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Positive Impact of a Brief Nutrition Education Intervention on Underserved Adolescents: A Pilot Study

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Abstract

Objective: A pilot study to assess the impact of a small-group, behavior-based brief education intervention, on the nutrition and food buying habits of low income, at-risk adolescents' dietary and food purchasing habits.

Methods: Low-income at-risk adolescents (N=19) were recruited from three "mobile clinic" affiliated partner sites. Individual pre- and post- intervention dietary intake and food purchasing data were collected via 24-hour recall and shopping purchase logs respectively. The intervention focused on discussing food choices, nutrition principles, identifying food healthfulness, and creating alternative snack lists.

Results: Dietary recall data showed an increase in protein consumption (p=0.01); slight increase in dairy, fruit and grain; and decrease in vegetable consumption. Shopping trip data showed decreases in calories, protein, sugar, fat, and sodium, and increases in fiber.

Conclusions and Implications: This small-group, brief intervention highlights a positive impact of nutrition education on the dietary and food buying habits of a cohort of lowincome, at-risk adolescents, and demonstrates the utility and potential efficacy of similar interventions in improving the nutritional health of underserved adolescents.

Keywords: Behavior; Adolescents; Health; Nutrition; At-risk; Self-efficacy

Introduction

Obesity currently affects approximately eighteen percent of American adolescents, and along with associated co-morbidities, is one of the most pressing concerns of contemporary adolescent health. [1] While weight is the result of a myriad of factors stemming from genetics to lifestyle, diet has repeatedly been shown to be intricately linked to the development of cardiovascular disease, hypertension, diabetes, osteoporosis and depression. [2-6] A large body of epidemiologic data demonstrates diet quality following a socioeconomic gradient with energy-dense nutrient-poor diets preferentially consumed by persons of lower resources. [7-9] This is particularly salient with respect to adolescents who, as a group, consume the largest proportion of calories at quick service restaurants. [8] These facts highlight the need for comprehensive health education programs addressing self-efficacy in nutrition and eating behaviors with appropriate consideration given to local resources and financial means. This study aims to test the hypothesis that a personalized nutrition education geared towards at-risk underserved adolescents will have a positive impact on dietary intake and food shopping behaviors.

Methods

Study procedures

Three sites representing diverse groups of nineteen adolescents ages 15-23 in the San Francisco Bay Area were chosen for the intervention: a local Boys and Girls Club (BGC), LGBT Youth Center (YC), and Conservation Corps (CC), a charter alternative high school. All three sites were partners of a mobile clinic program (the "Teen Health Van") that provides free, comprehensive primary care services to uninsured at-risk youth. There were two inclusion criteria: a) being a Teen Health Van patient; and b) interest in participation. The study consisted of two brief small-group nutrition educational sessions for the adolescents from each site, led by a Registered Dietician. The impact on dietary habits and food purchasing were assessed through pre and post-intervention 24-hour food recall and pre and post-shopping trip purchase logs. Prior to the brief educational sessions, a 24-hour food recall outlined typical food intake utilizing one-on-one RD-patient interviews, following probes based on the USDA Automated Multiple-Pass Method. [10,11] Once 24-food recall data was gathered pre-intervention, participants were given ten dollars each to spend at a local market. No guidance was given and all food purchases were logged. After these baseline data were collected, the educational intervention occurred, which consisted of two group nutrition education sessions for the adolescents from each site. The first session was designed to stimulate discussion about food choices, basic nutrition principles and identifying the healthfulness of foods, and lasted one hour. The second session took place in a local market where participants were again given ten dollars each to spend. At this second

session the RD was available to answer any questions the participants had while shopping, but did not direct any shopping choices. This session lasted ½ hour. Participants applied a "Traffic-Light Snack" tool developed for the study to classify their snack choices as: red-light (stop, use sparingly), yellow-light (yield, caution), or green-light (go).

Data analyses

Nutritional values from each package were calculated and total values for each shopping trip were calculated (Table 1). To maintain uniformity across participants, values were taken from the entire package, and individual changes from pre-intervention baseline shopping trip were calculated for analysis. The 24-hour food recall data was analyzed through the MyPlate "Analyze My Diet" online tool (Table 2). [12]

	Mean Change in Macronutrient Levels				
Macronutrient (Pre- and Post-Intervention Rounded to Nearest Whole Number)	BGC N=5	YC N=2	CC N=12	ALL SITES¥ N=19	P value†
Calories (kcal) Pre- 3,062; Post 2,678.	-591.0	-520.0	-274.9	-383.9 (-939.7 , 171.9)	0.18
Protein (gm) Pre- 18.0; Post- 16.0	14.9	-11.0	-7.8	-2.2 (-23.5 , 19.2)	0.84
Sugars (gm) Pre- 155 Post- 98	-54.7	-52.5	-74.4	-66.9 (-135.6 , 1.8)	0.07
Fiber (gm) Pre- 18 Post- 22	1.8	-1.5	6.3	4.3 (-3.8 , 12.5)	0.30
Total Fat (gm) Pre- 118 Post- 94	-34.8	-11.0	-21.4	-23.8 (-58.0 , 10.3)	0.18
Saturated Fat (gm) Pre- 40 Post 28	-15.8	-16.5	-9.6	-11.9 (-26.9 , 3.0)	0.13
Trans Fat (gm) Pre- 2.0 Post 1.0	0.4	0.0	-1.7	-1.0 (-3.0 , 1.0)	0.34
Sodium (mg) Pre- 4,165 Post- 3,810	345.2	-177.5	449.9	356.3 (-1348.7 , 2061.2)	0.68

¥ Data presented with associated 95% Confidence Interval

† Calculated by two-tailed T-test

Table 1: Food Purchase Data - Average Change From Baseline by Macronutrient Level

ANOVA tests were performed to test variance between site groups for both 24 hour recall and shopping trip data. No statistically significant differences were noted 59 between groups, and the three groups were merged for analysis. Standard Error, 95% Confidence Intervals and p-values ($p<0.05$ was determined to be statistically significant) were calculated for the observed values (Tables 1 and 2).

