn't like this!" I tell them that I don't plan the lunches, and they are already planned out ahead of time." – Kitchen Staff
>
> "One particular student came up to me one day and said, 'Mrs. Martinez, do you have a piece of paper?' And I said, 'Why?' And he said, 'Because I'm going to have everybody sign it, so we can get rid of this particular dish. We want to get rid of this items because it's just gross, and we don't like it.' And I said you know, 'Well I applaud you for taking action like that.'" – School Administrator

Issues with Implementation

The final Associated Formulated Meaning within the theme *"Effects of 'Choices' Cafeteria Intervention"* is "*Issues with Implementation"* (9/76 mentions). Considering the pressure that is put on the cafeteria staff and Nutrition Service employees to efficiently serve lunch to a large number of students, without a kitchen in the building, in such a short amount of time, it was essential for the "choices" intervention to work within those parameters. Specifically, the speed of the lunch line and the ability for cafeteria staff to keep the choices "stocked" were crucial to the intervention's success. Mentions in this Associated Formulated Meaning group take a behind-the-scenes look at the effects of the intervention on the cafeteria staff, with an eye towards making improvements for the future.

> "It takes a lot of time [to keep the dispenser stocked with choices]. Probably something that you could just change trays. For example, I got a tray that holds 35 of them, after it's gone just trade it. So you don't have to go one by one because I found myself stuck to the thing, which meant I couldn't help the other ladies. Most of the time they didn't need my help anyways. But I found myself just stuck there refilling it all day. But if I could just change the trays, I'd change them every now and then, but not every time." – Kitchen Staff

> "[on 'choices' posted on cafeteria wall] And having, having the menu choices ahead of time really helped." – Kitchen Staff

> "I was a little nervous, to be honest, in the beginning because one of our main concerns is trying to get the kids in and out on time. You've seen it, and it can get chaotic if the line gets backed up with certain items, but it actually ran a lot smoother than anticipated. As a matter of fact, I even think sometimes it went faster, and kids got in and out." – School Administrator

> "Right, because you know just serving it, you put the fruit on the tray. There's no extra paper cost. Whereas with having them choose the fruit, you have to buy the container. So that would be a cost." – Nutrition Services Employee

> "I think letting them pick and choose some of their own little, either vegetables or fruits, made a difference. Next time maybe having a little bit more- I think grapes were probably a high point too- and so we might have given our more grapes if we just happened to have more grapes. And at the same time, you can't always give grapes every single day

> of the school year, so just trying to figure out what choices in the future they would go for and having more of those, so variety." – School Administrator
>
> "I also would not use the system that we used there at Horace Mann, the slide thing (see Figure 3), that became cumbersome for her to fill and keep filled. I think a system where there are colorful trays, where once one was empty they could put out another tray. You know like when you go through a cafeteria and they have the plastic, colored trays... would buy colorful, nice presenting ones so that once one was empty, they could just switch it out. It's easier than what she was doing." – Nutrition Services Employee
>
> "I'm not sure if it's because the containers were not sturdy. But that's the only negative thing. But if you close them too tight the little ones are going to have issues." – Kitchen Staff

Analysis of Findings

The analysis of the interview data provide critical insights into the eating environment in the cafeteria of the intervention school, specifically shedding light on the barriers that exist within this setting that actively discourage students from consuming the fruit and vegetable portions that they are served each day. The themes generated by the analysis process align with our current understanding of determinants of fruit and vegetable consumption in children, as well as aspects of the behavior setting (e.g. the presence of adults, the behavior of other students, the timing of lunch, the physical features of the cafeteria) which could potentially play a role in students' eating behaviors. Lastly, the qualitative interviews allowed us to conduct an in-depth follow up to the "choices" cafeteria intervention; discussions with students and staff describe why our intervention worked so well, highlighting the role of the active choice, as well as other features of the intervention that we hadn't thought of previously (e.g. serving fruits and vegetables in containers makes them mobile, so students can trade or share them more easily). The following analysis of each of the six themes that emerged is an attempt to provide a deeper, more full understanding of each theme and the role it plays in student eating behavior.

