

The Effectiveness of Educational Tools on Finding Solutions to Childhood Obesity

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Abstract

The prevalence of childhood obesity is increasing at an alarming rate across the globe, causing negative psychological and somatic comorbidities including diabetes, high blood pressure, depression, and self-esteem issues. Several tools aimed at elementary school (kindergarten through sixth grade) students attempt to decrease childhood obesity through education on making healthy diet decisions. For example, some schools have implemented nutrition classes into their curriculum; those that participated found improvements in their students' nutritional knowledge compared to those that did not. However, researchers disagree on how effective nutrition classes are for all the students, as a "kitchen-sink" method is commonly used. Additionally, social marketing techniques, such as MyPlate and children's books, are commonly utilized by a child's teacher or parent. This is not the most effective technique as social marketing campaigns often do not encourage engagement with the material. Parent communication is another influential tool that is important in a child's life. Young children often base their actions on adult role models, meaning that parents can make a bigger difference in preventing and mitigating childhood obesity through their actions and habits. After evaluating these three tools, our group found a different technique that proves to be the most effective on children's health: hands-on learning through gardening and cooking. Although not utilized often, a few schools have added these activities to their campus; they have seen significant positive changes among student's dietary habits by encouraging them to garden or cook using school resources. Children who participate in gardening or cooking programs are more likely to make healthier and nutritious eating choices. Despite school education, social marketing campaigns, and parent communication being somewhat effective tools to educate students, hands-on learning tools are shown to be the most effective and impactful in educating students on nutrition and healthy lifestyles. Our group strongly advocates for the implementation of gardening and cooking programs into children's weekly routines in order to combat rising childhood obesity rates.

Introduction

The rate of obesity for the 5-19 age group has dramatically risen in recent years, from 8% in 1990, to 20% in 2022, meaning that one in every five children are classified as 'obese.' ("Obesity and overweight", 2024; "Childhood Obesity Facts", 2024). As a result, these groups of adolescents that grow up obese, and stay obese for a large portion of their early adult lives, have an increased risk of developing other cardiovascular conditions later in life (Iguacel et al., 2021). Obesity could also lead to other harmful physical conditions such as: diabetes, high cholesterol, high blood pressure, and heart disease, which is the leading cause

of mortality in the United States. (“Childhood obesity”, 2022). Additionally, obesity can lead to negative mental health consequences such as depression, body dysmorphia, and self esteem issues (“Childhood obesity”, 2022). Beyond the physical and mental complications, obesity can be costly for individuals affected, as annual medical costs for obese people were \$116 higher than those without (“Childhood Obesity Facts”, 2024). These higher costs are driven up by the numerous medications, additional check-ups, and expenses associated with other medical conditions that people with obesity have to pay for (Ling et al., 2022).

Due to the public health threat obesity poses, the prevention of obesity is essential to the wellbeing of the next generation. Childhood obesity is perpetuated by a multitude of factors such as genetics or inaccessibility to healthy food options. One prominent factor contributing to obesity rates in children is the lack of accessible and effective nutritional education. Especially pertaining to children, the earlier education efforts take place, the more effective they are at lowering obesity rates. Because of this, we will focus on obesity prevention targeted at children kindergarten through sixth grade (Balasubramaniam et al., 2021). To address this educational issue, we reviewed three different educational tools used in the last fifteen years and evaluated their successfulness. While assessing prevention measures, we will focus on nutrition classes, social marketing campaigns, and parent communication. These three tools are used primarily in communities to mitigate the rise of obesity. This review will address, analyze, and make conclusions on whether these three specific tools have been successful or unsuccessful. Afterwards, this review will propose a new type of educational tool that could leave a major effect on childhood obesity: hands-on learning (specifically gardening and cooking).

Problem Statement

The problem our group is addressing through this project is the lack of educational tools to combat the rise of childhood obesity. In order to address this issue, we observed the previous tools used to educate children in making healthy diet decisions (using existing research), and analyzed the influence and success of those three educational tools.

Additionally, our group proposed new solutions that schools can implement to further encourage children to make healthy dietary choices.

The United Nations Sustainable Development Goals (UN SDG) are seventeen goals that strive towards a better future for the people and the planet. The plan is part of the 2030 Agenda for Sustainable Development adopted by all of the members of the United Nations (UN), to be met by 2030. These goals address a wide variety of global issues, and focus on the international partnership that is required to resolve them (“The 17 goals”, n.d.). Some of these goals connect with our topic of childhood obesity, specifically goals two, three, and four.

