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Five A Day, The Rainbow Way: A Nutrition Education Toolkit For Elementary School Aged Children

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Abstract

The capstone project I created involved the development of a nutrition education toolkit to improve fruit and vegetable consumption in elementary school children, aged 6-11 years old. The toolkit was developed based on the Social Cognitive Theory (SCT) and consists of a classroom based 10-minute animated video, an interactive worksheet with rewards, and a supplemental take-home infographic. The infographic handout will serve helpful to parents who seek to reinforce the information at home and find ways to improve their child's eating habits. Poor consumption of fruits and vegetables is a major contributing factor to childhood obesity, increasing the risk for chronic diseases later in life. This education tool could hence be utilized for future implementations to prevent childhood obesity. With the literature showing an increased need for multicomponent nutrition education tools to influence child eating behavior, this 3 component toolkit aims to improve child awareness, knowledge, and self-efficacy, related to the healthy food choice of fruit and vegetable consumption. The current project describes the development of the toolkit.

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Introduction & Background

In the United States, childhood obesity affects over 14.7 million children and adolescents. It is a condition defined as excess percentage of body fat that places individuals at risk for chronic and acute health complications including high blood pressure, high cholesterol, heart disease, type 2 diabetes, fatty liver disease and several cancers. These diseases are detrimental to a child's health and in the long run causes many problems as they grow past adolescence. In some cases there are no obvious symptoms other than weight being above normal. In other instances, other aspects of a child's health, fitness, self-esteem and performance may be impacted. The pathologic process is associated with multifactorial causes such as genetics, individual and family reasons, psychological and socioeconomic reasons, organic pathology, and even government policies.[1]

An individual's physical and social environment can play a role in lifestyle choices that can lead to obesity. Factors that create energy imbalance include a combination of poor eating habits and reduced physical activity. In addition, lack of nutrition education and knowledge on healthy dietary habits often influences one's choices as well. As such, there is a need to target these influencing factors. Specifically, it has been shown that eating a diet rich in fruits and vegetables can help reduce the risk of chronic illnesses like obesity. Despite the proven positive health benefits, only 1 in 10 Americans consume enough fruits and vegetables daily. The United States Department of Agriculture recommends that children should consume 1.5 to 2 cup equivalents of fruits and 2 to 3 cup equivalents of vegetables daily.[3] Although this information seems fairly simple, it is not known and executed by the majority of children.[4] In the United

States, less than 50% of children of the ages 6-11 consume enough fruits, and less than 12% consume enough vegetables. Consequently, these statistics of inadequate consumption of fruits and vegetables is linked to poor health, constipation and increased risk of being overweight, obese, and developing several noncommunicable diseases.[4]

Increasing fruit and vegetable consumption can help to lower the risk of developing obesity. There are many methods of intervention and prevention which can be used to target this health issue.[1] Particularly, the use of educational programs may improve children's knowledge of the consumption of fruits and vegetables as shown in literature.[5,6,7,8] Through review of literature and analysis of previous interventions and studies, the need for educational programs was assessed to be successful in raising awareness to the importance of fruit and vegetable consumption.[5,7] Further evidence has also shown that the use of multimedia and animated content is successful in grasping the attention of young children.[8,9,10,11] Hence to educate elementary school aged children, the proposed study is to create an educational tool which consists of an animated video and take-home worksheet, which will serve as an informational handout for children. The handout will also serve helpful to parents who seek to reinforce the information at home to find ways to improve their child's eating habits.

A variety of interventions and interactive materials captivate the attention and mind's of young children in terms of education. The Social Cognitive Theory (SCT) is the theoretical basis by which this educational nutrition tool will be based on. A central claim of social cognitive theory is the concept of self-efficacy which is an individuals' belief in their capability to perform a behavior. The use of the SCT in different

educational programs has helped to improve self-efficacy and behavior that may contribute to proper consumption of fruit and vegetable in children.[8] Essentially use of SCT within this educational project will help to assess the relationships between knowledge, behavior, and self-efficacy as it pertains to fruit and vegetable consumption amongst elementary school children.[8] Moreover, there is a substantial amount of evidence that supports the basis for creating an interactive campaign that demonstrates the importance of fruits and vegetables consumption in elementary school children as a way to reduce the risk of childhood obesity.

