Kids In Nutrition Curriculum

Gianna Zeno and Mahsun Mirmohammadsadeghi
Faculty Advisor: Dr. Tarek Azzam
Department of Education, University of California, Santa Barbara

Introduction

Improper nutrition is one of the most influential contributors to poor health outcomes and noncommunicable diseases on a global scale. Unhealthy eating patterns have been recognized as major risk factors in cardiovascular disease, cancer, obesity and diabetes [1]. Childhood obesity rates in the United States affects about 17% of children, 3 times more than during the 1970s [2]. Childhood and adolescence are formative periods, where behaviors and ideas are learned and reproduced. Nutrition education in adolescence can create and transform perceptions regarding food that can guide eating patterns throughout a lifetime [1]. Inadequate nutrition knowledge has been shown to be associated with poor dietary choices and increased nutrition knowledge has been associated with healthy dietary choices [3]. We are aware that due to socioeconomic factors, healthy food options may not be accessible or affordable for families.

In order to teach children about complex ideas in a simple language, terms such as “good” and “bad” are used to label and identify food items that are respectively deemed “healthy” and “unhealthy”. This study is in conjunction with the KIN curriculum for first graders to investigate if these daily dualistic language choices effectively aid comprehension or promote a negative attitude towards food. KIN wants to educate children about nutrition and motivate them to incorporate healthy habits teaching moderation instead of "good" and "bad" habits into their everyday lifestyle. This study uses surveys to test whether the current KIN curriculum is effective.

We hypothesize that if the KIN curriculum effectively teaches the focused material on moderation, then students will have a greater retention and understanding of the material, which will reflect in higher scores on the Nutrition Knowledge Test and a more positive attitude with food on the Nutrition Attitude Test.

Methods

In this study, participants from three 1st grade classrooms, from two different schools, across Santa Barbara county were given two tests to assess their knowledge on nutrition for their grade level according to the KIN curriculum. There were 38 participants for the pre-curriculum experimental group surveys and a total of 14 participants for the post-curriculum experimental group surveys. Experimental classrooms were concurrently participating in the Kids in Nutrition program. The control group had a total of 18 participants that did not receive KIN instruction. Students only participated with informed consent from their parents or guardians.

The two surveys administered were 1) the Nutrition Knowledge Survey, and 2) the Nutrition Attitude survey. We administered the surveys in two consecutive sessions each for about 10 minutes with the Nutrition Knowledge survey first. This survey asked 12 questions and tested whether students could determine which of two options is the healthiest. Then the Nutrition Attitude survey was administered, consisting of 11 questions asking students to give their opinion on statements regarding specific food groups, food items and/or key concepts taught during the KIN curriculum. Tests were conducted in the format the classroom teachers used to gain the student’s attention, such as the use of auditory cues like “silent coyote”. Tests are then graded on a point system, visualized using R studio and Google Sheet, and statistically analyzed using the appropriate test associated.

1) The Health Knowledge survey data is visualized with Box and Whisker Plot on R-studio to see the distribution of test scores between the control, pre, and post-instruction. An ANOVA test is used to determine whether there is a significant difference in test scores between the groups based on their time with KIN. If the assumptions of normality and homogeneity are not met, then we can reject the null hypothesis.

2) The Nutrition Attitude survey was visualized using a stacked bar chart and statistically analyzed using the Likert test. Students were asked to rank statements according to a 3 point Likert Scale.The Likert Scale ranged from 1 (disagree) to 3 (agree). Corresponding icons such as an angry face and a smiley face were included to aid comprehension. To determine if any significant differences were made in classrooms participating in KIN, the average scores on each statement between pre- and post-surveys were calculated and compared using an unpaired t-test.

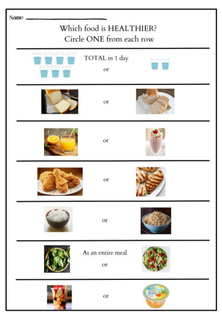
Results

1) Health Knowledge Test

Our null hypothesis is:
The difference in mean test scores on the Health Knowledge survey are the same across the three treatment student groups.