Theme One: Motivation for Buying School Lunch

Initial observations by the researchers within the school cafeteria environment documented high rates of plate waste, both of fruits and vegetables and of the entrée items. Without knowing why these items were being wasted, the question became "why do so many students choose to get their lunch at school if they aren't eating the food?" Participant statements within this theme describe the ease of choosing to get lunch at school, both for students and parents. They also point to cost as a deciding factor; for a school like the intervention school where a large majority of students (81%) qualify for free and reduced lunch, there is little incentive for families to provide students with meals from home. However it is possible that because these meals are free or subsidized, parents have less vested interest in whether or not their children actually eat the meals. Either way, the ease, price, and high participation rates (including peer pressure to eat the cafeteria lunch, despite the popular act of complaining about the food) encouraged many families to get their students lunch through the National School Lunch Program.

Theme Two: School Food is Different than Home Food

In this theme, students conveyed the differences they perceive in the food they are served at home versus the food they are served in the school cafeteria. As researchers, we understand that significant differences in "school food" and "home food" can help explain poor rates of student consumption within the cafeteria. This is true especially for the younger students, who expressed frustration and confusion with fruits and vegetables they had never seen before, ending up on their plates. Students were not only not familiar with the tastes, but they often did not know now to eat the food item (e.g. trying to bite into the brown skin of a kiwi).

Additionally, we saw also that how food is prepared matters as well; students may have been exposed to things such as broccoli at home, however, they are used to eating it in a different way (e.g. raw vs. covered in cheese). Variety and students pallets must be in tune in order for the School Lunch Program to be successful; however, this is a challenge because students come from different cultural and socioeconomic backgrounds. Another interesting thing that arose during these interviews was the idea that the food served at lunch in the cafeteria was not traditionally seen as "lunch food." In an effort to provide students with complete, nutritional meals, the cafeteria rarely serves them things such as "sandwiches" that they see as lunch food.

Theme Three: Issues Related to the National School Lunch Program

Of all the themes that emerged from the qualitative data, this is probably the most complex. Within this theme are participant mentions of various aspects of the National School Lunch Program, from the characteristics of school meals themselves, to the way in which these meals are planned and delivered to students, that may have a role in impacting student eating behaviors. Students complained about the quality of certain cafeteria foods, as well as what they saw as "poor planning" (e.g. when an item runs out). Cafeteria staff and district Nutrition Services employees emphasized the challenges that they had working within a confined budget, following rules so that they can be reimbursed properly, and adapting national guidelines to fit local needs. Because the elementary schools in this district do not have their own kitchens (with working equipment), food is prepared at a central location and shipped out to the schools. This severely limits the options of individual schools to adapt to their specific student body.

Also in this theme were issues of awareness. Researchers were surprised to see the high level of awareness of USDA regulations that students exhibited; they knew that they "had to" take certain items even if they were going to throw the item in the trash as soon as they walked

past the cashier. Students expressed some resentment towards these imposed rules, and often saw them as nonsensical. Other mentions within this theme showed that the school can do more to raise awareness of what is being served at lunch each day; although menus are made, it is not clear whether or not students and families are using them on a regular basis.

Theme Four: Food Served Does Not Equal Food Consumed

This theme deals with the central problem in the cafeteria: although healthy meals are being served, they are not being fully consumed. Just because healthy food is put in front of children does not mean they are benefitting from its nutritional value. In this theme we are granted access into the students' world, specifically they attempt to explain the "not eating" phenomenon. This behavior, actively choosing not to eat the lunch (or anything else), is not really rationalized by the students we interviewed; rather it is described as the "only choice" they have because they don't like the food put in front of them. (Don't like, or in some cases, won't try). They describe hunger pangs throughout the day, and the rush to finish school and grab something to eat from home.

Outside the children who simply choose not to eat, we identified many other factors that may be negatively influencing students' eating behavior. These include food preferences, peer influence (one "yuck" from a student can lead to an entire table not eating a certain item), difficulty in consumption of some items they are served, and the presence of snacks in the cafeteria which compete for students attention and appetite. Interestingly enough we learn that not all food that a student chooses not to eat ends up in the trash; much of it is shared or "reclaimed' by other students.