Goal two of the United Nations Goals is to end hunger, achieve food security, and improve nutrition and promote sustainable agriculture. Although the second goal is mainly focused on ending hunger, many aspects of achieving this goal also include improving nutrition and sustaining that nutrition. Quality nutrition is an integral part of

maintaining a healthy diet, and therefore a healthy weight. Promoting sustainable agriculture and improving nutrition will allow more children access to healthy foods, leading to healthier lives.

The third goal of the UN SDG is good health and wellbeing for all ages. An important part of health and wellbeing is maintaining a healthy weight. As previously stated, obesity can also cause many long-term, negative health effects that can greatly decrease a person's quality of life. Therefore, ensuring that children have healthy and nutritious diets, will contribute to an improvement in children's mental and social state. Having a healthy mental and physical state significantly contributes to a child's overall health and wellbeing (O'Dea, 2004). Educating students on healthy habits will contribute to their health and well-being as children, but also into adulthood.

Finally, the fourth goal of ensuring inclusive, equal, and quality education to all also connects to childhood obesity. Having quality education has the possibility to positively influence children's diet decisions throughout their lives. However, the lack of education regarding nutrition, contributes to, and exacerbates the issue of childhood obesity. Providing education to children on nutritious and healthy lifestyles can help them build good habits and make better eating choices, thus decreasing obesity (Nga et al., 2019). Effective and engaging education can increase awareness among children about healthy diet choices that they can carry into adulthood. Young girls can especially be influenced by incorrect information, leading them to unhealthy and unsustainable eating/exercising practices (O'Dea, 2004). Providing accurate and quality education can prevent children from developing disordered eating, and instead learn to maintain a healthy weight through sustainable practices.

In addition to the UN, there are other major organizations working to address the rising childhood obesity rates. The National Institute of Food and Agriculture (NIFA) categorizes childhood obesity prevention as a high-priority research area. The United States Department of Agriculture (USDA), has made finding solutions to childhood obesity, and made it a key mission area for NIFA ("Obesity", n.d.). NIFA provides significant funding for effective interventions in the form of educational programs, especially in low-income and higher risk communities to spread information. Some of NIFA's initiatives within educational programs include educating parents so that they can help support their young children in making healthy choices. In addition, NIFA has also provided adolescents with information on how to create healthy eating habits ("Obesity", n.d.).

Methods

In order to identify previous tools and evaluate new solutions in the effort to reduce childhood obesity, our group conducted in-depth research across a variety of journals, studies, and medical websites. We analyzed both review articles and original research from databases such as ScienceDirect, JSTOR, and PubMed. We reviewed publications from numerous academic publications, including *Appetite*, *Journal of Nutrition Education and Behavior*, and *ACAMH*. In addition, we used sources from medical and scientific websites such as the CDC and the NIH. We used Google Scholar to search for sources, inputting keywords such as "childhood obesity", "education", "schools", "nutrition", "prevention", "hands-on",

“cooking”, and “gardens”, to locate articles for the paper. We tried to restrict most of our sources to the last ten years (2014 to 2024) in order to make sure our information was relevant and up to date. However, we included some sources from earlier years as they had useful background information and previous tools that had been used in the past.

In total, our group used a total of 26 sources covering previous educational tools that had been used to mitigate childhood obesity and their effectiveness. We analyzed each source and discussed how successful or unsuccessful each technique was in order to decrease the rates of childhood obesity. Then, using previous tools and studies, our group came up with new ideas that could be implemented by elementary schools to educate their students on nutrition and healthy eating.

Background

Obesity rates have been on the rise in the United States, and the rates of childhood obesity rates have increased even more. In 2016, over 340 million children aged five to nineteen were found to be overweight or obese (Balasubramaniam et al., 2021). The rates of childhood obesity are on the rise; in 1990 the obesity rate was 8% worldwide and in 2022 the rates had risen dramatically to 20%. Our group researched and analyzed three educational tools that have attempted to prevent childhood obesity by educating kindergarten through sixth grade children: nutritional interventions from school teachers or guest speakers, social marketing campaigns, and school gardens.

