

**Apples and Autonomy:
Improving Nutrition Education to Maximize Fair Equality of Opportunity**

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Abstract: Recent increases in children's food autonomy present both a problem and a promise for school nutrition education programs: greater food autonomy makes these programs all the more important, but how can we improve their effectiveness? While current programs have been shown to improve children's health knowledge, long-term behavioral changes are minimal. Ameliorating childhood obesity through nutrition education is more than a public health concern, it is an issue of justice: an equitable distribution of the social determinants of health will help to ensure Fair Equality of Opportunity for all children, creating a more just society. In this paper, I propose redevelopment of school nutrition education programs to incorporate educational psychology tenets such as Bandura's Social Learning Theory and best practices for habit formation and long-term retention. If these practices are implemented, educators can develop a solid health knowledge base in elementary school children that will translate into healthy habits as they age and gain greater food autonomy. We must collaborate with community members to ensure minimal paternalism and maximum parental support for these programs, while maintaining respect for important cultural food practices. In order to reach our goal of improving children's health, future research should focus on how to effectively create community-centered school programs that are both financially sustainable and culturally acceptable.

I. Introduction

Destiny grinned at her cousins during the town's annual Kool-Aid Pickle Eating Contest in early July, debating the merits of strawberry versus grape flavored pickles. Energetic volunteers from Main Street Helena, a downtown revitalization organization, announced the winners of each age category over the loudspeaker. At age three, Destiny already had a mouth full of silver teeth from being put down for naps with sugary soda in her bottle.

"Eat all day," Brady responded when asked what he does for fun during the summer. His great-grandmother, known as "Grandma Rosie" to everyone in the neighborhood, stood nearby, beaming with pride behind her catering table that advertised the best soul food in town. While the farmer's market sold locally grown fruits and vegetables, her candied yams, pulled pork, and fried catfish were always the first to sell. At the next table, volunteers from a community health agency painted Spiderman and The Hulk on children's faces and passed out healthy recipes to parents.

Children at summer day camp ate prepackaged cinnamon rolls and drank apple juice, intermittently getting up to purchase chips at the snack counter, while public health professionals in scrubs tried to teach them about the importance of eating whole grains and vegetables. The women told the children that a healthy diet would improve their basketball abilities, but the children seemed more interested in the free pencils and stickers than the MyPlate emblem they bore. Meanwhile, across town, the children's more affluent white counterparts performed science experiments at a camp called "Destined to be Doctors." Due to Helena's history of residential segregation and the mass enrollment of white students into private Lee Academy in neighboring Marianna, it is unlikely that these children's lives will ever intersect, despite their geographical proximity ¹.

These are the children I met during my summer in Helena, Arkansas, as a nutrition educator focused on preventing childhood obesity. Nationally, the childhood obesity rate is 17%, but for African American children like Brady, Destiny, and most of their fellow campers, the rate is even higher at 19.5%, which widens pre-existing race-based health

¹ Lancaster, "Marianna (Lee County)."

outcome disparities ². Another negative predictor of these children's health outcomes is their parents' socioeconomic status: children with household incomes below the federal poverty level are 2.7 times more likely to have obesity than children whose household incomes exceed 400 percent of this level ³. For reference, the 2017 federal poverty level for a family of four is an annual income of \$24,600 ⁴. Children suffering from obesity are at increased risk for diseases previously thought to be confined to the adult population, such as Type II diabetes, high cholesterol, and hyperlipidemia, which reduce their overall quality of life. The health services required to treat these chronic conditions contribute an estimated \$147 to \$210 billion dollars in preventable healthcare spending, demonstrating just how massive of a burden obesity-related diseases place on the healthcare system ⁵.



Figure 1: Vendors setting up their stands at the farmer's market in Helena, AR where I met Brady and his great-grandmother.

So how can we best address the growing problem of childhood obesity? Many public health officials have turned towards the public schools, where children spend most of their waking hours and eat at least one meal per day. The resulting nutrition education programs in schools have taken numerous forms, most notably the MyPlate curriculum

² "Childhood Obesity Trends."

³ *ibid.*

⁴ "Federal Poverty Level (FPL)."

⁵ "Childhood Obesity Trends."

championed by former First Lady Michelle Obama. At first glance, it may seem counterproductive to place such a large emphasis on educating children on issues of nutrition, since children typically do not grocery shop or cook for their families. For these reasons, children's ability to act on their health knowledge is somewhat constrained. However, we are currently living in an era of increasing food autonomy for children. Marketing agencies have certainly taken note: due to the rise in food advertising directed towards children, a child's first request for a specific food product occurs, on average, at just 24 months of age ⁶. This presents both a problem and a promise: increasing food autonomy makes school nutrition education programs all the more important, but how can we effectively engage children in learning this information and acting upon it? The stakes are high, but so is the potential for improved childhood health.

With this dichotomy in mind, it is essential to evaluate the effectiveness of school nutrition education programs and improve them where necessary. Based on a survey of the literature, current programs appear to improve children's health knowledge (for example, their ability to categorize foods into food groups). However, the evidence that they actually improve physical health remains inconclusive. If they fail to positively influence the more important of the two outcome metrics, nutrition education curricula should be improved using psychological tenets such as Bandura's Social Learning Theory. Additionally, habit formation, long-term retention, and increased parental involvement may be able to promote healthy choices even after school nutrition programs have ended. If we can understand the problems associated with current nutrition education programs, we can work to improve their influence on children's health. In this paper, I will first describe the particularly negative consequences of poor nutrition on children. Then, I will use a Rawlsian perspective to argue that we have a moral obligation to more equitably distribute the social determinants of health to maximize Fair Equality of Opportunity.

II. Negative Impacts of Poor Nutrition on Children's Health

For the purposes of this paper, I will use the guidelines of the Centers for Disease Control and Prevention to define childhood obesity as the following: a child with a BMI between 85th and 95th percentile is "overweight," and a child with a BMI above the 95th

⁶ Story and French, "Food Advertising and Marketing Directed at Children and Adolescents in the US."

percentile is “obese.” This percentile-based definition is more appropriate for children than the numerical BMI ranges used for adult diagnoses, because it takes into account that children are still growing and considers the fact that children grow at different rates based on their age and sex ⁷.

Why is childhood obesity a problem? Research by the Academy of Nutrition and Dietetics demonstrates that children who have obesity are more likely to suffer from problems such as hyperlipidemia, hypertension, insulin resistance, abnormal glucose metabolism, inflammation, and poor vascular function – the constellation of interrelated disorders known as “metabolic syndrome” ⁸. Additionally, children who suffer from obesity are at increased risk of bone and joint problems, asthma, obstructive sleep apnea, and liver and gall bladder disease. In girls, obesity tends to result in premature maturation, causing irregular menstrual cycles and fertility problems in adulthood ⁹. Furthermore, there are negative psychological consequences associated with childhood obesity: children who suffer from obesity frequently report reduced quality of life and bullying ¹⁰. Being rejected by their peers puts children at increased risk of developing eating disorders, depression, and substance abuse ¹¹. Finally, these problems do not stop after childhood: a child who has obesity between the ages of 10 and 13 has an 80% chance of having obesity as an adult. This continues the cycle of childhood obesity, as children with one parent who has obesity have a 50% chance of having obesity, and children with two parents who have obesity have an 80% chance of having obesity ¹².