Theme Five: Setting Level Influences on Behavior

This theme allowed us to examine the setting-level influences at work in the school cafeteria. Consistent with Behavior Setting Theories and the Ecological Model, discussed earlier, we see that individual action is influenced by context, in this case, the particular environment of the school cafeteria. Students described several negative aspects of the cafeteria environment as interfering with their eating experience including the noise level, the crowded tables, and the short amount of time they are given to actually eat. Although students tended to enjoy the social aspects of the cafeteria, it wasn't welcomed by everyone; we had several students report instances of bullying within the cafeteria, and adults we interviewed spoke about socializing as competing with eating time. Other aspects of the setting that could be tweaked to produce a better eating environment include scheduling lunch after recess, so students are hungrier and increasing the number of adults in the lunch room who are actually eating, and eating the cafeteria food (e.g. modeling).

Lastly, it is important to report that student behavior within the cafeteria is highly regulated. Students in the intervention school begin in Kindergarten and stay through eighth grade. This means they have nine years to internalize the rules and systems in use in the cafeteria. As a behavior setting, this particular school cafeteria has some very strict guidelines. These guidelines make the cafeteria feel a lot less like "eating at home," and perhaps have a negative effect on student eating behavior.

Theme Six: Effects of "Choices" Cafeteria Intervention

Statements in this theme provided rich, detailed feedback on the "choices" cafeteria intervention, feedback which supported our previously reported quantitative results. In this theme we see positive reactions of both students and staff to the intervention; although it was

more work for the cafeteria staff, they had only positive things to say about it. In fact, most students and staff were sad to see the intervention end. Students, especially, were empowered by the intervention and not only wanted it to stay, but expressed a desire for increased choice within the school lunch program.

From student interviews we see that students, specifically in the younger grades, viewed the "choice item" as a "bonus item," even though it was technically the same amount of food they used to get before the intervention. Perhaps it was the novelty of the container or the way in which it was presented to students, either way, this was an unintentional positive by-product of the intervention and undoubtedly led to excitement about the intervention. Both students and adults report that they were able to make the necessary behavioral changes to make the intervention work; the lunch line was not significantly slowed, and observers saw several interesting peer interactions that took place on the lunch line, with students encouraging each other to choose certain fruits and vegetables.

Another unanticipated by-product of this intervention was the increased mobility of fruit and vegetable servings; while we were collecting quantitative data, we often saw students walk by with two or three empty fruit containers during the intervention period. Since we were not prepared for that outcome we recorded it simply as "ate 100% of one serving." These interviews allowed us to understand how this was happening; the intervention not only raised individual student consumption, but it cut down on waste because the students who choose not to eat their fruit and vegetables could now give those items away, instead of throwing them directly in the trash.

DISCUSSION

School districts across the country are currently working on implementing the new, healthier guidelines for school lunches. The 2010 legislation (put into action at the beginning of the current school year) marks the first major overhaul of the National School Lunch Program in nearly 15 years, and it brings many challenges to food service providers in terms of adjusting how they plan, order, and serve food to over 32 million kids, nationwide (USDA, 2012b). These changes to the nutritional quality of foods served, while informed by the Institute of Medicine, fail to address actual student consumption behavior.

Consistent with previous research and literature, students in our study had a higher baseline consumption of fruit than they did of vegetables (excluding potatoes as a vegetable; Perry et al, 2004; Rasmussen et al., 2006). However, high rates of plate waste were still documented in the intervention school. At baseline, the students in the intervention school wasted, on average, 51.74% of fruits and 81.29% of vegetables. The "choices" cafeteria intervention produced an average daily increase of 15% of fruits and 15.6% of vegetables consumed as part of the National School Lunch Program. These results suggest that setting-level interventions, such as the one used here, can have a measurable impact on the effectiveness of the National School Lunch Program.

