CHAPTER I

INTRODUCTION

The United States (US) has one of the safest food supplies in the world; however, consumers remain at significant risk for contracting a foodborne illness (1). According to the Centers for Disease Control and Prevention (CDC), there are at least 76 million cases of foodborne infections each year in the US (2). Pregnant women, young children, the elderly, people with immune system dysfunction, and individuals with chronic conditions such as diabetes, are not only at high risk for contracting a foodborne illness, but they often suffer serious health complications from this type of infection (1).

The safety of food and water is an important public health concern, so much so that it has been a major focus area of the *Healthy People* initiatives (3). One of the goals of *Healthy People 2010* is to change behaviors in the consumer population by "increasing the proportion of consumers who follow key food safety practices" (3). Those practices are "Clean, Separate, Cook, and Chill" (4). They address some of the most common causes of foodborne illness including cross-contamination, failure to cook food to the proper temperature, and poor personal hygiene of food handlers (5).

The Partnership for Food Safety Education (PFSE) is one of the organizations that use the four core food safety messages as the foundation for much of their educational outreach to consumers (1). The "Clean" message includes proper handwashing procedures and instructions for cleaning and sanitizing cutting boards and kitchen surfaces to reduce bacterial contamination. Measures to avoid cross-contamination are part of the "Separate" message. The importance of cooking or reheating foods to a safe

minimum internal temperature is covered in the "Cook" message. The "Chill" message stresses the need to store foods promptly at proper refrigerator temperatures (4).

In September 2009, PFSE launched its *Mythbusters* campaign to debunk four home food safety myths related to the core messages. They are:

Myth 1: Lemon juice and salt will clean and sanitize a cutting board.

Myth 2: Putting chicken in a colander and rinsing it with water will get rid of bacteria like *Salmonella.*

Myth 3: Once a hamburger turns brown in the middle it is cooked.

Myth 4: You should not put hot food in the refrigerator.

The Partnership for Food Safety Education's Web site has downloadable *Mythbusters* educational materials in text form. There is also a four-minute video available addressing the four myths that was developed by the investigator of this research (6). The availability of this video, as well as the text materials, provided an opportunity to study the effectiveness of video versus text-only educational tools on an audience's ability to recall food safety information at least one week later.

Because it is generally much more difficult and costly to produce a video rather than a written handout, a text-only educational document "can allow for wider distribution to [people] of different socioeconomic backgrounds" (7). Therefore, a study assessing the relative educational efficacy of a video format could help food safety educators determine how best to apply their financial resources in developing educational materials and may help them conduct a more informed cost-versus-benefit analysis of educational media.

Moreover, by collecting data on the sample population's age, previous food safety instruction, and experience with food handling either in a restaurant or in the home, it may be possible to determine additional factors influencing performance on a food safety quiz. This information could help food safety educators tailor their messages more effectively to their audiences.

The study attempted to answer the following three questions:

1. Will students who received video food safety information score higher on a post-intervention food safety test than students who read the same food safety information in text-only form?

2. Will students who received food safety information in either video or text form score higher on a post-intervention test, compared to the pre-test, than students who did not receive any food safety intervention?

3. Will students who have worked in a restaurant, received classroom or online food safety instruction, who are 30 years of age or older, or prepare more than 50% of their daily meals score higher on the pre-intervention test than students who have none of these traits?

The hypotheses for this study were:

Hypothesis 1: Students who viewed only the food safety video will perform better on a post-intervention test than students who read the same food safety information in text-only form.

Hypothesis 2: Students who received food safety information in either video or text form will score higher on a post-intervention test than they did on a pre-intervention test.

Hypothesis 3: Students who have worked in a restaurant, received classroom or online food safety instruction, who are 30 years of age or older, or prepare more than 50% of the meals they consume each day will score higher on the pre-intervention test than students who have none of these traits.

CHAPTER II

REVIEW OF THE LITERATURE

The Need for Food Safety Education

In its position paper on food and water safety, the American Dietetic Association (ADA) states that consumers need to be educated on where their responsibilities lie in the food safety chain (1). Sixty percent of college students surveyed in one research study said they would like more food safety information. Most of the students reported they work in a restaurant or cook for themselves and family members (8).