III. The Obesity Epidemic and Social Determinants of Health

Since childhood obesity is linked to adult obesity and numerous negative health outcomes, maximizing Fair Equality of Opportunity as defined by John Rawls requires us

⁷ “Childhood Obesity Facts.”

⁸ Hoelscher, Kirk, Ritchie, and Cunningham-Sabo, “Position of the Academy of Nutrition and Dietetics: Interventions for the Prevention and Treatment of Pediatric Overweight and Obesity.”

⁹ “Overweight and Obesity.”

¹⁰ Hoelscher, Kirk, Ritchie, and Cunningham-Sabo, “Position of the Academy of Nutrition and Dietetics: Interventions for the Prevention and Treatment of Pediatric Overweight and Obesity.”

¹¹ “Overweight and Obesity.”

¹² “Obesity in Children and Teens.”

to ameliorate this epidemic ¹³. Rawls' argument is based on the concept of a Veil of Ignorance, behind which thoughtful, unbiased, free contractors would agree to certain Principles of Justice. One such principle is Fair Equality of Opportunity, which states that certain benefits, such as better-paid positions, should accrue to individuals regardless of irrelevant characteristics including race and sex ¹⁴. Contractors would agree to this principle because, behind the veil, they do not know which characteristics they might have. Other such principles agreed upon behind the veil include the Liberty Principle, in which all people are included in basic liberties, regardless of irrelevant characteristics, and the Maximin Principle, which states that a safety net must exist to make society's worst off as well off as possible through redistribution ¹⁵. I argue that children who suffer from obesity and its negative physical and psychological consequences are being deprived of the Fair Equality of Opportunity that justice requires. The repercussions associated with childhood obesity interfere with individuals' schoolwork, employment, and family life, preventing them from having Fair Equality of Opportunity to reach their full potentials. For example, a child who suffers from obesity may lack the capability of affiliation if she is bullied due to her size. This same child, if no intervention occurs, might later suffer from reduced bodily health if she develops heart disease or type II diabetes as a result of her excess weight, depriving her from being able to focus her full efforts on her career and family.

Thus, if some basic level of health is necessary to ensure Fair Equality of Opportunity, justice requires the Social Determinants of Health to be equitably distributed among all populations. This is Norman Daniels' extension of Rawls' work ¹⁶. By the "social determinants of health," I am referring to the distribution of services, goods, income, and power that results in a social gradient in which the lower a person's socioeconomic position, the worse her health ¹⁷. One example is residential segregation

¹³ Crooks, "Trading Nutrition for Education: Nutritional Status and the Sale of Snack Foods in an Eastern Kentucky School."

¹⁴ Rawls, "An Egalitarian Theory of Justice."

¹⁵ *ibid.*

¹⁶ Daniels, Kennedy, and Kawachi, "Justice, Health, and Health Policy."

¹⁷ Marmot et al., "Closing the Gap in a Generation: Health Equity Through Action on the Social Determinants of Health."

on the basis of socioeconomic status. The social determinant of housing, which one might not initially expect to affect health, can negatively impact health due to the inaccessibility of grocery stores at which to buy nutritious foods. I witnessed this during my summer in Helena: the neighborhood where I lived alongside many of the city's low-income residents had no grocery store. The nearest place to buy groceries is the Wal-Mart in West-Helena, a 10-15 minute car ride away in a neighboring city with no public transportation. Access to transportation is yet another social determinant of health. Traveling to Wal-Mart was often inconvenient or altogether infeasible for those without cars who lived in my neighborhood, forcing those families to purchase processed, packaged food at the nearby gas station. The limited accessibility of nutritious foods constrained my neighbors' choices, contributing to the disproportionate negative health outcomes seen in low-income neighborhoods.

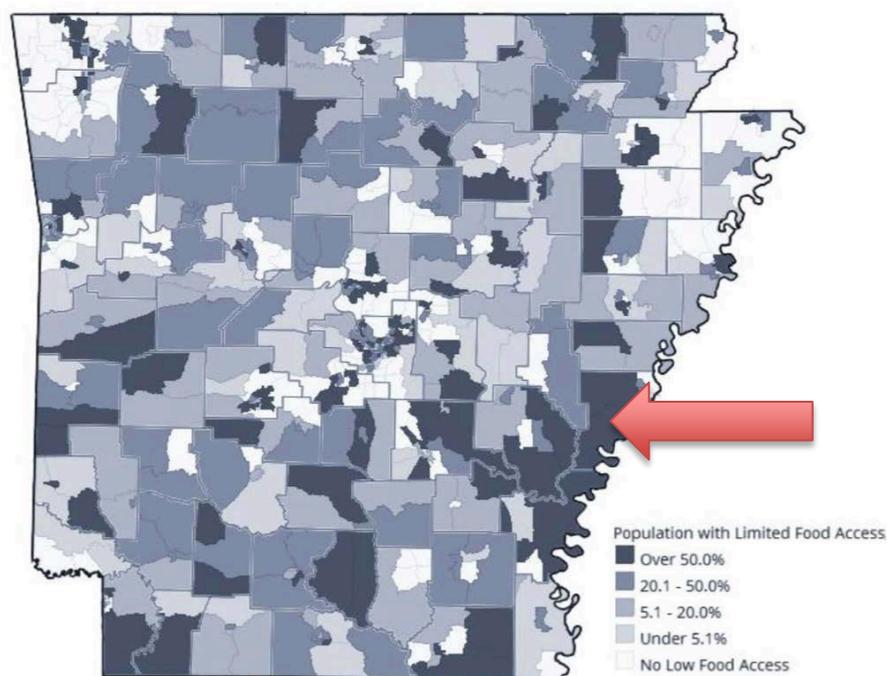


Figure 2: Arkansas Population with Limited Food Access, Percent by Census Tract¹⁸. Note Phillips County, where Helena is located, in dark purple to indicate over 50.0% of the population faces limited food access. Residing in a food desert is a negative social determinant of health.

¹⁸ Phillips, "Food Deserts."

Another example of a social determinant of health is access to high-quality education. Central High School, the only public high school in the Helena-West Helena school district, where 90% of students qualify for the Free Lunch Program and 4% qualify for Reduced-Price lunches, had a 0% pass rate on Advanced Placement exams in the 2013-2014 academic year ¹⁹. The best academic option in the area is the Knowledge Is Power Program (KIPP) Delta charter school, which has the same demographics as Central High School; however, charter school enrollment is based on a lottery system and there are not enough seats for the number of interested students. Additionally, children whose parents cannot or will not consent to KIPP's strict Parent Excellence Standards are not allowed to attend the school – these standards include checking the child's homework and reading together each night, informing the school if the child is to be late, "always" making oneself available to the school for communication purposes, and adhering to the school's dress code at all times ²⁰. Therefore, this opportunity is not available to all college-aspiring children in Helena, even if the school were to increase enrollment, because not all children have parents who are able to make these commitments, due to constraints such as long work hours and caring for other children in the family. This results in an unequal distribution of educational preparedness and achievement in Helena when comparing the children who attend Central versus those who attend KIPP. Higher educational attainment is, in turn, associated with more positive health outcomes due to reduced exposure to chronic stress and improved ability to navigate the healthcare system ²¹. According to Rawls and Daniels, we have an ethical obligation to equitably redistribute the social determinants of health such as housing, transportation, and education to ensure basic standards of health, and therefore Fair Equality of Opportunity, for all people. I am focusing specifically on the intersection of health and education by advocating that all children have access to high-quality nutrition education programs at school.