Implied in these findings is the basic concept that students will eat more when they are: A) given an active role in deciding what they will eat, and B) allowed to choose foods according to preference. Setting up a bound choice for students, e.g., allowing them to choose between different types of vegetables, instead of between vegetables or a side of potato chips, is a safe way to encourage consumption of healthy foods. Plus, it gives students practice making healthy

decisions, something that will hopefully spill over onto their post-school dietary habits, and it has a strong impact on student perceptions of the school lunch.

Further, as the qualitative results show, students who participated in this intervention felt empowered by it; at the local level, they began to express their opinions about the food and issues related to the school lunch, and requested an increased amount of decision making power within the school lunch program. Increasing their decision making, it seems, is akin to increasing their buy-in to the program. The introduction of choice into this particular school's lunch program altered the behavior setting and behavior patterns of students in a positive way, these positive changes extended to include the students' attitudes about the school lunch as a whole.

Although this intervention was done within a "serve" model, it could easily be transported into a schools that operate within the "offer" model as well. Considering the cost of wasted food each day, this was a relatively cheap and efficient environmental intervention. The costs associated with the intervention were the price of the containers (5 cents each), which was deemed negligible by the school district, and staff time, which was necessarily reallocated in order to pre-package the fruits and vegetables. No additional staff time, over and above what had been required in the control condition, was needed during implementation. Pre-planning and meetings with the cafeteria staff all contributed to ensuring that food waste not wasted on the back end of the service delivery, as this waste would have offset any potential cost savings to the district.

Additionally, it is important to note that since school lunch menus are largely left up to the local districts themselves, it is probable that there are already schools operating under a form

of this hybrid model: make the students take the foods, but offer them a choice within the designated category. For those schools, there is now data to support their decisions.

The success of this ecologically-grounded intervention can be used to inform future cafeteria-based research. Ideally, future interventions aimed at increasing fruit and vegetable consumption in the cafeteria setting will utilize multiple environmental tweaks, with the understanding that intervening on more than one level (e.g. combining the presence of "active choice" with another setting-level modification, for example, a longer lunch period) has the potential to produce larger increases in consumption. The qualitative interviews included in this study are a great source of ideas for future interventions, as they shed light on the experience of eating in the school cafeteria from the perspectives of both students and staff.

Limitations

When doing research on eating behaviors, the goal is to examine the behavior with as minimal interference in the setting as possible. Thus, the researchers chose to take a random sample of students pre-intervention and during the intervention. In order to remain unobtrusive, these samples were not matched pre/post. However, theoretically, a matched sample might provide more insight into the effects that the intervention had on eating behavior.

Another limitation to this study regards patterns in student consumption of vegetables. Although the intervention produced measurable increases in the amount of vegetables consumed (15.6%), this number is substantially decreased when one controls for the type of vegetables: cooked vs. raw. Understanding the intervention design is essential to interpreting this confounding factor.

In an effort to match the cafeteria environment pre-intervention, researchers created the "choice" items based off of fruits and vegetables that were already being served to students.

Because the choice items needed to be pre-packaged, the numerous hot, cooked vegetables that students had been served previously could not be included as choice items during the intervention. This affected the data in two ways: first, it limited the number of options that were available on days when vegetable was the choice item. Second, since students ate less of the hot vegetables to begin with, using only cold vegetables during the intervention artificially inflated the consumption rate for vegetables.

Reanalyzing the vegetable sample using only the pre-intervention observations where students were served cold vegetables (n=263, over 4 separate observation days), the intervention still produces significant increase in consumption during the choice/intervention period, $t(681)=2.13$, $p < .05$. However, the magnitude of this increase is smaller (6.76% increase versus a 15.6%). The demonstrated difference in consumption patterns between cooked (hot) and raw (cold) vegetable items will be useful in understanding overall consumption behavior and providing recommendations to meal planners at the schools.

