

Evaluating Strategies for Childhood Nutritional Education to Improve Institutional Outreach
regarding Sugar Intake

Introduction:

One of the most significant current global health issues is the increase of nutrition-related health conditions such as obesity, Type 2 diabetes, and elevated blood pressure found in children^{1,2,3}. In 2020 globally, 5.7% (38.9 million) of children less than five years old were overweight, with higher rates found in North America and Europe, primarily due to an increase in access to highly processed foods containing elevated levels of sugar and salt⁴. In the United States, the obesity rate among children from 2-19 years old has more than tripled from 5% in 1978 to 18.5% in 2016⁵. Moreover, underrepresented populations such as Latinx and Black children have experienced higher childhood obesity rates than white children⁵. Childhood obesity has also been shown to translate to adult obesity. Using five different US youth data sets and applying a simulation model to predict youths' growth trajectories into adulthood, Ward et al. 2017 found that the probability for obese children to remain obese at 35 years old increased with age, from 74.9% at 2 years old to 88.2% at 19 years old⁶. Additionally, severely obese children (youths with a BMI of at least 120% of the 95th percentile) had a higher risk of remaining obese as adults, with that risk of maintained obesity at 79% at 2 years old and 93.9% at 19 years old⁶. Other research has found links between the onset of childhood obesity and parental obesity^{7,8}. Furthermore, the upwards trend in nutrition-related childhood health conditions has been stimulated by the growing consumption of foods and beverages containing or sweetened with added sugar. While the Dietary Guidelines for Americans recommends that less than 10% of a person's total calories be composed of added sugars, about 66% of school-age children consume at least one sugar-sweetened beverage per day^{9,10}. These alarming trends, combined with the knowledge that the mean total lifetime cost for a child or adolescent with obesity is roughly \$179,000, with \$21,400 comprising of healthcare costs¹¹, has led to a growth in research regarding children's nutrition and children's nutrition education interventions^{1,2,3,12,13,14}.

Since ameliorating the health issues caused by children's malnutrition is complex and multifaceted, researchers have investigated a variety of solutions. For instance, Cotton et al. (2020) have found that teacher-delivered nutrition programs have a small to medium effect on enhancing the nutritional knowledge and reducing the sugar consumption of elementary-school children¹. Furthermore, other studies have found that successful and effective nutrition educational interventions such as community gardens, educational courses, and active-learning school curriculums, whether instituted in the school setting or by a non-profit organization, consist of parental involvement and a sustained combination of behavioral and educational approaches^{1,12,15}. While there has been a strong initiative by researchers to study the characteristics of effective programming to enable children to better manage their nutrition, there has been a specific lack of evidence and analysis of effective children's nutrition educational interventions in the area of sugar intake management, especially when focusing on the type of intervention that is most successful in encouraging children to better manage their sugar intake. Moreover, parental involvement in the formation of and the participation of these programs

remains a challenge for many non-profits focused on nutritional education, along with assessing the sustainability of the programming.

The primary focus of my research proposal concerns evaluating current strategies employed by parents in the home to encourage their children to better manage their sugar intake, along with evaluating various non-profit organizational strategies for change that have the most significant impact on families' decision-making. This will be done via quantitative and qualitative surveys of both parents and non-profits. In order to lower the incidences of nutrition-related health conditions in children, derive effective methods to decrease overconsumption of added-sugar products, and provide the future generation with the knowledge and tools to better manage sugar intake, it is crucial that parents are targeted throughout the creation and implementation of nutrition educational programming. As the research emphasizes, parental lifestyles and involvement are some of the main drivers of childhood nutritional health and wellness.

Research Questions:

1. What strategies and actions are currently being employed by parents in the home to better manage their children's sugar intake?
2. Which organizational strategy for change is most effective in impacting families' decision-making?
3. How have families' sugar intake been impacted by the COVID-19 pandemic?

Methods:

To identify what strategies are currently being employed by parents in the home to better manage their children's sugar intake, I will use a descriptive approach by conducting a qualitative and quantitative survey. This study will have a large sample size and survey a broad sample of parents across the United States with elementary school and middle school-age children. The survey will ask parents about their attitudes towards moderating their children's sugar intake along with their current strategies towards limiting intake and encouraging a healthier diet for their children. Parents will be asked to answer questions regarding three different aspects of children's nutrition (sugar intake, fat consumption, and fruit and vegetable consumption) to avoid potential biases and better understand relative parental concern about sugar intake compared to other food categories. The quantitative portion of the survey will include rating the parents' perceived importance to limit or encourage a specific aspect of nutrition on a 1-5 scale and identifying their children's estimated consumption level of a specific food category in terms of common food products. Qualitative portions of the survey will include describing the parental rationale behind limiting or encouraging a specific aspect of nutrition and strategies employed in the home to limit or encourage children's consumption. The proposed data analysis will graph a relationship between parents' perceived nutritional knowledge and their children's sugar consumption level. Potential parental demographic information may include the respondents' states of residence, zip code, and/or race and ethnicity. The respondents' data can then also be analyzed based on socioeconomic status and race. To cross-validate this data, a small sample of parents will be closely monitored and incentivized to aid in more