Results

Shopping behavior

Shopping trip data showed a trend of decreases in average total calories (384 calories), protein (2.2 gm), sugar (66.9 gm), total fat (23.8 gm), saturated fat (11.9 gm), trans fat (1.0 gm), and sodium (356.3 mg) consumed; with an increase in the amount of fiber (4.3 gm). Two-

tailed t-tests showed that none of these values were statistically significant (a=.05) (Table 1).

24-Hour food recall

Data showed a statistically significant increase in average consumption of protein group foods (2.45 servings; p=0.01), and a trend towards increased consumption of dairy (0.17 servings), fruit (0.76 servings) and grains (0.83 servings), with a slight decrease (0.06 servings) in vegetable consumption. (Table 2).

	Mean Change in Number of Servings				
MyPlate Food Group[#]	BGC N=5	YC N=2	CC N=12	ALL SITES[¥] N=19	P value[†]
Dairy	-0.1	0.35	0.3	0.17 (-0.42 , 0.75)	0.57
Protein	3.2	2.35	2.2	2.45 (0.74 , 4.15)	0.01
Vegetables	0.3	-1.65	0.1	-0.06 (-0.62 , 0.51)	0.84
Fruits	-1.1	1.05	1.5	0.76 (-0.59 , 2.10)	0.27
Grains	3.0	4.9	-0.8	0.83 (-1.45 , 3.10)	0.48

[#] 1 Serving of Dairy, Vegetables or Fruits = 1 cup equivalent; 1 serving of Protein or Grains = 1 ounce equivalent

[¥] Data presented with associated 95% Confidence Interval

[†] Calculated by two-tailed T-test

Table 2: 24-Hour Recall Data by MyPlate Food Group Servings

Discussion

This pilot study demonstrates an initial overall positive impact of a small-group, behavior-based, brief education intervention on the nutrition and food buying habits of low income, at-risk adolescents, and provides a framework for future projects targeting nutrition and food buying habits in this vulnerable demographic. Over the last few decades, researchers in the field of nutrition have amassed a large body of research to quantitatively support a link between anthropometric measures and dietary intake. In an attempt to better understand the driving forces behind dietary intake, more recent endeavors in health promotion have focused on elucidating the dietary behaviors thought to be a large contributor to the obesity epidemic. While a majority of the evidence is focused on adults, a few of these studies have placed a particular emphasis on diverse adolescent populations. One cross-sectional study examined racial/ethnic differences in the dietary behaviors of a large cohort of overweight or obese adolescents in California. [13] Respondents were compared with regard to consumption of five categories of food: fruits, vegetables, French fries, soft drinks, and fast-food. Findings indicated significant racial/ethnic differences in food preferences, and highlighted the need for culturally and linguistically tailored interventions that consider how individuals' dietary behaviors are influenced by their racial/ethnic backgrounds. One longitudinal study of Spanish adolescent students showed that an ongoing classroom-based nutrition education intervention was successful in reducing obesity and improving various measures of metabolic function. [14]

Other cross-sectional studies have confirmed that there are significant racial, ethnic, and gender differences among underserved adolescents concerning food preferences, food-buying behaviors, and perceived barriers to healthy eating. [15,16] Thus, our study is novel in building on the need to address these issues with the implementation of a direct personalized nutrition intervention.

Although the cohort of youth participating was small, these preliminary results are promising, as this is a unique study addressing dietary intake and shopping behaviors in the context of improving self-efficacy in adolescents. In identifying potential means to establish meaningful and sustainable behavioral change surrounding nutrition amongst adolescents, this pilot study outlines a simple approach to empower youth to be more active participants in their dietary intake.

Limitations of the study include: 1) short timeframe of the intervention; 2) small sample size; and 3) adolescents volunteered to participate in the intervention, so were likely more interested in learning new information and changing their behavior, than adolescents in general. Further studies are necessary to fully determine the effect that this approach may have over time on dietary intake and food purchasing.

Similar to how the quantitative data indicates a positive impact of the educational intervention, additional qualitative data collected by

the researchers in the form of comments further supported the perceived impact. In the formative phase, it was noted that the participants had a low baseline level of nutrition knowledge. Throughout the study, it became clear that the knowledge deficit was not due to lack of concern. Particular comments such as "Wow, no one ever took the time to explain that to me" with respect to how to calculate calories in a bag of potato chips and "My boyfriend gets mad at me now because I take too long in the market reading food labels." suggest that this project has impacted the behaviors and knowledge of these adolescents beyond what the quantitative data shows.

Implications for research and practice

This and other public health interventions aimed to improve self-efficacy by addressing the more complicated structural factors surrounding diet can be an important addition to improving the health of underserved adolescents. The benefits for this research model are three-fold: first, it is a simple model which requires little start up resources; second, it applies the appropriate level of health literacy in utilizing tools that are easily understood by adolescents; and third, it focuses research efforts on food purchasing from local markets identified by the research participants. Therefore, this approach provides a personalized, attainable brief-intervention model that could be useful for organizations of any level. Future endeavors to expand upon these findings should focus on continuity and relationship building through implementing personalized educational intervention sessions.

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