Project Aim & Objectives

The aim of this project is to develop a nutrition education toolkit designed to help improve consumption of fruits and vegetables in elementary school aged children in order to prevent and reduce the risk of childhood obesity. The main objective is to help children understand the importance of consuming an adequate amount of fruits and vegetables everyday as a preventative measure to the onset of obesity in their adolescence. By changing their eating patterns to incorporate the recommended amount of fruits and vegetables, alongside the help of their parents, children will be able to reduce caloric and unhealthy fat intake, as well as feed their bodies the essential nutrients it needs. By modeling this project on the central concepts of the social cognitive theory, we can effectively create an educational tool that will improve knowledge and self efficacy related to fruit and vegetable consumption which will lead to better health outcomes and habits. Overall through this project, the desired outcome is

to execute the creation of a nutrition education tool that will not only emphasize the importance of fruit and vegetable consumption, but bring about positive attitude and behavioral changes towards reducing the risk of childhood obesity.

Hypothesis

Interactive educational tools are successful in increasing knowledge and awareness of the importance of consuming fruits and vegetables amongst elementary school aged kids, as well as raise their self efficacy in ability to reduce risk of childhood obesity.

Literature Review

Childhood Obesity

Childhood obesity is defined as excess percentage of body fat that places individuals at risk for chronic and acute health complications including high blood pressure, high cholesterol, heart disease, type 2 diabetes, fatty liver disease and several cancers.[1] An imbalance of intake of calories and expenditure of energy is essentially what leads to childhood obesity. Medically, it is defined as having a body mass index at or above the 95th percentile for age and gender. Furthermore, less energy use by physical activities combined with high caloric intake of food and drinks by quantity, quality, and frequency leads to obesity.

Obesity is a disease that has multiple causes and effects on an individual including biological, psychological, environmental, and societal factors.[1] Biological influences are typically genetic predisposition, hormone levels, and gender.

Psychological effects of childhood obesity include low self esteem, avoidance of emotions, poor body image, negative core beliefs, and binge eating. Some environmental influences to childhood obesity include diet, physical activity, exposure to endocrine disruptors, and bioavailability. Lastly, societal factors that influence childhood obesity may include families and peers, culture, ethnic background, economic status or even education level and employment status. Outside of these categories many other lifestyle factors increase a child's risk of obesity. Changes like lack of home-cooked whole food meals, eating processed foods that are high-calorie, high use of foods with simple, refined carbohydrates or added sugar, regular consumption of high-carbohydrate beverages, and overeating fast foods.[1] In addition to these dietary lifestyle patterns, over engaging in screen time, decreased amount of sleep, and inadequate amount of physical activity contribute to the sedentary lifestyle factors that influence likelihood to develop childhood obesity.

With a look at the multifactorial causes of childhood obesity it is also important to consider the range of comorbidities and complications that are associated with the diagnosis. Obesity during childhood leads to many adverse health problems and creates an increased risk to having chronic diseases with a lifestyle of long-term complications.[1] Some common comorbidities fall under the following categories: cardiovascular, gastrointestinal, endocrine, neurologic, mental health, orthopedic, pulmonary, oncology, and chronic inflammation. Such complications that arise are hypertension, type 2 diabetes, gallbladder disease, migraine, depression, low self-esteem, back/joint pains and strains, sleep apnea,and increased risk of cancer.[1]

The impact and implications of childhood obesity present it to be a global health epidemic. If corrective and preventative actions are not taken then childhood obesity persists into adulthood with worsening symptoms and development of chronic illnesses. With understanding of its predictors, it is possible to evaluate the relevance of the risk of obesity as it relates to children's health and nutrition. Creating goals, changing dietary habits, implementing interventions, and education for prevention are key ways to shift the statistics of childhood obesity.