For an ANOVA, we tested the following:

1) Assumptions of normality (the data is normally distributed)
   a) Residual plots
      i) Fitted graph and qqPlot have an almost curved shape
      ii) NOT MET
   b) Normal-QQplot
      i) Data points are mostly within the line but curved
      ii) NOT MET
   c) Shapiro Test
      i) P-value of 0.004501
      ii) REJECT null
2) Assumptions of homogeneity (the outcome effects are the same for all)
   a) Residual plot
      i) Skewed left so the regression model
      ii) NOT MET
   b) Levene’s Test
      i) p-value is 0.63
      ii) FAIL TO REJECT null



2) Nutrition Attitude Test

We found a statistical difference between pre and post curriculum response for statements 1, 2, and 6. Since, the post-survey response pool did decrease by 36%, it is difficult to gauge the full impact of post-survey responses and whether our identification of statistical significance is valid or not.

Additionally, many students would answer the statements based on the images provided and not the statement itself, many responses were distinct from our predictions. For example, 7.5% more students disagreed with the statement “A lot of candy will make me feel sick”, in the post-curriculum survey, as opposed to the pre-curriculum survey. The statement “A little bit of candy is bad for me” saw a 21.1% increase in “disagree” responses and the statement “I can never eat processed food” demonstrated similar results with a 19.1% increase in “disagree” responses.

It is unclear if students have a better understanding of moderation or believe the food group is bad for them. We may be able to validate this assumption due to the increase of “disagree” responses by 7.5% for the statement “I can eat cookies all the time”. We are unsure if some of the responses were a result of the image before them, the statement they heard or random guessing.

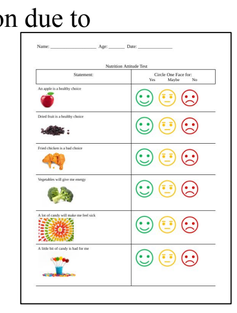


Figure 1.1: Health Knowledge Survey Results Box and Whisker Plot

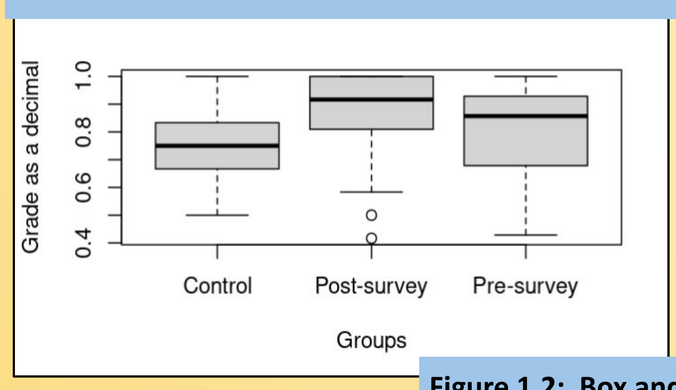
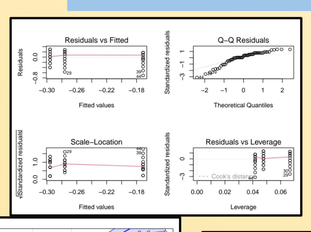
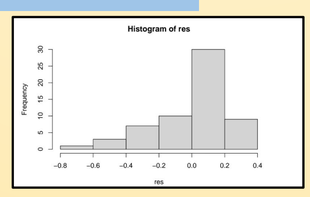


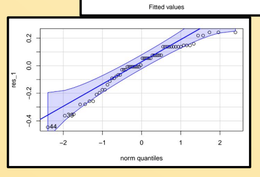
Figure 1.2: Box and Whisker Plot Table

Box and Whiskers Plot Data:					
	Min	Q1	Med	Q3	Max
Control (Peabody)	50.00%	66.67%	75.00%	83.33%	100.00%
Pre-Survey (Canalino classroom 1)	42.86%	67.86%	85.71%	92.86%	100.00%
Post-Survey (Canalino room #2)	41.67%	82.14%	91.67%	100.00%	100.00%