Schools

Schools are an influential part of most children’s lives; they teach children many important life lessons, such as the importance of making smart dietary choices. While it is not very common, this can be done through a number of nutritional classes or programs available to children; a few schools even include health classes or programs in their required curriculum. These classes or programs aim to cover a variety of topics: nutritional education, physical activity, health instruction, and any other subjects relating to a child’s well-being (Nga et al., 2019).

A research study on British schools measured the impact their schools leave on childhood obesity. This research found that each school differs in their impact on their students’ obesity levels. (Procter et al., 2008) This difference is caused by a variety of factors; one of the main proposed causes is the difference in the success of the schools’ diet interventions. Thus meaning that those schools with low obesity rates owe their success to their nutritional interventions (Procter et al., 2008). However, Nga et al. (2019) analyzes and evaluates a countless number of studies based on the recent increase in the body mass index (BMI), a formula used to find the height to weight ratio of an individual, of children and adolescents. This literature review believes that school education is merely a part of the solution to childhood obesity. Other factors, such as a child’s community, parents, policy makers, researchers, and more, must be included in order to fully solve this problem (Nga et al., 2019).

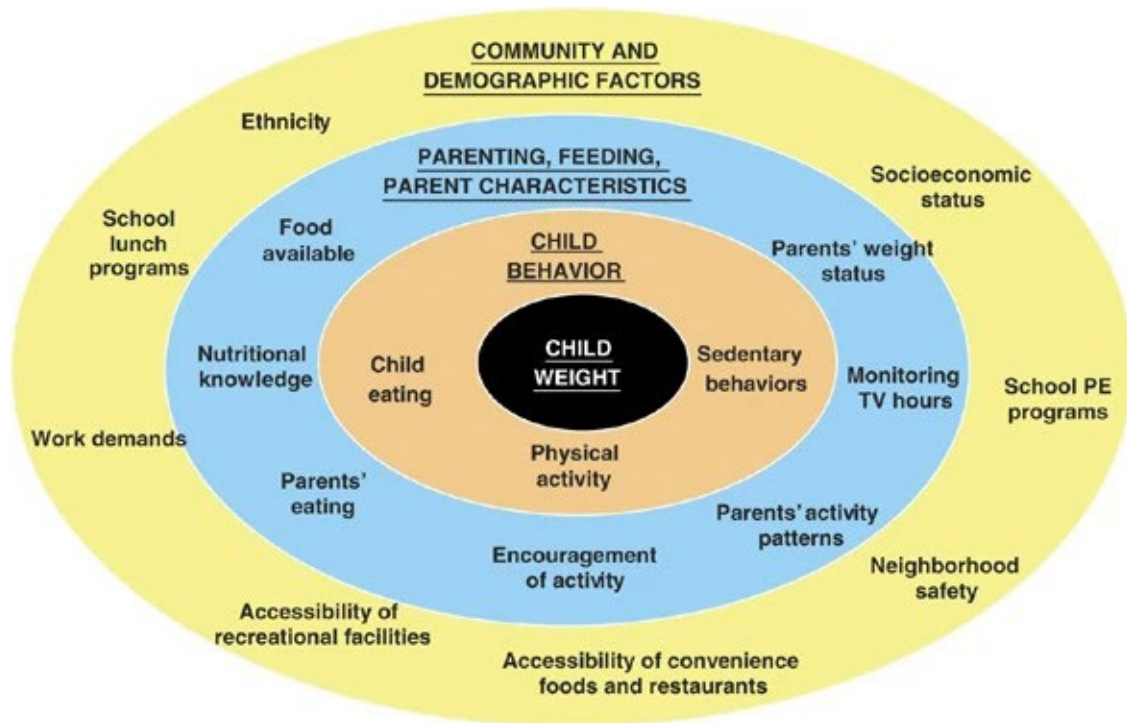
Most literature reviews and studies can agree that the majority of childhood obesity

prevention programs are taught by schools; however, according to Birch and Ventura (2009), school-taught programs have very little success on a child's life. They believe that schools take a "kitchen sink" approach, meaning that schools teach their students a combination of several important topics (such as physical activity, dietary patterns, reducing weight gain, and more).

While the intent is pure, "kitchen sink" lessons usually do not have any success with a change in the students' eating habits. These students remain confused because of the incoherent combination of different topics. The report states that it would be more beneficial for schools to focus on one meaningful lesson rather than combining them all together. As a result, these "kitchen sink" school interventions have little effect on their students. Birch and Ventura created a figure that represents the ecological framework of the factors that affect a child's weight status (Birch & Ventura, 2009).