Statistics on Childhood Obesity

The numbers and statistics in childhood obesity pose a public health problem. The prevalence of obesity has nearly tripled between 1975 and 2016 worldwide. Globally, over 41 million children younger than 5 years were overweight or obese according to a 2016 study.[1] By age groups, the prevalence amongst 2- to 5-year-olds is 12.7%, 20.7% among 6- to 11-year-olds, and 22.2% among 12- to 19-year-olds.[2] According to the Center for Disease Control and Prevention, certain populations are impacted by childhood obesity more than others. Statistics show that obesity prevalence was 26.2% among Hispanic children, 24.8% among non-Hispanic Black children, 16.6% among non-Hispanic White children, and 9.0% among non-Hispanic Asian children.[2] By socioeconomic status, the statistics slightly differ. Children and adolescents aged 2-19 years in the lowest income group have an average of 18.9% obesity prevalence while the middle-income group have 19.9%, and just 10.9% in the highest income group. Evidently, the prevalence of obesity varies as other outside factors increase or decrease.

Childhood obesity is preventable and curable. A fundamental part of managing the risk of developing childhood obesity is reducing the consumption of foods that are high-fat, high-sugar, high-salt, energy-dense, and micronutrient-poor. Children can also optimize their health and lower their risks by limiting energy intake from unhealthy fats and sugars, engaging in regular daily physical activity, and increasing consumption of fruit and vegetables. From a nutrition standpoint, these goals are an integral part of gaining optimal health in early childhood and reducing risk of childhood obesity.

Fruit and Vegetable Consumption

Adequate fruit and vegetable consumption are crucial to a balanced diet and overall health, growth and development. Fruits and vegetables provide an excellent range of nutritional sources including potassium, folate, fiber, vitamin A, vitamin C, vitamin K,1 and many phytochemicals.[12] These nutrients provide health benefits such as reducing the risk of obesity, cardiovascular disease, stroke, diabetes, and certain cancers. By replacing energy-dense foods with fruits and vegetables, adequate and consistent consumption aids in healthy weight management and weight loss. Fruits and vegetables contain vitamins, minerals, fiber and antioxidants which help to boost the immune system to promote good health and fight against illnesses. More research shows that along with immune benefits, FV consumption also helps to improve mood, enhance cognitive skills, and raise academic performance.[12] The Dietary Guidelines for Americans says that individuals should aim to eat 5 servings of fruits and vegetables a day. For children, 1-2 cups of fruit and 1-3 cups of vegetables each day is sufficient for healthy and balanced diet consumption.[3,4,12]

Despite all the health benefits provided from a diet of consuming fruits and vegetables, American children still do not consume the nationally recommended amount of fruits and vegetables.[3] The CDC reports that one out of every three children do not eat the daily recommended fruit servings, nearly one half do not consume the daily vegetable amount, along with more than half drink sugary beverages at least once a day.[3,12] These statistics are presented heavily in the age group of elementary school aged children between 6 to 11 years old. Younger children and those in early adolescence typically present higher rates of FV consumption according to data.[3] The results from low amounts of fruit and vegetables in children's diets are heavy factors that influence and increase the risk of developing obesity and other poor health outcomes during early childhood.[3,4,12]

The Social Cognitive Theory

This nutritional project and the educational toolkit being developed is based on the concepts of the Social Cognitive Theory. The SCT is a theory that describes how humans make choices with a focus on the relationship between the individual, his or her environment, and behavior. A key part of social cognitive theory is the concept of self-efficacy. An individual's belief in their capability to perform an act is crucial to the outcome. Essentially, people have an extent to which they believe their behavior will result in a certain outcome and their efficacy expectations influence if they can or will achieve such behavior.[13] In a study, a SCT-based survey was the instrument created and used to focuses on knowledge, behavior, and self-efficacy for fifth grade students.[8] The purpose was to evaluate the healthy eating habits among the fifth grade student. The results showed that the SCT-based survey is a reliable and useful tool to assess

SCT-based elementary nutrition education programs. More so, strategic interventions are necessary to improve dietary behaviors regarding fruit and vegetable consumptions among elementary school students. Results like these show that interventions grounded in the SCT can result in positive outcomes in creating significant changes in healthy eating and/or physical activity. As such, there is evidence that supports this project being based on the social cognitive theory.