¹⁹ "Central High School in West Helena, AR."

²⁰ "Commitment to Excellence."

²¹ Zimmerman, Woolf, and Haley, "Understanding the Relationship Between Education and Health."



Figure 3: Daniels' extension of Rawls' definition of justice as fairness.

While some might attribute the racial discrepancies in childhood obesity to biological causes, Michael Marmot, Professor of Epidemiology and Public Health, explains that this inequitable distribution is *not* a natural phenomenon but rather stems from poor policy choices and the social determinants of health ²². Considering that the obesity epidemic only took a few decades to skyrocket, Marmot argues that it is not biologically plausible to assume that the gene pool has shifted so much in so little time. Beyond the biological argument, others may be inclined to place the blame entirely on parents; however, I argue that while parents have some degree of responsibility, low-income families are disproportionately constrained by negative social determinants of health, as I frequently saw during my time in Helena. That being said, childhood obesity should not be oversimplified as simply a matter of poor parenting. By acknowledging that neither biological factors nor parenting techniques are fully at blame for childhood obesity, we must then turn our attention to the influence of social and political institutions. If minimizing childhood obesity *is* within the realm of our control, which evidence seems to suggest, this puts even more responsibility on society as a whole to ameliorate the obesity epidemic.

Furthermore, reducing childhood obesity would lessen the financial burden of obesity-related diseases on our healthcare system and labor market. In addition to the

²² Marmot et al., "Closing the Gap in a Generation: Health Equity Through Action on the Social Determinants of Health."

aforementioned estimated \$147 to \$210 billion dollars in preventable healthcare spending attributed to the obesity epidemic, there is a huge loss of contribution to the labor market due to illness and premature death. The Centers for Disease Control and Prevention recently published that non-communicable chronic illnesses such as diabetes, heart disease, and stroke are the leading cause of death and disability in the United States, with about half of all adults (117 million people) suffering from one or more chronic health conditions. Approximately one in four of these people report that they cannot perform one or more daily activities, preventing them from leading normal lives. As a result, 86% of the U.S.'s annual healthcare spending is related to chronic disease ²³. Judiann McNulty, a consultant specialist who focuses on maternal and child health and nutrition, estimates that 12.5 million Disability-Adjusted Life Years have been lost in the Americas due to nutrition-related non-communicable diseases, plus an “incalculable loss of human potential and social and economic development” ²⁴. Efforts to combat this loss are causing increases in government spending: the U.S. Department of Health and Human Services has allocated \$8,000,000 for Chronic Disease Self-Management and \$73,000,000 for Heart Disease and Stroke Prevention Programs in 2017 ²⁵. Therefore, I argue that in order to maintain optimal economic productivity and reduce the burden of excessive healthcare spending, we must combat obesity starting from a young age. It is more logical and cost-efficient to address health issues in children, before they become sick, than to spend large sums putting temporary fixes on our increasingly unhealthy adult population. Since I am focusing on schools in this paper, I define “children” as five through 18-year-olds who attend school. I acknowledge that nutrition interventions dealing with maternal, pre-natal, and infant health are also necessary, but I will focus on elementary through high school students because these programs are already in place and simply need to be improved rather than established from the ground up. When we take into account the fact that most schools already have nutrition education programs included in their budgets, it

²³ “State Public Health Actions to Prevent and Control Diabetes, Heart Disease, Obesity, and Associated Risk Factors and Promote School Health.”

²⁴ McNulty, *Challenges and Issues in Nutrition Education*.

²⁵ “Prevention and Public Health Fund.”

is logical to ensure that this money is used as efficiently as possible by maximizing program effectiveness.

IV. School Nutrition Education Programs are Crucial to Reducing Childhood Obesity

Having established our Rawlsian obligation for ameliorating childhood obesity, I recognize that some might argue that fulfilling this duty should focus on popular food providers instead of schools. A successful example of this is the Alliance for a Healthier Generation's 2013 partnership with McDonald's, in which McDonald's agreed to five commitments to increase customers' access to fruits and vegetables and improve the availability of nutritional information. One such commitment was to feature only water, milk, and juice as drink choices in Happy Meals, which contributed to the company serving 21 million additional milk jugs and juice boxes from July 2014 to May 2015 ²⁶. While I admire this success, I believe that both public and private sector prongs are crucial. In the words of educationalist and philosopher Nel Noddings, "the massive human problems of society demand holistic treatment" – combatting childhood obesity requires collaboration among schools, families, and providers ²⁷. Although there are certainly other ways to address the childhood obesity epidemic, I am choosing to focus on schools: since children eat at least one meal per day at school and participate in physical activity during recess and physical education classes, schools present the perfect opportunity to combine learning and practice, an opportunity that some children do not find elsewhere. While I recognize that food accessibility and cost continue to constrain many families, school nutrition education programs are a good place to start because, as anthropologist Deborah Crooks has noted, schools are a "primary source of learning about nutrition and appropriate diet through classroom teaching *and* they provide a venue for modeling and practicing those lessons during the school day" ²⁸. Thus, in order to promote Rawls' principle of Fair Equality of Opportunity, we ought to improve the effectiveness of school nutrition education programs.

²⁶ "McDonald's and Alliance for a Healthier Generation Announce Progress on Commitment to Promote Balanced Food and Beverage Choices."

²⁷ Noddings, "What Does It Mean to Educate the Whole Child?."

²⁸ Crooks, "Trading Nutrition for Education: Nutritional Status and the Sale of Snack Foods in an Eastern Kentucky School."

Furthermore, this question encompasses what we, as a society, view as the role of the public school system. In his paper on enhancing school-based prevention and youth development, psychologist Mark Greenberg argues that “most educators, parents, students, and the public support a broader educational agenda that involves enhancing students’ social-emotional competence, character, health, and civic engagement”²⁹. This holistic approach to education is not new: historically, the role of U.S. public schools has included promoting the health and overall well-being of students. For example, in the National Education Association’s 1918 report on the seven aims of public schools, “health” is listed as the very first goal³⁰. More recently, the Centers for Disease Control and Prevention presented their “Whole School, Whole Community, Whole Child (WSCC)” model for improving school health³¹. This approach promotes learning, childhood health, and the school as a “reflection of the local community”³². If holistic education is truly our aspiration and has been for decades, this further suggests that we have a moral obligation to develop more effective school nutrition education programs. With this in mind, I will now turn to an evaluation of existing nutrition education programs in schools and how they can be improved.