Figure 1

An ecological model of the factors that affect a child's weight status. (Birch & Ventura, 2009).



As seen in the orange area, the most influential factors are those representing the child's behavior (sedentary behaviors, child eating, physical activity). The blue section represents the significance of the parents' effects (parents' weight status, activity patterns, eating, etc.) on their child, which is notably more important than community and demographic factors (school lunch programs, school PE programs, etc.) in the yellow area (Birch & Ventura, 2009). Therefore, parents need to monitor their children's television hours, provide healthy food options, and be a role model for their kids. Otherwise, the school's "kitchen sink" lessons will remain ineffective with a low success rate (Birch & Ventura, 2009).

Social Marketing Campaigns

Social marketing aims to influence and change people's behavior through posters, books, infographics, or other commercial marketing techniques ("What is Social Marketing?", n.d.). There are many examples of social marketing campaigns that can be seen in everyday life. For example, to encourage the public to be more sustainable, grocery stores began charging their customers to use plastic bags, and many coffee shops encouraged the use of reusable cups and metal straws. Social marketing has proven to be an extremely effective way of influencing the public, as it combines ideas from both social sciences and commercial marketing ("What is Social Marketing?", n.d.).

Social marketing campaigns have been used in the efforts to prevent and mitigate childhood obesity. For example, MyPlate has been a common approach to educate both children and the general public on smart eating choices. Replacing the Food Guide Pyramid, MyPlate was launched in 2011 by the USDA in order to remind people on their daily eating habits ("What is MyPlate?", n.d.). MyPlate is a simple visual that illustrates the amount of each of the five food groups: fruits, vegetables, grains, protein, and dairy, that everyone should strive to meet in every meal ("What is MyPlate?", n.d.).

Although MyPlate was designed for people of all ages, this well known visual has been seen in many schools, particularly elementary schools, across the country in order to remind their students to reach their food portions. Because MyPlate is often posterized throughout schools, it is able to have a large reach to many students. It is commonly used by teachers in classrooms, through handouts and activities (Chrisman et al., 2019). However, Chrisman et al. concede that although MyPlate can be very useful, it is not an effective way to teach children about nutrition and healthy habits. Instead, schools should aim to incorporate MyPlate and nutrition education into more lessons, specifically in health and physical education classes (Chrisman & Diaz Rios, 2019). Since MyPlate is a more passive way of teaching children, it isn't very successful at making long term changes into their adult life.

Children's books have also been found to be effective in building healthy habits. Some authors have partnered with government agencies such as the USDA to spread information is another example of a social marketing campaign. Because these books are targeted towards kids using large and colorful prints, fun characters, and simple lessons, they are more easily digestible. Social marketing campaigns can also be aimed to promote healthy eating habits to children. An example of this is the book *In Moderation* by Antonio Braccioforte. Braccioforte, who has worked in healthcare for many years, began writing children's books in order to help them learn life lessons. *In Moderation* was published in

2010 by the Lessons for Children LLC, in partnership with the USDA to improve family nutrition and end childhood obesity (“‘In Moderation’ Children’s...”, 2010). This book utilized specific visual aids aimed at children, such as colorful pictures, simple language, fun characters and a straightforward message. *In Moderation* advised against overeating and complete avoidance of certain foods, and instead advocated for eating treats “in moderation.” This book serves as an example of an attempt to promote nutritious eating in a non-school setting with a specialized effort to teach a younger audience about healthy nutrition.

However, books such as these have an issue similar to MyPlate: they struggle to convince K-6 children to act on the knowledge they have learned. After reading books such as *In Moderation*, kids tend to forget what they have learned and refrain from implementing their new nutritional knowledge into their everyday life. It would be more beneficial for these children to learn about nutrition in interactive and more engaging ways (Chrisman et al., 2019).

Parent Communication

The eating habits and practices of parents are highly influential to the manner in which their children eat. Parents hold the most authority for what foods their child consumes, as they are often the ones who purchase, prepare, and plate the food. In addition to the physical food that parents provide, their mindset towards food, parenting style, cultural background, socioeconomic status, and eating behavior, can determine their children’s ability to form and consume a healthy diet.

