



Kids in Nutrition: Evaluating the Efficacy of a Nutrition Program in First and Second Graders

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Abstract

Kids in Nutrition (KIN) encourages 1st and 2nd graders to lead healthier lives through interactive nutrition lessons taught by student volunteers that discuss the benefits of healthy eating. This study sought to determine if the curriculum effectively improved 1st and 2nd graders' nutrition knowledge and increased their likelihood of opting for healthier dietary choices. Assessments were given before and after the program, and retention of nutrition knowledge was examined. Students who participated in KIN showed significantly greater improvements in both nutrition knowledge and dietary choices when compared with controls, suggesting the KIN curriculum is effective.

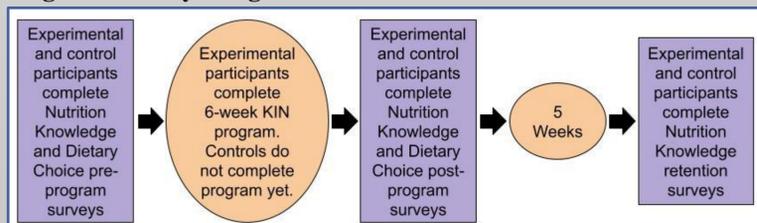
Introduction

Heart disease, obesity, and type 2 diabetes are highly prevalent in the United States, with obesity rates rising in children and heart disease being the leading cause of death.^{1,2} Research has shown that quality nutrition can have significant impacts on lowering the rates and severity of these chronic diseases, as well as offering many other benefits such as increased academic performance and improved mental health and well-being.^{1,3,4} Yet, according to the CDC, most school children in the U.S. receive far less nutrition education than recommended.⁵ As KIN aims to teach students about the value and benefits of nutrition, improving the effectiveness of our curriculum could have positive long-term effects on the quality of life and well-being of children in the community. In addition, the results of this study may demonstrate the value of nutrition education and encourage more schools to incorporate formalized nutrition education in their curriculum. Previous studies indicate that nutrition education causes teenagers to follow dietary guidelines more closely, but less research has been conducted among younger children.^{6,7} Assessing if this also applies to 1st-2nd graders is helpful in determining the best age group to direct nutrition education efforts. Upon demonstrating that 1st-2nd graders respond well to nutrition education, other programs may likewise direct their efforts towards younger students to encourage children to develop nutritious dietary habits as early as possible.

Methods

The program consisted of six weekly lessons taught virtually over Zoom by 3-4 volunteers. Topics included Water and Sodium, Fruits and Veggies, Grains and Proteins, Fats and Cooking Methods, Sugars, and Moderation and Balance.

Figure 1. Study design and timeline.



Methods (Cont.)

There were four experimental classrooms (two 1st grade, two 2nd grade classrooms) and five control classrooms (two 1st grade, three 2nd grade classrooms). Surveys were proctored by the students' teachers. Approval from the UCSB Human Subjects Committee was received. Two surveys were done:

Nutrition Knowledge: Worksheets were administered to assess students' ability to determine which food of two given options was healthier. Worksheets consisted of 12 picture-based questions, with 2 questions for each lesson topic. The order of the questions was changed for each survey, but the questions remained the same. Scores could range from 0-12, with correct answers receiving one point and incorrect answers receiving zero points.

Dietary Choice: Students were given a choice between two food options, either a fresh tangerine or a packet of fruit snacks, before and after the lessons. The goal was to determine if students were more likely to choose the healthier option (fresh tangerine) after receiving the lessons. Students were assigned a score of 1 if they chose the healthier option and 0 if they chose the less healthy option. The average scores represent the proportion of students who chose the healthier option.

Results

Nutrition Knowledge:

Due to attrition, the retention test was studied in a separate analysis with a small subset of students.

Figure 1. Average Nutrition Knowledge pre- and post-test scores.

61 experimental and 64 control participants completed the pre- and post-test. One-tailed paired t-test found a significant difference between the average pre- and post-test score of both experimental and control students. One-tailed two sample t-test found that the average improvement in scores was significantly greater in experimental students (1.49) than controls (0.59), $t(df=123) = 2.96$, $p\text{-value} = .0019$.