V. Current Nutrition Education Programs Improve Students’ Knowledge

Most public schools in the U.S. mandate nutrition education classes; for example, Arkansas has nutrition curricula in place each year from kindergarten through eighth grade and requires a semester of nutrition education in high school³³. Many of these programs have been shown to effectively improve students’ knowledge of topics such as the relationship between diet and health, dietary guidelines, and nutrients found in foods. In 2001, Perez-Rodrigo et al. published in the *Journal of Public Health Nutrition* a comprehensive study of the outcomes of ten nutrition education programs, including the popular Coordinated Approach to Child Health (CATCH) curriculum that has been

²⁹ Greenberg et al., “Enhancing School-Based Prevention and Youth Development Through Coordinated Social, Emotional, and Academic Learning.”

³⁰ Noddings, “What Does It Mean to Educate the Whole Child?”

³¹ “Whole School, Whole Community, Whole Child (WSCC).”

³² *ibid.*

³³ “Physical Education and Health.”

implemented in 10,000 schools and communities across the U.S. ³⁴. Based on pre- and post-tests using control and experimental groups, all of the evaluated programs were found to improve students' knowledge of nutrition to some extent ³⁵. Another successful example is Spice MyPlate, a version of the U.S. Department of Agriculture's MyPlate curriculum tailored to urban, predominately African-American high school students. The program emphasizes flavor enhancement and the use of spices and herbs to improve students' diets. In a 2016 study, the group that received Spice MyPlate classes demonstrated improved attitudes towards healthy foods (measured by the question, "How likely are you to eat the following foods?") compared to the group that received the generic MyPlate curriculum ³⁶. Another successful program has been the Centers for Disease Control and Prevention's Eagle Book Series, which was originally implemented in Native American communities but has now spread. The books' protagonist, Rain That Dances, and his friends Thunder Cloud, Little Hummingbird, and Simon learn healthy habits from a wise eagle. The books' authors hope to prevent type II diabetes by inspiring readers to find joy in physical activity and healthy eating, while respecting traditional Native American lifestyles. A 2015 study found that after a five-week Eagle Book Series program, children remembered the books' content and, more importantly, they were able to share those messages with their peers and family members ³⁷. Overall, children who participate in existing nutrition education programs seem to improve their knowledge of topics related to nutrition and health, and may even become ambassadors of this information in their communities.

VI. Why Current Nutrition Education Programs Do Not Improve Long-Term Health

However, I contend that these programs are not effectively combating childhood obesity. Despite their demonstrated ability to improve students' knowledge, many current nutrition education programs are not empirically proven to benefit students'

³⁴ "About CATCH."

³⁵ Pérez-Rodrigo and Aranceta, "School-Based Nutrition Education: Lessons Learned and New Perspectives."

³⁶ D'Adamo et al., "Spice MyPlate: Nutrition Education Focusing Upon Spices and Herbs Improved Diet Quality and Attitudes Among Urban High School Students."

³⁷ Fredericks, Lin, and Ektheerachaisakul, "Kids Food Reboot: a Campaign to Reboot What Kids Eat Using Social Media."

physical health. For example, the aforementioned Perez-Rodrigo study found that after three years, the CATCH curriculum did not produce significant changes in students' serum cholesterol levels, blood pressure, or BMI ³⁸. While I acknowledge that these are imperfect metrics, the fact that there were no improvements in any of the three categories leads me to believe that the program had little to no effect on the children's health. In the 2016 Spice MyPlate study, the only behavioral changes in the experimental group were modest increases in lean protein and whole grain consumption, with no effects on fruit, vegetable, or low-fat dairy intake ³⁹. If children do not apply what they have learned to make healthy lifestyle choices, the programs are not serving their intended purpose of reducing or preventing obesity.

Why are these programs improving knowledge but not impacting students' health outcomes? There are a number of problems present across socioeconomic statuses; translating health knowledge into action is a difficult task that is not confined to children from low-income families. Firstly, unsupportive school environments undermine nutrition education programs in schools, acting as a barrier to their overall effectiveness. In his paper on enhancing school-based prevention and youth development, psychologist Mark Greenberg elaborates on "insufficient coordination with other components of school operations" ⁴⁰. Examples include the sale of unhealthy snack foods to supplement schools' tight budgets, as well as the à la carte sale of desserts and fried foods in school cafeterias that do not comply with guidelines set forth by the National School Lunch Program ⁴¹. In his study of the CATCH curriculum, Professor of Public Health Guy Parcel calls for a process of "institutionalization" in which nutrition education programs become an integral part of schools and their missions, resulting in coordinated, well-planned, and multi-year programming ⁴². In order to do this, school officials must be willing to commit

³⁸ Pérez-Rodrigo and Aranceta, "School-Based Nutrition Education: Lessons Learned and New Perspectives."

³⁹ D'Adamo et al., "Spice MyPlate: Nutrition Education Focusing Upon Spices and Herbs Improved Diet Quality and Attitudes Among Urban High School Students."

⁴⁰ Greenberg et al., "Enhancing School-Based Prevention and Youth Development Through Coordinated Social, Emotional, and Academic Learning."

⁴¹ Crooks, "Trading Nutrition for Education: Nutritional Status and the Sale of Snack Foods in an Eastern Kentucky School."

⁴² Parcel et al., "School Climate and the Institutionalization of the Catch Program."

multiple years to classroom time and staff training ⁴³. In 2013, the Academy of Nutrition and Dietetics published a survey of nutrition education programs and found that the most successful interventions at achieving changes in health combine education with institutional modifications, allowing students to practice what they are learning within the school environment itself ⁴⁴. In this article, Professor of Public Health Deanna Hoelscher argues that in an ideal nutrition education program, “children are taught about healthy eating and physical activity while [being] provided healthy foods and more opportunities for physical activity” ⁴⁵. This issue remains challenging as school officials must decide how much time and resources to devote to staff training and classroom programs – nutrition education programs must be reasonable enough to implement without causing undue burdens on schools, but stringent enough to create real, lasting change in students’ health ⁴⁶.

A second barrier to effective nutrition education is that many educators fail to tailor their programs to their specific audience. Program designers and implementers ought to take into account factors such as the audience’s age, cultural eating preferences, and socioeconomic status ⁴⁷. This type of audience-specific tailoring was present in the aforementioned Spice MyPlate and Eagle Book Series, but these two programs are exceptions in nutrition education, not the rule. In her evaluation of an online MyPlate program, dietician Elizabeth Jackson notes that constraints such as the cost and accessibility of healthy foods are not addressed. She fears that “when these issues are ignored, teens are likely to find the material irrelevant” and will memorize the information for testing purposes but fail to translate it into their daily lives ⁴⁸. To effectively engage children in culturally appropriate lessons, I advocate involving

⁴³ Perry et al., “The Child and Adolescent Trial for Cardiovascular Health (CATCH): Intervention, Implementation, and Feasibility for Elementary Schools in the United States.”

⁴⁴ Hoelscher, Kirk, Ritchie, and Cunningham-Sabo, “Position of the Academy of Nutrition and Dietetics: Interventions for the Prevention and Treatment of Pediatric Overweight and Obesity.”

⁴⁵ *ibid.*

⁴⁶ Perry et al., “The Child and Adolescent Trial for Cardiovascular Health (CATCH): Intervention, Implementation, and Feasibility for Elementary Schools in the United States.”