A parent’s attitude and actions towards food correlate with their own children’s attitude and actions towards food. The amount of involvement and care parents express towards their children’s health reflect their child’s body weight status and diet quality (Faught et al., 2015). Parents who indicate more involvement with their child’s health have children who were less likely to be overweight and were more likely to have a better diet (Faught et al., 2015).

Different parenting styles and discipline methods can affect children’s eating habits as well. Demanding and stress-inducing parenting styles (those reliant on insults and threats as discipline) lead to a child’s unhealthy mindset around food. These children may eat healthy while living with their parents, but will not develop the skills needed for a long lasting healthy relationship with food. Their main motivation for healthy eating will be an external fear, rather than an internal desire to be healthy and promote their own well-being. When these children move out of their parents’ houses, they may develop poor eating habits since their parents do not have authority over them anymore. However, when parents use less invasive methods to promote healthy eating (such as purchasing healthier options) they better encourage their children to independently form positive eating habits. Therefore, when these children become adults, they will maintain these healthy dietary choices since their relationship with food is not centered on parental fear (Birch & Ventura, 2009).

Another significant familial aspect which affects the way children form eating habits is their cultural or religious background. Every family has certain guidelines and traditions that they follow and live by. Certain religions (such as Christianity, Buddhism, Hinduism, and

Islam) can have specific dietary restrictions (Thrive, 2024). For these specific spiritual needs, parents are most adept at guiding their children about what works for their family, rather than a third-party, such as schools.

Figure 2

Prevalence of Overweight Children Is Lower Among Parents Who Use Nutrition Labeling. (Variyam, 2001).

Prevalence of Overweight Children Is Lower Among Parents Who Use Nutrition Labeling

Survey questions	Share of children overweight or at risk of being overweight ¹	
	Parent Did not use	Parent Used
Think about food labels. When you buy foods, do you use ...	Percent	
The list of ingredients?	32.1	26.6
The short phrases on the label like "low-fat" or "light" or "good source of fiber?"	32.9	26.1
The nutrition panel that tells the amount of calories, protein, fat, and such in a serving of the food?	33.5	25.9
The information about the size of a serving?	30.2	27.0
Statements on the label that describe health benefits of nutrients or foods?	31.9	25.2

¹Represents children of parents responding to DHKS. Source: 1994-96 CSFII-DHKS, USDA.

Families with a higher income tend to have lower obesity rates; however, lower income families have a higher risk of having overweight children. The prevalence of obesity in different income households was “11.5% among U.S. children with family income more than 350% of the Federal Poverty Level (FPL), 21.2% among children with family income 130% to 350% of FPL,” and “25.8% among children with family income 130% or less of FPL” (“Childhood Obesity Facts”, 2024). These low income families often do not have access to nutritious options or nutritious education.

Parents' diet quality and energy intake compared to the diet quality and energy intake of their child (Robson et al., 2016). Researchers found a strong association between parents’ diet quality and energy intake to their child’s (Robson et al., 2016). This connection can be seen through a different group of researchers from AgEcon Search. They asked parents with overweight children a variety of questions concerning food labels. Researchers specifically asked “When you buy foods, do you use...” items such as “low-fat” labels, serving sizes, the amount of calories, or other nutritional labels. Unfortunately, a higher percentage of these

parents refrain from looking at these food labels; they choose to ignore them because they are either too lazy or unconcerned with their child's obesity (Variyam, 2001).

Parent communication could be a vital tool in a child's life; it could teach children valuable dietary lessons that could be used throughout their entire lives. As seen in Birch and Ventura's ecological model, parents have a greater influence on their children's weight compared to schools. However, many parents do not fully comprehend the impact they leave on their children; they may let their child consume unhealthy food in large quantities or refrain from having discussions about their child's dietary choices. Thus, parent communication is not an extremely effective tool, since most parents tend to be less involved in their children's life than they should be. Additionally, researchers found that the way in which parents communicate about food was "less informative" and included more "evaluat[ed] information" (Yee et al., 2020). A negative, but often inevitable, consequence of relying on a family member for nutrition information is that the content taught is inherently more biased than if taught by a person further removed from the student. These studies all indicate that parents contribute a sizable portion of influence to what eating habits a child develops, perhaps more so than any other factor.