TABLE 10

FRUIT AND VEGETABLE OPTIONS OFFERED DURING THE INTERVENTION

	Fruit Choices	**Vegetable Choices**
	Apple Slices	Baby Carrots
	Apricots	Broccoli
	Banana	Cucumbers
	Fruit Cocktail	Salad
	Grapes	
	Kiwi	
	Orange Wedges	
	Peaches	
	Pears	
	Tropical Fruit	
Total	11 Fruit Options	4 Vegetable Options

The last limitation to report is the time frame of the study. At the start, the intentions of both the researchers and the school district were to implement the "choices" intervention for a full six month period (January 2011 - June 2011); this would have allowed an assessment of initial behavior change, as well as follow-up assessments to determine whether or not the

effectiveness of the "choices" intervention waned over time. However, in the middle of January, the district's nutrition services department was given the new guidelines from the USDA for school lunches, and had to switch its focus towards planning the next year's lunches to meet new federal guidelines. The amount of work associated with this reform was unprecedented, and unfortunately, it meant that the intervention was stopped short. Although follow-up data is not available in this situation, the delayed data collection process (discussed in the Methods Section) that was used should address any concerns related to the "novelty" of the intervention.

Methodologically, the next step is to test this intervention in a larger population, with a separate, designated control school. This will help researchers understand if the intervention can be generalized to other populations and if the increases in consumption are robust, and worth the added effort. Additionally, more testing is necessary to ensure that other schools can successfully adopt the "choices" intervention in a way that does not create excess waste on the back-end of the cafeteria.

Conclusion

While access to fruit and vegetables is crucial, access itself is not enough to change eating behaviors. If we want to make a large, population-based impact on childhood obesity, work needs to be done to ensure that the environments children learn, live, play and eat in are setup to encourage consumption of healthy food; the school cafeteria is one of the most critical settings in this battle, and it is a setting that we, as policy makers and researchers, have the most potential to influence.

While the new National School Lunch guidelines have students' health in mind, schools and school districts should take a step back from the nutritional value of the food itself and examine the aspects of the school "lunch experience" that may be negatively influencing

students' eating behaviors within the cafeteria setting. It's not only the food that matters; we heard from both students and staff in our interviews, and both parties identified several setting-level factors that influences their lunch experience, and the likelihood that they actually eat what they are being served. These aspects, whether it is the time set aside for lunch or the way in which behavior is regulated in the cafeteria, need to be given as much weight as the nutritional quality of the food is given, if we truly want to see changes in student eating behavior.

As we saw in this study, the "choices" cafeteria intervention, combined with other "tweaks" to the cafeteria environment (some of which were mentioned during our qualitative interviews) can be coupled to encourage students to eat the food prepared for them by the School Lunch Program. Specifically, the changes in consumption patterns seen in this intervention will add up across weeks, months and years – and have a potential to positively influence students' weight status and overall health. Changing the choice architecture in cafeteria settings across the country to ensure that students have an active choice in what they eat on a daily basis has the potential to raise consumption of fruits and vegetables at the national level, improve the effectiveness of a service (the National School Lunch Program) that is already reaching millions of American school children, and prove that small, ecologically-based changes to everyday environments can have a significant positive impact on the rising childhood obesity epidemic.

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APPENDICES

APPENDIX A
INFORMED CONSENT – INTERVIEW PARTICIPANTS

WICHITA STATE UNIVERSITY
Fairmount College of Liberal Arts and Sciences
Department of Psychology

WICHITA STATE UNIVERSITY

TITLE OF STUDY: **Nutrition, Choice, and the School Cafeteria**

INVESTIGATORS:
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Graduate Student
Department of Psychology
Wichita State University
316-978-3170

Protocol number:

PURPOSE: You are being asked to participate in an interview discussion designed to explore your understanding of the school cafeteria and students' eating behaviors within that environment.

PARTICIPANT SELECTION: Fifteen individuals have been asked to participate in individual interviews. Individuals have been identified by Horace Mann administration or USD 259 Nutrition Services as people who would have a unique insight into the cafeteria setting at Horace Mann school. Participants include students, teachers, cafeteria staff, school administrators, and USD 25D Nutrition Services staff.

EXPLANATION OF PROCEDURES: This discussion will take approximately 45 to 60 minutes of your time. The interview will be audio taped. We will ask you to talk about your perceptions of the cafeteria environment at Horace Mann, students' eating behavior, and your understanding of how one affects the other.

DISCOMFORT/RISKS: There are few risks associated with participating in this discussion. Participation is your choice and is completely voluntary. If any question causes you discomfort, feel free not to answer it.