⁴⁷ Post, Haven, and Maniscalco, “Putting MyPlate to Work for Nutrition Educators.”

⁴⁸ Jackson, “Eat Smart! MyPlate and 2010 Dietary Guidelines.”

participants and community members in the creation of nutrition education programs. In his review of the World Health Organization's Commission on the Social Determinants of Health, WHO program manager Erik Blas notes that "successful engagement of target communities in decisions about how to address social determinants of health will increase the likelihood of policies and actions being appropriate, acceptable, and effective" ⁴⁹.

VII. Three Psychological Tenets for Improved Nutrition Education: Social Learning Theory, Habit Formation, and Long-Term Retention

With these current limitations in mind, my foremost suggestion for improving nutrition education programs is to inform educational practices using modern psychological theory. Nora Newcombe, a cognitive psychologist, has presented this idea in her numerous works on education. She argues that psychology should inform education in the same way biology informs medicine, with constant updates as new information is acquired, resulting in "Evidence-Based Education" ⁵⁰. This sentiment was echoed in a 2003 statement published by the U.S. Department of Education, which called for instruction to be guided by theory and rigorously evaluated by researchers in the field ⁵¹. Nutrition education programs should be developed and improved based on empirical evidence and psychological theory, rather than past tradition.

One guiding principle in education ought to be Albert Bandura's Social Learning Theory, which takes into account personal characteristics, behavioral factors, and environmental influences to improve students' self-efficacy ⁵². Self-efficacy is one's perceived control over a situation, which combines internal factors such as skill and knowledge with external factors such as the availability of resources ⁵³. For example, an educational campaign to increase fruit intake might attempt to increase self-efficacy

⁴⁹ Blas et al., "Addressing Social Determinants of Health Inequities: What Can the State and Civil Society Do?."

⁵⁰ Newcombe, "Biology Is to Medicine as Psychology Is to Education: True or False?."

⁵¹ Walters and Stacey, "Focus on Food: Development of the Cooking with Kids Experiential Nutrition Education Curriculum."

⁵² Powers et al., "Effects of a Nutrition Education Program on the Dietary Behavior and Nutrition Knowledge of Second-Grade and Third-Grade Students."

⁵³ Aarts, Paulussen, and Schaalma, "Physical Exercise Habit: on the Conceptualization and Formation of Habitual Health Behaviours."

regarding fruit consumption by showing how others have overcome their own barriers to fruit intake ⁵⁴. In the psychological literature, “extensive work based on self-efficacy theory has documented the critical importance of confidence in one’s ability to master the material being taught” ⁵⁵. One example of successful implementation of a Social Learning Theory-based nutrition education program was a 2005 study performed on 1,100 second- and third-graders in Alabama, in schools where at least 51% of students receive free or reduced-price meals. In this study, students in the experimental group were given a pre-assessment, six weekly nutrition classes, and a post-assessment. Using the tenets of Social Learning Theory, students were taught skills for selecting healthy foods at school *and* at home, which constitute behavioral factors that contribute to self-efficacy. Environmental factors included teachers modeling healthy behaviors in the cafeteria and posting messages about healthy eating on the walls. The students in the control group received only the two assessments. At the end of the trial, the experimental group showed significant increases in their consumption of juice at breakfast, vegetables and cheese at lunch, fruit at dinner, and fruit as a snack. They also demonstrated improved knowledge of food groups, nutrient-food association, and specific nutrients’ roles in the body. This study provides evidence that nutrition education programs informed by Bandura’s Social Learning Theory have the potential to be effective at improving both knowledge and health outcomes ⁵⁶.

⁵⁴ Brug, de Vet, de Nooijer, and Verplanken, “Predicting Fruit Consumption: Cognitions, Intention, and Habits.”

⁵⁵ Newcombe et al., “Psychology’s Role in Mathematics and Science Education.”

⁵⁶ Powers et al., “Effects of a Nutrition Education Program on the Dietary Behavior and Nutrition Knowledge of Second-Grade and Third-Grade Students.”

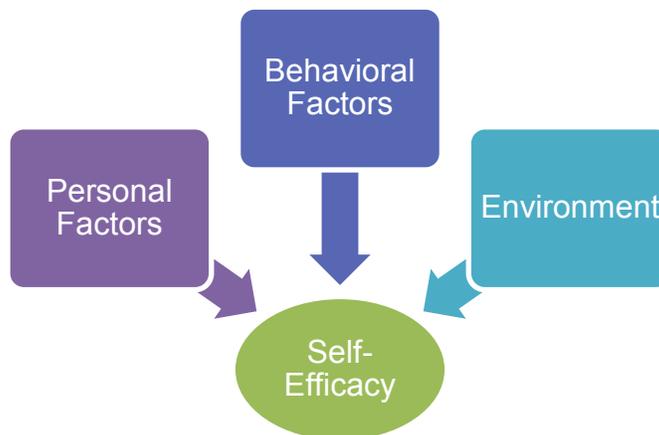


Figure 4: Bandura's Social Learning Theory describes three categories of factors that influence human behavior through self-efficacy.

Although not explicitly rooted in Bandura's Social Learning Theory, school gardens improve program effectiveness by increasing students' self-efficacy. School gardens are increasing in popularity, especially in California, where the State Education Department promotes the ideal of "a garden in every school." One successful example is the Edible Schoolyard at Martin Luther King Junior High School in Berkeley, a previously empty lot where students now grow food that is served in the cafeteria ⁵⁷. A survey of California fourth-grade teachers found that the majority of teachers feel that teaching using a garden is "moderately to very effective" in improving their students' science and social skills and "somewhat to very effective" at enhancing academic performance, physical activity, and healthful eating habits ⁵⁸. Another example is FIT For Kids, a garden-based nutrition education program that targets SNAP-eligible children ⁵⁹. As students' self-efficacy improves through the act of gardening, they are empowered to make better nutritional choices because they feel as though they have more control over their health.

⁵⁷ Ferris, Norman, and Sempik, "People, Land and Sustainability: Community Gardens and the Social Dimension of Sustainable Development."

⁵⁸ Graham and Zidenberg-Cherr, "California Teachers Perceive School Gardens as an Effective Nutritional Tool to Promote Healthful Eating Habits."

⁵⁹ Peterson, "FIT (Food Initiative Taskforce) for Kids: a Model for Garden-Based Nutrition Education Programming."

Cooking classes, which are highly recommended by the Centers for Disease Control and Prevention, are another way to increase students' self-efficacy ⁶⁰. Just as gardens can be used to teach scientific concepts about plants and growth, cooking classes can be tied into other academic subjects to make the most of school hours. For example, the CDC suggests practicing map-reading skills to locate the origins of foods, using math to measure and divide ingredients, and learning the chemistry behind cooking processes. These programs tend to elicit positive reactions from teachers: in a study of the Cooking with Kids program on 4,400 elementary school students in 12 public schools in Santa Fe, 98% of teachers said students learn about healthful food, 93% said students learn to become interested in new foods, and 66% would recommend the program to other educators ⁶¹. Educator satisfaction is important because teachers will be more likely to effectively and enthusiastically implement the program if they approve of it, resulting in more positive student engagement. Students also approve – after participating in an afterschool program called Common Threads Cooking Skills and World Cuisine, elementary and middle school students demonstrated improved attitudes based on their agreement with the following statements: I enjoy cooking at home; I tell my family about healthy eating; I show my family how to cook; and I prefer home-cooked food to fast food ⁶². In addition to these positive attitudes, cooking classes result in positive health outcomes: following participation in a cooking program for second- through sixth-grade Native American youth on reservations, 75% of parents reported their child eating more fruits and vegetables. Similar to the garden-based programs, the positive outcomes of cooking classes can be attributed to improving students' self-efficacy for selecting and preparing healthy foods ⁶³.