Figure 1.3: ANOVA summary



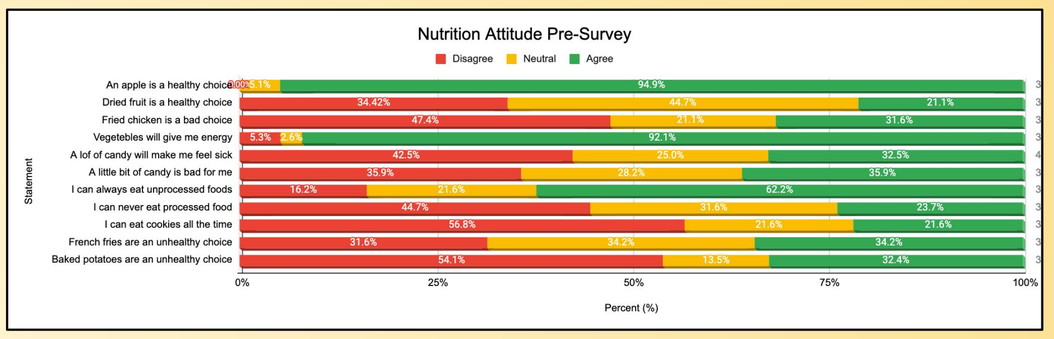


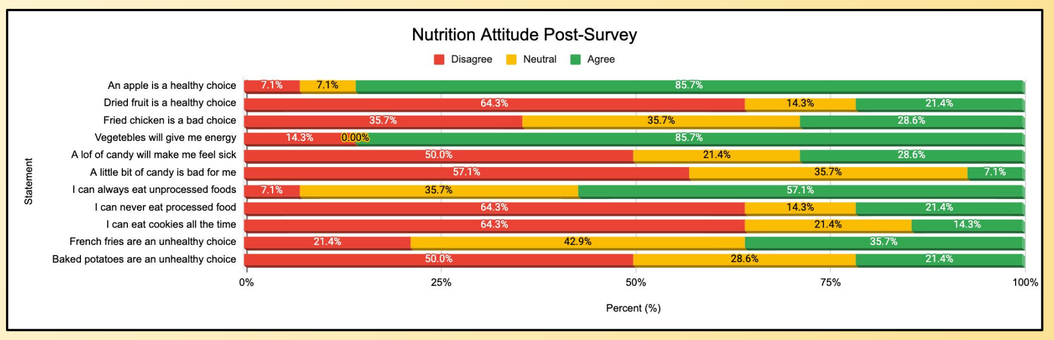


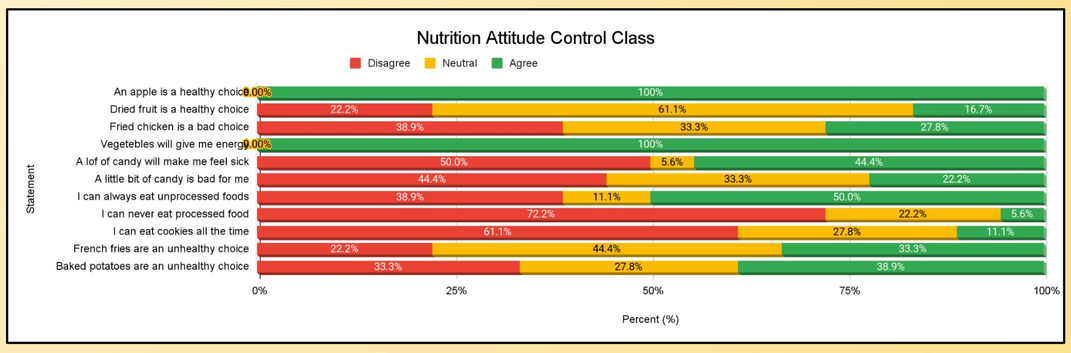

```
leveneTest(Grade~Student, test.data)

## Warning in leveneTest.default(y = y, group = group, ...): group coerced to
## factor.

## Levene's Test for Homogeneity of Variance (center = median)
##       Df F value Pr(>F)
## group  2  0.4717 0.6263
##       57
```

```
shapiro.test(res_1)

##
##  Shapiro-Wilk normality test
##
## data:  res_1
## W = 0.9382, p-value = 0.004501
```