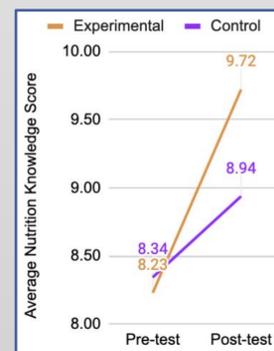


Figure 2. Average Nutrition Knowledge pre-, post-, and retention test score.



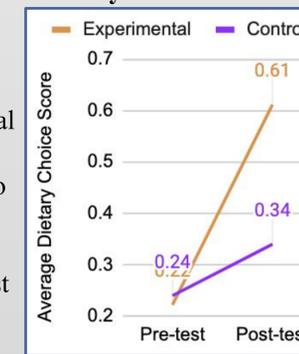
Results (Cont.)

41 experimental and 37 control students completed the pre-, post-, and retention tests. One-way repeated measures ANOVA found there was a significant difference between average scores in both experimental ($F\text{-value} = 35.008$, $p\text{-value} < .001$) and control students ($F\text{-value} = 4.374$, $p\text{-value} = .016$). For experimental students, Tukey's HSD post hoc test found that post- ($p\text{-value} < .001$) and retention ($p\text{-value} < .001$) scores were significantly higher than pre-test scores, while differences between post- and retention test scores were not statistically significant. For control students, Tukey's HSD post hoc test found that retention scores were significantly greater than pre-test scores, ($p\text{-value} = .013$), while pre- vs. post- and post- vs. retention differences were not statistically significant. One-tailed two sample t-test found that the average improvement between pre- and retention test scores were significantly greater in experimentals (1.88) than controls (0.65), $t(df = 76) = 3.10$, $p\text{-value} = .0014$.

Dietary Choice:

Figure 3. Average proportion of students who chose the healthier option in the pre- and post-survey.

The survey included 36 experimental participants and 50 control participants. One-tailed paired t-test found that experimental students' average score increased significantly from the pre- (0.22) to post-test (0.61), $t(df=35) = 4.72$, $p\text{-value} = .00002$. Differences between the pre (0.24) and post-test (0.34) were not statistically significant for control students, $t(df=49) = 1.53$, $p\text{-value} = .067$. One-tailed two sample t-test found that the average improvement in scores of experimental students (0.39) was significantly greater than the improvement in control students (0.1), $t(df=84) = 2.77$, $p\text{-value} = .0034$.



Correlation and Regression

Correlation and regression was conducted for any pre- or post-program measurement in which a participant completed both the Nutrition Knowledge and Dietary Choice survey, $N=190$. Point-biserial correlation found there was a statistically significant positive correlation between Nutrition Knowledge and Dietary Choice scores, $r_{pb} = .152$, $n = 190$, $p = .037$. Logistic regression was run, and the model was statistically significant, $X^2(df=1) = 4.492$, $p\text{-value} = .034$. The model explained 3.2% (Nagelkerke R^2) of the variance in dietary choices and correctly classified 65.3% of cases. The odds of students choosing the healthier option increased by 20.4% (95% CI [1.0%, 43.6%]) for a one-unit increase in Nutrition Knowledge score, $p\text{-value} = .039$.

Discussion

Following the lessons, experimental students showed greater improvements than controls in nutrition comprehension and in the proportion of students choosing healthier food options. Thus, we suspect that KIN lessons are effectively teaching students nutrition concepts and encouraging students to form healthier habits. Correlation and regression analyses indicated that improved health knowledge was associated with healthier food choices in first and second grade students, indicating that incorporating more nutrition education into elementary curriculum could help improve students' long-term health.

Limitations and Future Directions

Sample size was lower than expected and not all students completed both surveys due to absences resulting from the steep rise in Omicron Covid-19 cases. Repeating the surveys with larger sample sizes could yield more useful results.

The Dietary Choice survey examined behavioral tendencies, and because students were informed of the purpose of the study and its association with KIN during the consent process, priming may have impacted their decisions, making them more likely to choose the healthier option than in everyday scenarios. It would be useful to employ alternative methods to examine students' natural eating tendencies in which priming has less of an impact. While students showed improved food choices immediately after finishing the program, testing whether improved diet habits are retained weeks after completion would be informative.

Experimental students received an online format of KIN's lessons. KIN is typically taught in-person, with the remote option only being used as a result of public health concerns. Both Nutrition Knowledge and Dietary Choice should be reassessed with in-person lessons.

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