Solutions

After reviewing these three rudimentary tools, educational cooking and gardening were found to be the most effective in emphasizing the importance of a healthy diet. Both of these tools teach children about the importance of eating vegetables through hands-on activities. Children learn while cooking healthy foods or growing vegetables that they can eat later. According to Vaughan et al. (2024), school-based vegetable cooking classes improve the vegetable intake of children between the ages of four to twelve (specifically classes that are more than six hours). While Vaughan et al. strongly supports healthy children cooking programs, it recommends future interventions and studies to find which types of class works in specific circumstances and which do not (Vaughan et al., 2024).

Dimple and Ramesh (2023) found similar results; after examining a variety of studies, it concluded that all studies improved the diet and nutritional education of children. However, this study states that cooking programs need to be studied more thoroughly. It is hard for researchers to completely separate the effects of cooking programs from other outside factors (such as school lessons, parent communication, etc.) (Dimple & Ramesh, 2023).

Cooking programs teach children about the importance of having a balanced diet; however, healthy cooking shows have also proven to leave a positive lasting impact on child viewers. An experiment performed by Folkvord et al. (2020) proves this idea; one hundred twenty-five children who are ten to twelve years old were separated into two groups. One group watched a cooking program featuring unhealthy foods while the other was given a program with healthy foods. Afterwards, children who watched the healthy cooking program had a higher probability of selecting healthy foods than those who watched the unhealthy cooking program (Folkvord et al., 2020).

In addition to cooking, gardening also prevents childhood obesity by teaching children in a hands-on way. Roche et al. (2017) evaluates the promising results that gardening

programs have left on children; it believes that gardening introduces children to healthy foods through hands-on experiences. Table 2 represents change in two different groups of students: the program group (students that completed a before and after school gardening program) and the control group (students who did not complete the program) (Roche et al., 2017).

Figure 3

Change in Student MyPlate Knowledge and Intent to Eat Vegetables (Roche et al., 2017).

	Program Group		Control Group	
	Pre-test	Post-test	Pre-test	Post-test
MyPlate Knowledge	41.9	39.7	41.8	36.3
Intent to Eat Vegetables	7.2	24.3***	7.7	9.9
Garden Skills (mean out of 8)	4.4	3.9	3.4	3.7

Notes: ***Statistically significant at the 1% level

There was barely any change in the myplate knowledge or gardening skills of the program and control group. However, students a part of the program group had a significant increase in their intent to eat vegetables, while the control group hardly increased. Therefore, gardening class integration will prevent obesity by educating children about the importance of eating vegetables (Roche et al., 2017).

The University of Wisconsin Extension and the Wisconsin Department of Health Services expanded on the idea of educational gardening through their own study. They evaluated twenty eight different sites across Wisconsin to observe student health behaviors before and after working in a garden. Eight hundred one students showed significant changes in their dietary decisions after taking a posttest survey. However, the University of Wisconsin believes that there is one major issue with gardening interventions: it will be difficult to implement successful gardening programs into children’s everyday lives (Meinen et al., 2012). These children already attend school, practice sports, and have their own hobbies; thus, it will be hard to find time for these children to participate in daily, weekly, or even monthly gardening activities.

Cooking programs, cooking shows, and gardening teach children the importance of eating nutritious foods in their own unique ways. Rather than sitting in a classroom or reading a poster about the dangers of childhood obesity, children can “make learning fun” while watching their favorite chef, cooking healthy meals, or watering their carrots. Overall, cooking and gardening have proven to be extremely successful tools in the battle against childhood obesity; it should be implemented into K-6 children’s lives to teach them how to make healthy choices.

Conclusion

In response to the rising rates of childhood obesity, our group evaluated three previous

educational tools that have been implemented to educate students on nutrition and healthy lifestyle habits. In addition, we proposed two new solutions that schools should start implementing to help prevent childhood obesity.

The first tool we reviewed was including nutrition classes into a school's curriculum, which was the most popular and researched method of the tools we reviewed. This method of in-school intervention was shown to be the most effective of the three tools reviewed, as it engaged the students and had a significant effect on their dietary decisions. However, because a “kitchen-sink” teaching method was used, not all students were as impacted as others. Despite the ease of enactment and wide audience that school-based methods can reach, its limited effectiveness with students due to incoherent combination of nutrition information make it an unideal method for obesity prevention.