Methodology

Design

The start of this study was conducted by completing a systematic review of past and existing research and evidence of significant studies and interventions involving the effect of nutrition education to improve the knowledge of the importance of fruit and vegetable consumption in elementary school aged children. Sources were collected from PubMed, ScienceDirect, and Google Scholar. There were many keywords used in the search included: childhood obesity, fruit and vegetable consumption, nutrition education, elementary school aged children, nutrition intervention.

Based on substantial evidence of successful interventions, it was determined that for this project a 10-minute animated video would purposefully serve to educate elementary school aged children on the importance of fruit and vegetable consumption. The video consists of broad introductory information on fruit and vegetable consumption as it relates to childhood obesity. The theme of this project is “Five A Day, The Rainbow Way”. As such, the topics covered in the short educational video are also specific to increasing knowledge on how much fruits and vegetables should be consumed. Further

the video addresses the importance of eating a variety of fruits and vegetables in a creative way as well as the health benefits we receive from them based on color. To make the educational experience more interactive, a supplemental worksheet was created to measure how much the school children learned as well as information to take home to their parents.

Subjects

The target audience for this nutrition education project is elementary school aged children between the ages of 6-11. The information presented in this project is also directed towards the parents of elementary school children as it is useful to help them understand and emphasize the importance of consuming fruits and vegetables to prevent childhood obesity.

Intervention

For this nutritional campaign, an educational tool was developed with the objective of improving the knowledge that elementary school aged children have on the importance of consuming fruits and vegetables as a way of preventing and reducing the risk of developing childhood obesity.

This project describes the creation of our nutritional education tool with a future goal to present the animated video and pamphlet in a workshop-styled class by integrating it as a classroom lesson plan within the Broward County school district of South Florida in the United States.

Instruments

Surveys were created to measure knowledge on the importance of fruit and vegetable consumption. The pre and post assessment surveys once implemented will provide data on the participants eating patterns, attitudes, and self-efficacy as it pertains to fruit and vegetable consumption.

The materials of the current educational toolkit were created using Canva. Canva is a free online graphic design tool used to create social media posts, presentations, posters, videos, logos and more. For this project the platform was used to create visually appealing and engaging content for learning purposes. The worksheet was guided to the contents of the video. The toolkit also consisted of an infographic with information that served as “take home” supplemental material for the children and their parents. *(See Appendix A, B)*

Results & Discussion

Once the toolkit is implemented in schools and the survey results are collected, *(See Appendix C)*, we can conclude further what the findings imply for the population of elementary school aged children and how the use of an educational tool based on the SCT helps increase their knowledge and improve their behavior, attitudes and self efficacy. Pre-post survey data will be analyzed with the help of SPSS, utilizing paired comparison tests and other descriptive statistics. The outcome of survey results will also allow for further analysis of the research and evaluation of the hypothesis.

Conclusions and Future Implications

There are three main aspects of this project: the health issue, the nutrition, and the theory; childhood obesity, fruit and veggie consumption, and the social cognitive theory respectively. In consideration of these, Five a Day, the Rainbow Way will serve as a nutrition educational toolkit based on the social cognitive theory in order to improve knowledge and self efficacy related to fruit and vegetable consumption in elementary school children ages 6-11. The overall goal is that the presentation and distribution of this nutrition educational toolkit within elementary schools will help children and their parents understand the importance of consuming enough fruits and vegetables. Future plans include expansion of this nutrition project into full teachable workshops in classrooms and integration into science or physical education class lesson plans for teachers. In conclusion, through theory based nutrition education, we aim to improve knowledge, self efficacy related to consumption of fruits and vegetables, which in turn can improve healthy eating behavior, preventing and reducing childhood obesity.