in-depth research, such as quantifying what their children are eating in a week. Then, this data will be compared to the larger survey data to identify a correlation. Other limitations besides cross-validating the data will be acquiring a sample size that is broad enough to mirror the actual nationwide trends and remaining cognizant of intermediate variables such as food deserts that will result in higher levels of poor child nutrition despite parental nutritional knowledge.

In order to evaluate the effectiveness of different non-profit organizational strategies on enabling families to better manage their children's sugar intake, I will utilize a correlational, case study approach with the help of potential partnerships with St. Louis area nutrition education organizations. Potential partners will be different non-profit nutrition education organizations with the goal to improve the nutritional wellness of the St. Louis community that feature interventions geared towards parents of elementary schoolers and middle schoolers, elementary school-age and middle school-age children, and both groups. For example, programming that I will analyze in the research study will include lecture-based and handout-based approaches along with more interactive programs such as cooking, community gardening, and recipe-making classes. I will develop pre- and post-surveys targeted towards the parents participating in each program type over a six-month time period. Through these surveys, I will be able to analyze to what extent the programming would impact the way families would address nutrition in the home. The surveys used in this portion of the research study will be similar in question content and data analysis to the broader parental survey, and the data cross-validation techniques will be applied to the pre- and post-surveys as well.

Since the COVID-19 pandemic has changed the ways that families have lived and worked, along with how they have bought, prepared, and consumed food products, it is important to investigate how the pandemic has altered families' sugar intake. To do this, I will use a descriptive research approach and survey both St. Louis area families with elementary school-age and middle school-age children and non-profit organizations in the St. Louis area. Potential topics that respondents will be asked to answer in greater detail will cover the COVID-19 pandemic's impact on transportation, families' participation and presence of nutritional programs found in institutions such as schools and workplaces, and estimated consumption level of specific facets of nutrition (including sugar intake). Non-profit organization leaders will be asked to describe how the pandemic has impacted different facets of the organization such as program attendance, the reach of their programming, estimated levels of time spent on different facets of nutrition education, and possible changes in the nutritional knowledge of their target audiences. This pandemic-focused research will feed into my core research question regarding the impact that organizational interventions have on families' sugar intake, nutritional decision-making, and access to healthy nutrition.

Intellectual Merit:

This work will extend the nutrition education field's knowledge on the interplay between non-profit organizations' interventions, families' decision-making, and children's nutrition by understanding how parental involvement in the creation, implementation, and participation of non-profit organizations' programming impacts children's sugar intake. The issue of parental

involvement remains a challenge for several nutrition educators designing programs, and the current research base has identified a need for more evaluation from parents. My work would fill this knowledge gap by providing data identifying the current parental nutritional knowledge base along with strategies that are being employed in the home to encourage better children's sugar intake management. This work also focuses on studying the actual practice of nutritional strategies and their effectiveness in impacting families' decision-making, rather than basing my approach on analyzing the theories driving nutrition education. This approach will provide for some interesting data regarding actual impacts and obstacles faced by non-profit organizations and parents. Additionally, my work will add valuable information to the sugar intake space of the nutrition education field, as there is a relative lack of evidence and analysis regarding nutritional education strategies that target children's sugar intake. My research will advance the knowledge in the nutrition education field and provide insights into how different organizational interventions impact how families and their children manage their sugar intake.

Broader Impacts:

The research proposed will be beneficial for not only nutrition educators working in the space of helping families better manage their children's sugar intake and lead healthy diets, but also for the parents and children in the community. Using the quantitative observations from my work, I will have been able to assign families to different quantiles and identify the parents that appear to have lower nutritional knowledge based on their survey answers. With parental consent, I will relay their results to my partner organizations and communicate their specific needs. This will enable the non-profit organizations to produce more targeted interventions and streamline their efforts for maximum impact in the St. Louis community. Additionally, with consent, my results will be sent to institutions such as relevant public schools and companies that are in charge of nutrition programs so they can use their tools to help develop a more accessible way to provide their nutritional resources. The pandemic-focused results from the St. Louis area will also be communicated to the St. Louis Department of Health with recommendations for how to ameliorate the predicted decrease in familial nutrition and wellness due to the pandemic. In turn, using my proposal's results, the city's public health department would be well-equipped to develop effective programming to decrease poor childhood nutrition due to sugar intake and carry out solutions that would benefit underserved members of the St. Louis community.

I certify that this proposal presents my original work.

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