COMPENSATION OR TREATMENT: Wichita State University does not provide medical treatment or other forms of reimbursement to persons injured as a result of or in connection with participation in research activities conducted by Wichita State University or its faculty, staff, or students. If you believe that you have been injured as a result of participating in the research covered by this consent form, you can contact the Office of Research Administration, Wichita State University, Wichita, KS 67260-0007, telephone (316) 978-3285.

BENEFITS: There are no direct benefits of participating in this discussion, although we hope that our results will be useful to both USD 259 and Horace Mann Dual-Language Magnet School in their mission to serve their students healthy meals.

CONFIDENTIALITY: Identifying participant information will not be shared outside of the research team. The information collected from this research project will be kept confidential. Information will only be available to the research team and no names or identifying characteristics will be included in presentations or publications. Only the investigators and the Institutional Review Board at Wichita State University will have access to interviewer notes or audiotapes of this interview.

You will be given a copy of this consent form for your records.

COSTS/COMPENSATION: There will be no cost to you; you will not be compensated for your participation in this interview.

REFUSAL/WITHDRAWAL: Participation in this study is completely voluntary. Signing this form says you voluntarily chose to participate. You may refuse to participate in the discussion and decide to stop at any time. Doing so will not affect your relationship with Wichita State University.

_____

Signature of Participant Date

_____

Signature of Parent or Legal Guardian Date

_____

Signature of Witness Date

October 2011

APPENDIX B
YOUTH ASSENT FORM – INTERVIEW PARTICIPANTS

WICHITA STATE UNIVERSITY
Fairmount College of Liberal Arts and Sciences
Department of Psychology

WICHITA STATE UNIVERSITY

I have been told that my parents (mom or dad) have said it's okay for me to participate, if I want to, in a discussion about what I eat at school for lunch.

I know that I can stop at any time I want to and it will be okay if I want to stop.