Figure 2.1: Three Nutrition Attitude Survey Result Distribution







Discussion and Future Direction

For the Health Knowledge survey, the results are significant because our assumptions of normality and homogeneity variance are not met indicating that we can reject our null hypothesis. All the tests instead of Levene’s Test reject the null hypothesis by having a p value less than 0.05 or a non linear quality. The p-value obtained for Levene’s Test is larger than 0.05 due to our small sample size. If we had a larger sample size, we expect to see a lower p-value are larger differences in every aspect of this study. Our results generally show that ***there is a difference in mean test scores on the Health Knowledge survey that are across the three treatment student groups.***

For the Nutrition Attitude survey, we found three statements to hold a significant difference between the pre-curriculum survey and the post-curriculum survey. Since our pool of participants decreased by 36%, it is difficult to address the relevance of our results and the relationship between nutrition knowledge and nutrition attitude surveys. ***Due to unforeseen challenges that impacted our data collection, results for nutrition attitudes based on the KIN curriculum are inconclusive.***

It’s important to highlight our small sample size and the barriers we faced greatly impacted our data, like errors in surveying and inconvenient survey administration times. ***Further research is needed to investigate the larger impact of the KIN curriculum through the nutrition knowledge and nutrition attitudes surveys.***

<u>For future studies, we aim to:</u>

1. Simplify the language on the Nutrition Attitude survey by taking out some confusing double negatives and taking out food images. Take out “healthy” and “unhealthy” questions.
2. Simplify the pictures on the Health Knowledge survey to correlate with the Nutrition Attitude for consistency and minimize confusion
3. Survey second graders instead of first graders for more ease at administering the test due to them following the instructions better and overall retaining information more
4. Preplan with teachers a time to meet right before the school year begins and send our permission slips
5. Separate survey questions and responses. Provide only a numbered sheet to fill in the answers and display each question one at a time on the board or digitally to keep everyone on the same question
6. Try to go early morning, not after lunch or near the end so maximize attention span

Barriers

Certain challenges were faced in coordinating and conducting the surveys that affected the data we collected, directing us to change the format of our study.

In terms of coordinating with classrooms, we faced <u>difficulties with contacting participating schools a</u>nd their teachers on scheduling a time to come in as well as getting consent forms from parents. This setback caused the control group data to be 4 weeks late and only half of the post-survey students originally expected to be tested. Additionally, one of the experimental classrooms never communicated back with after repeated attempts from our research team to reach out and complete the post-curriculum surveys.

In terms of conducting the surveys, <u>student behavior and test structure affected the answers</u> the kids wrote. Students would not follow the directions given to them and had difficulties in comprehending the material language. Some students would convince their classmates to write the answer they thought was correct or shout it out to the class. Others would get distracted by the images or grow impatient waiting for the others, prompting them to continue with the test and circle an answer. We noticed students who went ahead and filled in an answer before we explained the question as a class slowly forgot the task at hand and filled out what they thought was delicious, not nutritious. In general, students asked a lot of questions about what food item they were seeing due to the complexity of the photos. Others were puzzled by the phrasing of specifically the Nutrition Attitude Test with the double negatives and positives. Taking all these factors into consideration, we aim to update both the Health Knowledge and Nutrition Attitude Test to be more effective at demonstrating the task at hand.

Literature Cited

[1] Wang, D., Shi, Y., Chang, C., Stewart, D., Ji, Y., Wang, Y., & Harris, N. (2013). Knowledge, attitudes and behaviour regarding nutrition and dietary intake of seventh-grade students in rural areas of Mi Yun County, Beijing, China. *Environmental Health and Preventive Medicine*, *19*(3), 179–186. https://doi.org/10.1007/s12199-013-0372-4

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[3] Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2012). Prevalence of Obesity and Trends in Body Mass Index Among US Children and Adolescents, 1999-2010. *JAMA*, *307*(5), 483. https://doi.org/10.1001/jama.2012.40

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For further information

Please contact ucsb@kidsinnutrition.org for more information about this and related projects is available at: www.kidsinnutrition.org