Since eating healthily requires long-term commitment, many nutrition educators continue to explore how to transform these behaviors into lifelong habits. Educators

⁶⁰ Walters and Stacey, "Focus on Food: Development of the Cooking with Kids Experiential Nutrition Education Curriculum."

⁶¹ *ibid.*

⁶² Egan, Hopkins, and Hingle, "Encourage Practice Inspire Change in Kids (EPIC Kids) Diabetes Prevention Program at the YMCA."

⁶³ Fredericks, Lin, and Ektheerachaisakul, "Kids Food Reboot: a Campaign to Reboot What Kids Eat Using Social Media."

ought to combine Bandura's Social Learning Theory with research underlying habit formation. In the psychological literature, habits are defined as behaviors that do not involve rational choice, but rather are automatically triggered by the specific situational cues that normally precede that behavior ⁶⁴. Because of this, nutrition education interventions should explore the creation of environmental triggers that act as cues for health-improving behaviors ⁶⁵. Habit formation is influenced by previous experiences performing that act: we repeat habits if we have satisfactory experiences with them, because each satisfactory experience more strongly associates the behavior with the goal we are trying to reach ⁶⁶. Habit formation also depends upon the nature of the task, how difficult it is to learn, and how much effort it requires ⁶⁷. The Journal of Health Economics recently published a 2016 study that demonstrates that even short-term incentives can produce positive changes in children's food choices that eventually become habitual and persist after the incentives have ceased. In 40 elementary schools, for either three or five weeks, students received a token worth \$0.25 in the school store, school carnival, or book fair if they ate a serving of fruits or vegetables at lunch. By the end of the trial, the original baseline of 39% of children who ate at least one serving of fruits or vegetables at lunch had doubled. Two months after the experiment ended, the three-week program schools were 21% above baseline and the five-week program schools were 44% above baseline ⁶⁸. The fact that these positive choices persisted even after the incentives ended provides evidence that they had become habitual, which increases their likelihood of improving the children's health over time.

Finally, educators ought to ensure that students retain the material long-term and use it to make healthy choices throughout life. This is especially important as children get older and have even greater autonomy over their food choices. Cognitive psychologist Patricia deWinstanley argues that long-term retention of lectures, which are one of the

⁶⁴ Brug, de Vet, de Nooijer, and Verplanken, "Predicting Fruit Consumption: Cognitions, Intention, and Habits."

⁶⁵ *ibid.*

⁶⁶ Aarts, Paulussen, and Schaalma, "Physical Exercise Habit: on the Conceptualization and Formation of Habitual Health Behaviours."

⁶⁷ Loewenstein, Price, and Volpp, "Habit Formation in Children: Evidence From Incentives for Healthy Eating."

⁶⁸ *ibid.*

most common teaching techniques, can be improved in a number of ways based on the components of effective processing. Firstly, the concept of Elaborative Processing states that effectively processing new information requires interconnections with other, previously learned information. These connections provide more routes for retrieving the new information in the future ⁶⁹. This idea is echoed by Diane Halpern, former president of the American Psychological Association, who advocates drawing concept maps because information that is organized into both the visuospatial and auditory-verbal channels is more likely to be recalled than information that is stored in just one of these channels ⁷⁰. If these techniques are applied to nutrition education classes, children will be more likely to remember what they are taught as they grow into adolescents and adults who have greater autonomy over their diets.

Another important component of long-term retention is Retrieval Practice. The more students practice retrieving information, the easier retrieval becomes ⁷¹. In the classroom, this can take the form of spacing out lectures on important topics so the information is presented on multiple days in different ways ⁷². Another way to incorporate Retrieval Practice is to use Elaborative Interrogation, a practice in which educators require students to explain the underlying reasons behind their answers rather than simply stating the answers. Cognitive psychologist Nora S. Newcombe supports this practice by emphasizing the need for educators to “ask deep explanatory questions” ⁷³. Since Elaborative Processing and Retrieval Practice are important for learning and memory, they ought to be implemented into teacher training and curriculum development for nutrition education programs.

Specifically, I advocate using the techniques regarding long-term retention for elementary school students, because although they have some degree of food autonomy, they do not yet have as much control as older children. Then, by the time these students

⁶⁹ deWinstanley and Bjork, “Successful Lecturing: Presenting Information in Ways That Engage Effective Processing.”

⁷⁰ Halpern and Hakel, “Applying the Science of Learning to the University and Beyond: Teaching for Long-Term Retention and Transfer.”

⁷¹ *ibid.*

⁷² deWinstanley and Bjork, “Successful Lecturing: Presenting Information in Ways That Engage Effective Processing.”

⁷³ Newcombe et al., “Psychology’s Role in Mathematics and Science Education.”

enter middle and high school, they will have a nutritional knowledge base on which to build self-efficacy as they become more independent from their parents. As early as nine years old, children report having high autonomy over their food choices: in a study performed in the UK, 90% of nine year olds reported having control over what they ate for breakfast, 66% reported having control over snacks, and 33% reported having control over how much food they eat in a given day ⁷⁴. For example, in the lunchroom, students choose which foods on their tray to eat and which to throw away. In adolescence, a time of great transition, this level of autonomy further increases as teenagers experiment with new foods and build solidarity with their peers ⁷⁵. This is the age at which programs based on Bandura's Social Learning Theory and habit formation should be implemented, because this is the time during which individuals develop responsibility for their health behaviors. In a study of 47 adolescents and their parents, qualitative social researcher Raewyn Bassett noted that, "home environment influences diminish in adolescence and compete with external influences" such as peer pressure and media advertising ⁷⁶. The adolescents in this study reported having "substantial control" over their breakfast, lunch, and snack choices, but somewhat less control over dinner, which was typically cooked by their mothers ⁷⁷. However, some degree of autonomy remained even during dinner, because many of the interviewed adolescents were allowed to cook their own meal if they chose not to eat what was prepared for the family ⁷⁸. Based on the great increase in food autonomy associated with adolescence, we ought to address knowledge deficits in young children using the techniques of long-term retention and then translate this knowledge into self-efficacious habits as they age.

VIII. Improving Nutrition Education Programs through Parental Involvement

It is not enough to educate children: parents must model and support what their children are learning at school. In a meta-analysis of multiple nutrition education programs, Deanna Hoelscher at the Academy of Nutrition and Dietetics found that

⁷⁴ Barasi, *Human Nutrition*, 2Ed.