A study of 1,598 clients in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) found that Hispanics and Latinas scored lower than Caucasians on a food safety knowledge questionnaire. The majority of respondents sampled said they determined doneness of ground beef dishes by checking the color of the meat and juices rather than using a meat thermometer (9).

Educational Media: Video versus Text

In a 2005 study, Koehler and colleagues point out that educators assume that audiences connect more easily with a video and therefore learn more, but their research found that students were able to recall factual information as easily from text sources as from video. However, viewers of the video rated the information it contained as more important than the same information contained in the text, and they reported experiencing a greater "affective change" after watching the video (10).

Researchers in another study found that subjects who read brochures on skin self-examination methods scored better on a knowledge questionnaire than subjects who had viewed the same educational material in video form. The videotape was found to be more effective than one-on-one self-examination instruction presented by a trained nurse practitioner. In their discussion of findings, the researchers suggest that it might have been more difficult for research subjects to process and remember information that was delivered orally (11).

The authors of a 2001 study looking at the efficacy of video instruction state that "certain principles that cannot readily be observed in a conventional classroom setting may be demonstrated by using a videotape" (12). The researchers divided pharmacy students into three groups. One group saw a video on how tablets are made. Another group read a passage of text describing the same process and a third group saw an unrelated video. The results of pre- and post-intervention tests found that students who had viewed the video on tablet manufacturing scored significantly higher on the post-intervention test than the other two groups. They also scored significantly higher ($p<.001$) on their post-intervention test when compared to their pre-intervention test. This outcome was in contrast to the text group and the control group. Both of those groups scored 35% lower on the post-test than they had on the pre-intervention test (12).

Even when educational material is not in video form, it appears that the inclusion of pictures or illustrations with text results in significantly better comprehension of material than text alone. The authors of the study of instructional literature on medical devices attribute the increase in cognition to the "mental model theory" in that people integrate the visual images with the verbal or text component which aids in overall

understanding (13). A meta-analysis examining the use of pictorial supports in patient education appears to concur. Katz and colleagues state that people have a preference "for picture-based rather than text-based instruction" (14). They found that pictures combined with written or oral instructions improved recall of the information and overall compliance (14).

Reaching the Consumer: Tailored Messages

The authors of *Healthy People 2010* point out that if health communication is to be successful, it is important "to identify the optimal contexts, channels, content, and reasons" that motivate people to put health knowledge to use. They believe such tailored television and radio messages can be especially effective for ethnic groups (15).

Researchers in Washington, DC, used specially tailored messages in their randomized intervention trials with 238 African-American men. The study tested the effects of prostate cancer screening information on knowledge and conflict surrounding deciding whether to be screened. Subjects who saw a video or read the same information in a brochure demonstrated reduced anxiety about the screening process and a significantly greater grasp of information over the control group. The video, however, appeared to be slightly more persuasive than the text, at least in the near term, because more men in the video group said they planned to have a prostate specific antigen test within the next year (16).

Reaching the Consumer: Using a Role Model

The authors of the research study on prostate cancer screening concluded that using a role model can be particularly effective in getting health messages received and having those messages acted upon (16). African-American celebrity and prostate cancer survivor, Frank Robinson, served as the host for the video and also was featured in the printed material.

Researchers in another study made a similar finding regarding the influence of role models. Premenopausal women with no personal or family history of breast cancer were recruited for a study comparing videotaped breast self-examination instruction to non-videotaped instruction. After the intervention, both groups said they performed breast self-examination more often than they had at baseline; however, the group that received videotaped instruction performed the examinations at an increased frequency as compared to the control group. Based on regression analysis, the use of a role model featured in the video was found to be the most influential factor (17).

Reaching the Consumer: Non-traditional Venues

Using a convenience sample, researchers in two different studies chose hospital waiting rooms to conduct their health education video interventions with positive results (18, 19). In a study conducted in India, researchers showed patients a video on symptoms of myocardial infarction (MI). The group who viewed the video demonstrated increased knowledge of MI symptoms as compared to the control group who did not see the video (18). The authors of the other study, in an urban setting in the US, used a video that

discussed stroke symptoms. The patients who viewed the video scored significantly higher on a knowledge test than the control group who did not receive an intervention. One month later, the patients who had seen the video could still recall the information they had learned (19). Investigators in two other studies reported that viewers of a video had superior delayed information recall, up to several weeks after the intervention, relative to the groups who had been given the same information in text alone (10, 20).