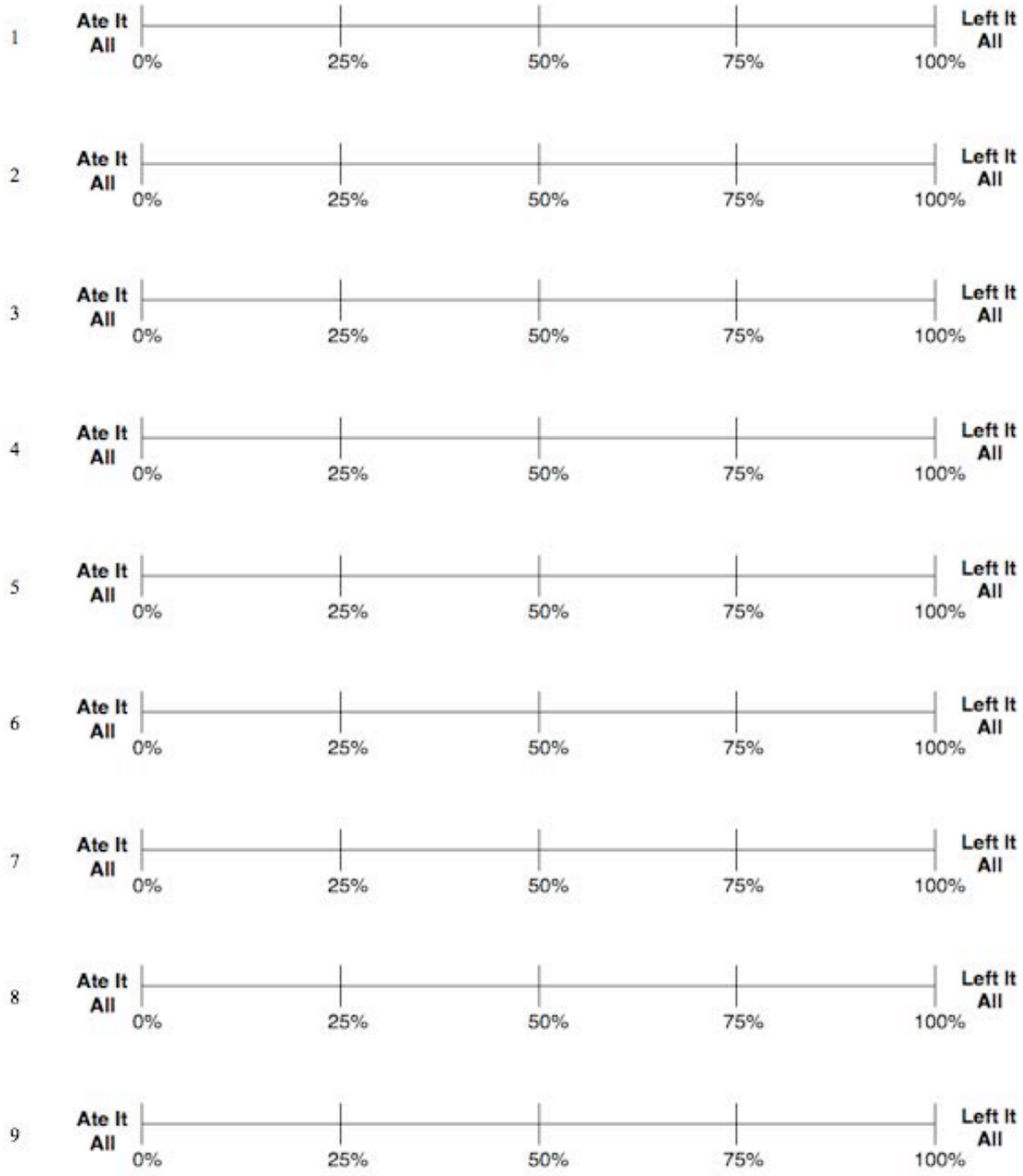
_____

Name Date

Wichita State University, Wichita, Kansas 67260-0034 Telephone: (316) 978-3170 Fax: (316) 978-3086
www.wichita.edu

October 2011

APPENDIX C
VISUAL DATA COLLECTION FORM FOR FRUITS AND VEGETABLES



APPENDIX D
SAMPLE QUALITATIVE INTERVIEW QUESTIONS

Students

- How often do you eat the school lunch?
- Do you like eating the school lunch? If so, what do you like about it?
- Here are some pictures of the fruits and vegetables that you are served with lunch at school.
- How many of these can you name? Which are your favorites? Which do you eat at home?
- Right now, the school is allowing you to choose the fruit or vegetable that you like the most to eat with lunch. What do you think about that?
- Imagine I am a new student who has never been to your school, tell me about the school
- cafeteria. What is it like? How is it to eat lunch there?
- What kinds of meals do you eat at home? How are the meals you eat at school similar or different to the ones you eat at home?

Cafeteria Staff

- You spend more time in the lunch room with students than anyone else. Please share your perspective on student behavior and eating habits in the cafeteria.
- Does student behavior change depending on what is served?
- What is the atmosphere in the cafeteria like? Do you think it's enjoyable for students to eat lunch there?
- How would you characterize students' feelings towards the school lunch?

Teachers and Administration

- You talk to and see the students more than anyone else. How do you think they perceive the school lunches?
- How does the school lunch program fit into your school's wellness plan? What other wellness activities do you do as a school, or as a classroom?
- Intervention Follow Up: Overall, do you think the students enjoyed making a choice?
- Intervention Follow Up: Did you hear any feedback, positive or negative, from students or parents about the way that the program was implemented?

Nutrition Service Employees

- You are in charge of preparing the students' lunch each and every day. What perspective do you have on what students like to eat, what they don't, and how to help them to eat healthily?
- The students in this school primarily come from Hispanic/Latino backgrounds, whereas this isn't true for the rest of the district. How do you think the students' cultural background plays into their preferences and eating habits?
- The "choices" intervention cut down on food waste on the student end - as more students were consuming their fruit or vegetable - and if not, they were sharing them with others. Did it create any extra waste in the kitchen? How did you manage this?
- Can you bring me through the process of planning, ordering, and delivering the school meals?
- Please describe the larger "food service environment" that the intervention school is a part of.