⁷⁵ *ibid.*

⁷⁶ Bassett, Chapman, and Beagan, "Autonomy and Control: the Co-Construction of Adolescent Food Choice."

⁷⁷ *ibid.*

⁷⁸ *ibid.*

interventions that involve parents are more successful than those that do not, especially among preschool and elementary school-aged children ⁷⁹. However, acting on this data remains problematic, as many school officials are hesitant to overstep their bounds and interfere with home life. In fact, as early as 1997, Professor of Public Health Cheryl Perry noted in her evaluation of the CATCH curriculum that the biggest challenge was developing home-based programs that can attract parents to reinforce what children are learning at school ⁸⁰.

Lev Vygotsky's Social Development Theory emphasizes the importance of parental involvement in nutrition education programs. This model states that children's development is based on social interaction with the "more knowledgeable other" (MKO), a term that refers to anyone who has a higher ability level than the learner. Vygotsky breaks down skills into three zones: what the child can do on her own, what the child can do with guidance from an MKO, and what the child cannot do. The middle zone is known as the "Zone of Proximal Development." During most of childhood, one's parents serve as the MKOs who model skills and provide opportunities for practicing them in real-life situations, allowing the child to achieve success within the Zone of Proximal Development. For this reason, parents are perfectly positioned to model healthy behaviors ⁸¹. For example, a middle-school aged child may struggle with interpreting nutrition labels on her own, but with the help of a parent to guide her through each component, she can learn to compare the nutritional contents of various foods. To effectively teach this skill, the parent can first model the behavior, then help the child to do it, and then eventually release the child to independently complete the task. The skill of reading nutrition labels has now been moved from the Zone of Proximal Development into the set of skills the child can perform on her own.

The importance of modeling was supported in a 2013 study by McGowan et al., in which the researchers successfully used habit theory to modify parents' eating habits,

⁷⁹ Hoelscher, Kirk, Ritchie, and Cunningham-Sabo, "Position of the Academy of Nutrition and Dietetics: Interventions for the Prevention and Treatment of Pediatric Overweight and Obesity."

⁸⁰ Perry et al., "The Child and Adolescent Trial for Cardiovascular Health (CATCH): Intervention, Implementation, and Feasibility for Elementary Schools in the United States."

⁸¹ Whitebread and Bingham, "Habit Formation and Learning in Young Children."

which then translated unto their children. The experimenters used four one-hour home visits over the course of eight weeks to provide self-monitoring sheets and teach parents about habit formation. They measured three health-related parental behaviors: serving fruits and vegetables, healthy snacks, and unsweetened drinks. At the end of the study, the automatic nature of these three feeding behaviors increased in the experimental group. Children whose parents were in the experimental group consumed significantly more vegetables, healthy snacks, and water than children whose parents were in the control group. These changes in children’s eating habits correlated with changes in parental automaticity, demonstrating that the children’s positive outcomes were based on their parents modeling healthier behaviors and serving them nutritious foods ⁸².

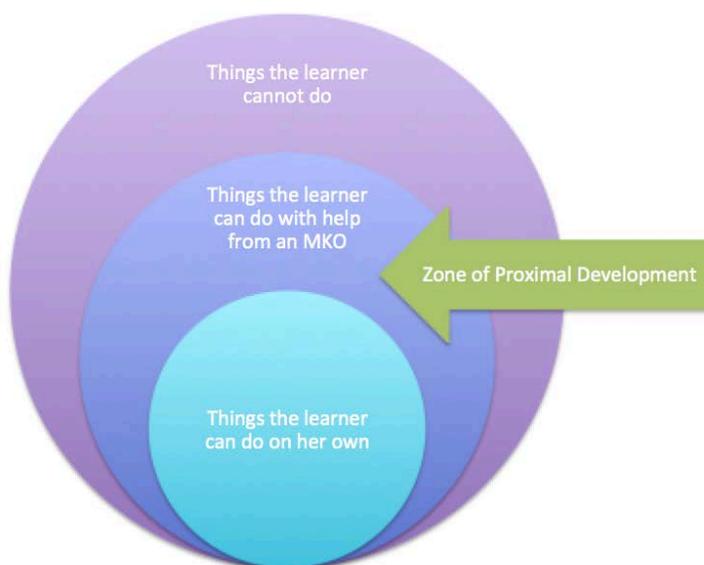


Figure 5: Vygotsky's Social Development Theory. During childhood, parents and teachers serve as the MKOs that aid children in the Zone of Proximal Development.

In addition to parents, teachers serve as MKOs for their students. One way to use this to improve children’s health is through family-style lunch service, which gives teachers an outlet to model healthy behaviors. In family-style service, a supervising adult such as a teacher offers students the full USDA-recommended serving of each food from a common dish. Students can then help themselves to additional servings, if desired. While this is not commonplace in most schools, there is evidence that it can effectively improve children’s

⁸² McGowan et al., “Healthy Feeding Habits: Efficacy Results From a Cluster-Randomized, Controlled Exploratory Trial of a Novel, Habit-Based Intervention with Parents.”

physical health and social skills. Because students have some degree of choice, this practice increases self-efficacy. In a 1984 study, forty students in fourth through sixth grades were randomly assigned to family-style or cafeteria-style lunch services. The children served family-style meals showed higher intakes of key nutrients such as protein, iron, riboflavin, thiamin, vitamin A, and niacin. They also demonstrated decreased food waste. In a 2008 study focused on modeling, teachers who used a family-style lunch service reported trying new foods with children more often (69% vs. 42%) and talking to children about food at a higher frequency (95% vs. 79%) than teachers involved in cafeteria-style lunch services. There are also motor skill benefits associated with passing food around and using real silverware, dishes, and napkins, as well as social skill improvements based on increased interactions with adults during mealtimes. Transitioning to family-style meal services in schools is a promising way to implement Vygotsky's Social Development Theory based on teachers' roles as MKOs⁸³.

However, for these interventions to be most effective, they must be long-term: a 2002 study by clinical epidemiologist Susan Norris showed that diabetes self-management education improves the average blood glucose levels of adults with Type II diabetes at immediate follow-up, but the main predictor of effect magnitude is the duration of educator-patient contact time⁸⁴. One of the best ways to ensure long-term interventions is the Two-Generation Model for schools proposed by the AEI/Brookings Report "Opportunity, Responsibility, and Security." In this model, schools become community hubs that provide health, social, and educational services for parents and children⁸⁵. This approach, which is currently being implemented at the KIPP Delta charter school in Helena, connects all members of the community to the services they require and builds trust within communities, furthering the aforementioned goal of holistic education⁸⁶. The aim is for a team of teachers, healthcare providers, and social workers to work together to address each child's educational, social, and health needs. Providing incentives such as

⁸³ Coborn and Marquart, "Building Healthier Children Through Family-Style Service in School Cafeterias."

⁸⁴ Norris et al., "Self-Management Education for Adults with Type 2 Diabetes."

⁸⁵ AEI & Brookings, *Opportunity, Responsibility, and Security*.