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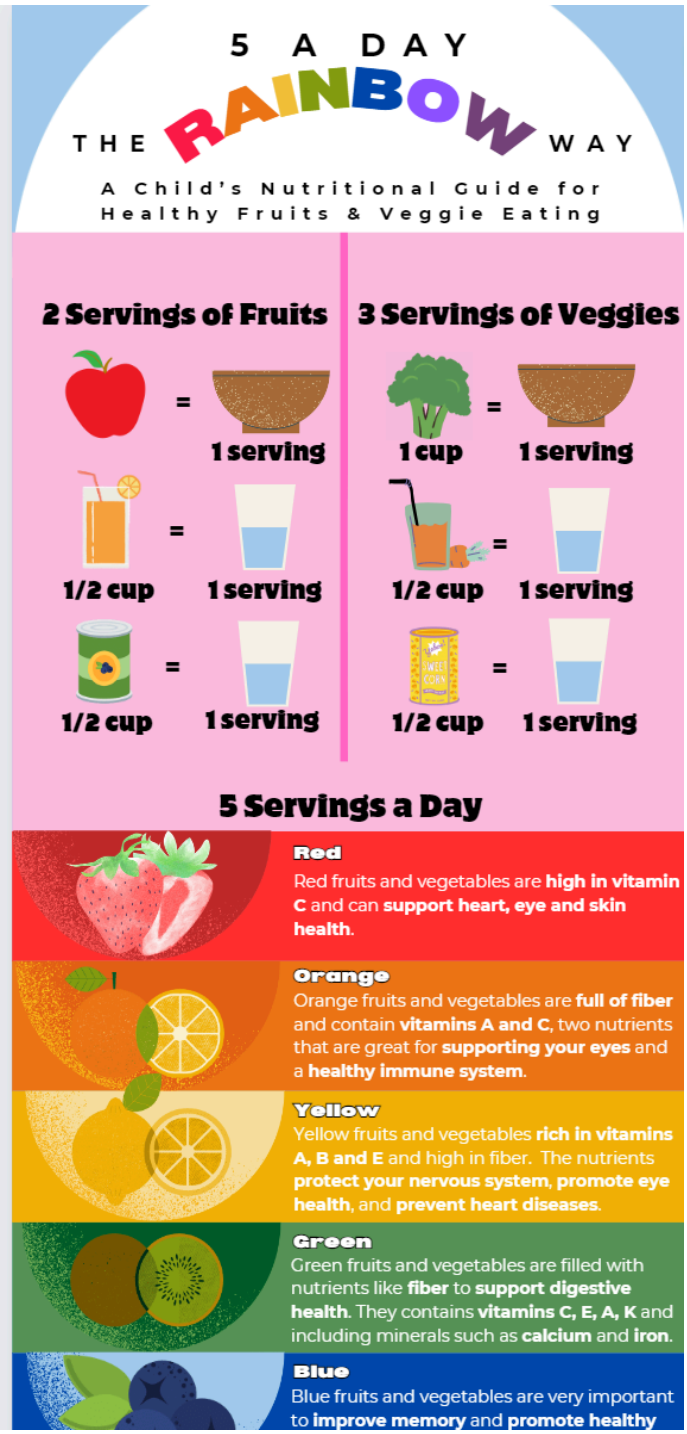
APPENDIX A

Link to Video:
https://www.canva.com/design/DAF07Syz5rQ/9d6tQhQhecflfd0IespE1A/watch?utm_content=DAF07Syz5rQ&utm_campaign=designshare&utm_medium=link&utm_source=editor

APPENDIX B



Link to Full Infographic:

https://www.canva.com/design/DAF0z2m3Jss/wiMiObobu7l46ToRcoD7Jw/watch?utm_content=DAF0z2m3Jss&utm_campaign=designshare&utm_medium=link&utm_source=editor

APPENDIX C

Name: _____

Date: _____

1) Childhood obesity is a condition in which a child is very _____ for his or her age and height.

a. normal
b. underweight
c. healthy
d. overweight

2) 1/2 cup of fruit juice is equal to 1 serving of fruit.

a. True
b. False

3) Eating 5 servings of fruits and vegetables total everyday can help children keep a healthy weight.

a. True
b. False

4) Match the fruit and vegetable colors to their benefits.

RED	support digestive health
ORANGE/YELLOW	improves eyesight and immune system
GREEN	support eye, heart, skin health
BLUE/ INDIGO/VIOLET	provides antioxidant support

Link to Worksheets and Surveys:

https://www.canva.com/design/DAF1TAotQII/3rOZgbFf1J07Cd9aVDGQqg/view?utm_content=DAF1TAotQII&utm_campaign=designshare&utm_medium=link&utm_source=editor