Our second tool evaluated was social marketing campaigns created to encourage healthy eating habits, with an emphasis on appeals to children. Several examples of this include: myPyramid, myPlate, and *In Moderation*. These social marketing campaigns do leave an overall positive impact on children’s nutritional education; however, most children refrain from acting on the knowledge they have gained from the social marketing campaigns. Rather than gaining a healthier lifestyle after utilizing a social marketing campaign, children maintain their poor dietary habits.

Lastly, our group assessed the effect parent communication leaves on a child’s nutritional knowledge. Since young children often base their actions off of influential adults in their lives, such as their parents, parental figures play a large role in how children develop life long habits. Indeed, parents can improve or worsen their child’s diet; if the parent refrains from teaching their child about healthy nutrition, then their child has a higher risk of forming unhealthy eating habits and of obesity.

After evaluating these three tools, our group proposed two alternative solutions that could teach children about the importance of a healthy diet: cooking and gardening. These hands-on activities allow for children to learn about nutrition in an entertaining medium. Cooking and gardening address many of the shortcomings of the previous tools, such as engagement and impact, making it a much more effective method. This solution can be integrated into schools, community centers, summer camps, and other educational platforms to work together cohesively; this will help educate children on nutrition and therefore lower obesity rates. By educating children on nutrition through providing them the tools and hands-on experiences to do so, we hope to combat childhood obesity and promote healthier lifestyles for future generations.

References

- Balasubramaniam, A., Richardson, N., Taylor, K., Landa, A., Cole, J., & Khan, R. (2021). Assessing the effectiveness of nutrition-focussed workshops in supplementing primary school education. *BMJ*.
- Birch, L. L., & Ventura, A. K. (2009). Preventing childhood obesity: What works? *International Journal of Obesity*, 33(S1), S74-S81. <https://doi.org/10.1038/ijo.2009.22>
- Childhood obesity*. (2022, November 16). Mayo Clinic. Retrieved July 12, 2024, from <https://www.mayoclinic.org/diseases-conditions/childhood-obesity/symptoms->

causes/syc- 20354827

- Childhood Obesity Facts*. (2024, April 2). CDC. Retrieved July 12, 2024, from <https://www.cdc.gov/obesity/php/data-research/childhood-obesity-facts.html>
- Chrisman, M., & Diaz Rios, L. K. (2019). Evaluating MyPlate After 8 Years: A Perspective. *Journal of Nutrition Education and Behavior*, 51(7). <https://doi.org/10.1016/j.jneb.2019.02.006>
- Chrisman, M., Patel, S., & Alonzo, R. (2019). Barriers to and facilitators of using MyPlate nutritional guidelines in K-12 teachers and principals. *Sage Journals*, 79(2). <https://doi.org/10.1177/0017896919867986>
- Dimple, D., & Ramesh, G. (2023). Cooking and Its Impact on Childhood Obesity: A Systematic Review. *Journal of Nutrition Education and Behavior*, 55(9). <https://doi.org/10.1016/j.jneb.2023.06.004>
- Faught, E., Vander Ploeg, K., Chu, Y.L., Storey, K., & Veugelers, P. J. (2015). The influence of parental encouragement and caring about healthy eating on children's diet quality and body weights. *Public Health Nutrition*, 19(5), 822-829. <https://doi.org/10.1017/s1368980015002049>
- Folkvord, F., Anschütz, D., & Geurts, M. (2020). Watching TV Cooking Programs: Effects on Actual Food Intake Among Children. *Journal of Nutrition Education and Behavior*, 52(1). <https://doi.org/10.1016/j.jneb.2019.09.016>
- Iguacel, I., Gasch-Gallén, Á., Ayala-Marín, A. M., De Miguel-Etayo, P., & Moreno, L. A. (2021). Social vulnerabilities as risk factor of childhood obesity development and their role in prevention programs. *International Journal of Obesity*, 45(1), 1-11. <https://doi.org/10.1038/s41366-020-00697-y>
- 'In Moderation' Children's Book to Help Fight Childhood Obesity. (2010, November 23). PR Newswire. Retrieved July 16, 2024, from <https://www.prnewswire.com/news-releases/in-moderation-childrens-book-to-help-fight-childhood-obesity-110185904.html>
- Larsen, J. K., Karssen, L. T., & van der Veek, S. M.C. (2022). Targeting food parenting practices to prevent early child obesity risk requires a different approach in families with a lower socioeconomic position. *Public Health and Nutrition*, 10. <https://doi.org/10.3389/fpubh.2022.1012509>
- Ling, J., Chen, S., Zahry, N. R., & Kao, T. A. (2022). Economic burden of childhood overweight and obesity: A systematic review and meta-analysis. *Obesity Reviews*, 24(2). <https://doi.org/10.1111/obr.13535>
- Meinen, A., Friese, B., Wright, W., & Carrel, A. (2012). Youth gardens increase healthy behaviors in young children. *Journal of Hunger & Environmental Nutrition*, 7(2-3), 192-204. <https://doi.org/10.1080/19320248.2012.704662>
- Nga, V. T., Dung, V. N. T., Chu, D.-T., Tien, N. L. B., Thanh, V. Van, Ngoc, V. T. N., Hoan, L.N., Phuong, N. T., Pham, V.-H., Tao, Y., Linh, N. P., Show, P. L., & Do, D.-L. (2019). School education and childhood obesity: A systemic review. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, 13(4). <https://doi.org/10.1016/j.dsx.2019.07.014>
- Obesity*. (n.d.). National Institute of Food and Agriculture. Retrieved July 16, 2024, from <https://www.nifa.usda.gov/topics/obesity#:~:text=NIFA%20provides%20funding%20and%20leadership,epidemic%20by%20conducting%20educational%20programs.>