⁸⁶ Greenberg et al., "Enhancing School-Based Prevention and Youth Development Through Coordinated Social, Emotional, and Academic Learning."

daycare and summer school persuades parents to spend time participating in on-site job training and parenting classes ⁸⁷. In their paper on reversing urban cycles of disadvantage, Professors of Public Health Catherine Diamond and Nicholas Freudenberg argue that “community schools become a comprehensive resource for children, families, and communities in which the cumulative impact exceeds the sum of the impacts of each constitutive element” ⁸⁸. Community-centered schools can thus be used to engage parents long-term in nutrition education programs alongside their children.

While parental involvement has been empirically shown to improve program effectiveness, it is important to avoid paternalism and maintain parental autonomy. A limited degree of paternalism, which can be defined as “interference with the liberty of another for the purposes of promoting some good or preventing some harm,” is justified when it is necessary to ensure Fair Equality of Opportunity, as long as it does not infringe on anyone’s basic rights ⁸⁹. I argue that this is the case with young children and the obesity epidemic – due to their early stage of development, some degree of paternalism is required to meet a child’s needs and secure their future interests. Children cannot be expected to make independent choices regarding their health. However, bringing parents into nutrition education complicates the situation. For example, how would school officials deal with those whose parenting style or beliefs conflict with the material being taught at school? This becomes a question of who has priority over the child – the parent or the school? We must weigh the cost of paternalism with the consequences associated with childhood obesity, particularly since obesity is already a highly stigmatized condition. The health risks must be high enough to justify interference with family life, which involves complex considerations and normative decisions about what constitutes risk. Here again I turn to Rawls by defining risk as a situation that infringes upon a child’s Fair Equality of Opportunity. For example, a child whose parents cannot afford to feed her nutritious meals and yet refuse to enroll her in the National School Lunch and Breakfast Programs to receive free or reduced-cost meals at school is violating that

⁸⁷ AEI & Brookings, *Opportunity, Responsibility, and Security*.

⁸⁸ Diamond and Freudenberg, “Community Schools: a Public Health Opportunity to Reverse Urban Cycles of Disadvantage.”

⁸⁹ Merry, “Paternalism, Obesity, and Tolerable Levels of Risk.”

child's Fair Equality of Opportunity and ought to have their parental liberties restricted in order to secure justice for the child.

Another moral constraint to take into consideration is the cultural significance of food practices. For many people I met in Helena, soul food is considered an important part of family traditions. For example, as I mentioned earlier, Brady's great-grandmother owns a soul food catering business. She was recently able to open a brick-and-mortar restaurant, Rosie's Diner, which is a major point of pride for their family. This food consists primarily of fatty meats, buttery potatoes, desserts, and vegetables cooked in bacon fat (see Figure 6 below). Most of these foods are unhealthy, but attempting to ban them altogether would be met with a great deal of resistance since they are so ingrained in the family's way of life. I do not recommend this approach – rather, to maximize feasibility and respectfulness, educators should focus on making small changes over time and emphasize enjoying traditional foods in moderation. One way to do this is to improve the appearance and taste of fruits and vegetables served in school cafeterias to make healthy choices more appealing: in a study of 2,600 third- through sixth-graders in two low-income school districts, trained chefs were “randomly assigned to some schools to spice up fruits, vegetables, and entrees with low-fat, low-salt recipes”⁹⁰. They also experimented with improving food presentation. Children in the experimental schools increased their fruit and vegetable consumption and had less food waste after seven months of the trial⁹¹. Making healthy foods more appealing is a less culturally intrusive way to improve children's diets than casting negative judgment on popular foods that may have important familial significance.

⁹⁰ Bernstein, “When the School Lunch Lady Works with a Chef, Kids Eat Their Fruits and Vegetables.”

⁹¹ *ibid.*



Figure 6: A photo taken by a customer at Rosie's Diner in Helena.

In addition to these moral constraints regarding parental involvement in nutrition education programs, there are numerous practical issues that must be taken into consideration: many of the parents I met in Helena could not reasonably be expected to take part in these programs on a regular basis due to the fact that they work multiple jobs, have limited transportation, and have other children and family members to care for. The stressors of everyday life, combined with the negative social determinants of health, leave little time for busy parents to engage in nutrition education programs, much less apply this knowledge to their lives. Some organizations have found that incentives can increase parental involvement: for example, at the community health agency in Helena, new and expecting mothers can sign up to attend one of the baby showers offered each month, in which they receive refreshments, home safety information, and a free car seat and installation by a trained car seat specialist ⁹². The turnout is typically between ten and twenty women each month, much higher than would be expected if the incentive of a free car seat and installation were not offered. Similarly structured incentive programs for nutrition education ought to be explored.

These numerous constraints to parental involvement are yet another reason to take a participatory approach in designing nutrition education programs; this way, community members can have input in deciding the program's goals and thus potentially reduce the

⁹² Loveless, "Regional Programs – Community Resources."

risk of future conflict. One way to do this is to use the PRECEDE/PROCEED model proposed in 1974 by Lawrence Green, former President of the Society for Public Health Education. This is a cost-benefit evaluation framework created to help policy makers design health programs efficiently. It is guided by the principal of directing attention to outcomes, rather than inputs. In this model, program planners start with the desired outcomes then work backwards to identify strategies for achieving those objectives. Heavy emphasis is placed on participants defining their problems and developing individual plans to reach specific goals ⁹³. Overall, I advocate that some degree of paternalism is necessary to reach the goal of effectively combatting childhood obesity, but it must be carefully planned using a method such as the PRECEDE/PROCEED model to avoid excessive restrictions on parental liberties ⁹⁴. Taking these precautions will not only improve children's eating habits, but will also improve the relationship among children, parents, and the school officials who serve them.

IX. Conclusion

It is clear that work must be done to improve school nutrition education programs' impact on children's health-related behaviors. While improving health knowledge is a promising start, behavior is what eventually affects long-term health outcomes, particularly given children's increasing food autonomy in today's society. We have a moral obligation to tackle this problem because an equitable distribution of social determinants of health will help to maximize Fair Equality of Opportunity, creating a more just society. If individuals do not have some basic level of health, they are prevented from having the opportunity to fulfill their full potentials in school, work, and family life; this is unjust, particularly since childhood obesity disproportionately affects racial minorities and children from low-income families. Furthermore, from a financial perspective, we should make the most of existing budgets for nutrition education and minimize the spending on healthcare services associated with preventable, obesity-related diseases. Therefore, I propose redevelopment of school nutrition education programs to incorporate educational psychology tenets such as Bandura's Social Learning

⁹³ Garden-Robinson and Burdett, "Kids' Cooking Camps Promote Exercise and Nutrition Knowledge Among Native American Youth."

⁹⁴ Merry, "Paternalism, Obesity, and Tolerable Levels of Risk."

Theory and best practices for habit formation and long-term retention. If these practices are implemented, educators can develop a solid health knowledge base in elementary school children that will translate into healthier habits as they age and gain greater food autonomy. We must collaborate with community members to ensure minimal paternalism and maximum parental support for these programs, while still maintaining respect for important cultural food practices. In order to reach our goal of improving children's health, future research should focus on how to effectively create community-centered school programs that are both financially sustainable and culturally acceptable. Childhood obesity is more than a public health issue – it is a matter of justice for millions of children like Brady, Destiny, and their friends.

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