- Obesity and overweight*. (2024, March 1). World Health Organization. Retrieved July 12, 2024, from [https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight#:~:text=The% 20prevalence%20of%20overweight%20](https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight#:~:text=The%20prevalence%20of%20overweight%20)
- O'Dea, J. A. (2004). Prevention of child obesity: 'First, do no harm'. *Health Education Research, 20*(2), 259-265. <https://doi.org/10.1093/her/cyg116>
- Procter, K. L., Rudolf, M. C., Feltbower, R. G., Levine, R., Conner, A., Robinson, M., & Clarke, G. P. (2008). Measuring the school impact on child obesity. *Social Science and Medicine, 67*(2). <https://doi.org/10.1016/j.socscimed.2008.02.029>
- Robson, S. M., Couch, S. C., Peugh, J. L., Glanz, K., Zhou, C., Sallis, J. F., & Saelens, B. E. (2016). Parent diet quality and energy intake are related to child diet quality and energy intake. *Journal of the Academy of Nutrition and Dietetics, 116*(6), 984-990. <https://doi.org/10.1016/j.jand.2016.02.011>
- Roche, E., Kolodinsky, J. M., Johnson, R. K., Pharis, M., & Banning, J. (2017). School Gardens May Combat Childhood Obesity. *Choices, 32*(1). <https://www.jstor.org/stable/90014633>
- Stuckrath, T. (2018, January 24). Religious Dietary Restrictions: Your Essential Quick Reference Guide. thrive! Retrieved July 16, 2024, from [https://thrivemeetings.com/2018/0/religious-dietary-restrictions-guide/The 17 goals](https://thrivemeetings.com/2018/0/religious-dietary-restrictions-guide/The%2017%20goals). (n.d.). Retrieved July 12, 2024, from <https://sdgs.un.org/goals>
- Variyam, J. N. (2001). Overweight Children: Is Parental Nutrition Knowledge a Factor? *FoodReview, 24*(2).
- Vaughan, K. L., Cade, J. E., Hetherington, M. M., Webster, J., & Evans, C. E.L. (2024). The impact of school-based cooking classes on vegetable intake, cooking skills and food literacy of children aged 4–12 years: A systematic review of the evidence 2001–2021. *Appetite, 195*. <https://doi.org/10.1016/j.appet.2024.107238>
- What is MyPlate?* (n.d.). USDA. Retrieved July 8, 2024, from [https://www.myplate.gov/eat-healthy/what-is myplate](https://www.myplate.gov/eat-healthy/what-is-myplate)
- What is Social Marketing?* (n.d.). NSMC. Retrieved July 8, 2024, from <https://my.noodletools.com/web2.0/bibliography.html>
- Yee, A. Z. H., Lwin, M. O., & Ho, S. S. (2020). Promoting healthier eating via parental communication: Development and validation of the active and restrictive parental guidance questionnaire (PARQ). *Health Communication, 36*(12), 1514-1526. <https://doi.org/10.1080/10410236.2020.1773696>