CHAPTER III

METHODS

Institutional Review Board

After the Institutional Review Board determined this study had exempt status, data collection occurred during a three-week period starting October 21, 2009. Consent information informing students that completing the survey was an expression of their willingness to participate was provided at the beginning of a demographic questionnaire. The students were also instructed that individual participation was voluntary, anonymous, and their performance on knowledge tests would not affect their grade in the course.

Participants

The sample population consisted of 133 Georgia State University (GSU) undergraduate students enrolled in an introductory, non-major nutrition course open to all students (Table 1). The students had not yet received any food safety education as part of the course curriculum. Each of the seven class sections included in the research received two visits from the investigator, one week apart.

Data Collection Tools

The data collection tool was a single document that included the consent statement, the demographic questionnaire, and the food safety quiz. With the permission of each section professor, the investigator came to class to administer the data collection tools.

Demographic Questionnaire. This portion of the data collection tool was a brief self-completed questionnaire asking four closed-ended questions including the students' age category (17 to 29 or 30 years of age and older), whether they had ever worked or currently work in a restaurant, whether they did more than 50% of the food preparation for the meals they consume each day, and whether they had received formal training in food safety either in a classroom or online. These questions were necessary to collect data to test hypothesis 3 that examined factors that could influence students' performance on a pre-intervention test of food safety knowledge. This part of the questionnaire was only administered during the first visit to each of the class sections.

Food Safety Quiz. During the investigator's first visit and after the demographic questionnaires were filled out, students in all sections were given a food safety quiz developed by the investigator to serve as both the pre-intervention test and the post-intervention test (Appendix 1). The quiz consisted of eight multiple choice and five true/false questions, covering the food safety *Mythbusters* material. The quiz was not validated, but it was reviewed by faculty and by college students for clarity.

Two of the questions (3 and 6) related to the food safety myth that "Lemon juice and salt will clean and sanitize a cutting board." Questions 2, 4, and 12 were based on the myth that "Putting chicken in a colander and rinsing it with water will remove

bacteria like *Salmonella.*" The myth that "Once a hamburger turns brown in the middle, it is cooked" was covered in questions 5, 7, and 13. Questions 1 and 10 were based on the myth that "You should not put hot foods in the refrigerator." Three additional questions (8, 9, and 11) on proper handwashing and the number of cases of foodborne illness in the US were based on the material in the introduction to the video and the text document. Questions 1, 2, 6, and 7 were considered key questions because they most directly tested knowledge of the four home food safety myths featured in PFSE's *Mythbusters* campaign.

Students received written instructions at the top of the quiz to read the questions carefully and answer them in order. There was also a written instruction for the student not to return to a previous question once it has been answered nor change the answer. The purpose of this instruction was to minimize the students' ability to discern correct answers from the wording of related questions and receive a higher score that was not reflective of their food safety knowledge. There was also an "I don't know" answer option for each question to discourage guessing.

Learning Tools

After the pre-testing was completed, the four-minute food safety video was shown to the sections that had been assigned to see it. The text-only class sections were given the same information contained in the video but in the form of a one-page, read-only document (Appendix 2). Sections that served as the control were given the same pre-test as the sections receiving the video or the text interventions, but they received no food safety information.

One week after the first visit, the investigator returned to each of the seven class sections to administer the post-intervention food safety quiz, regardless of whether subjects had seen the video, received the text-only intervention, or were in the control sections that received no intervention.

Pre- and post-intervention quizzes were scored by counting the number of correct responses to each question, dividing by the total number of questions (13) and multiplying by 100%. Any question left unanswered, incorrect responses, and "I don't know" responses were not counted. Average pre-intervention and post-intervention test scores for the text, video, and control groups were calculated.

Data Analysis

Subjects were asked for no identifying information except for the day and time their class section met, their gender, and the last four digits of their cellular phone number. That information was used during data analysis to determine whether the student was present and completed a pre-intervention and a post-intervention quiz. Questionnaires and quizzes from any student who was not present for both weeks of data collection were excluded from the study.

Data were analyzed using SPSS 16.0 for Windows. Pre and post-scores were tested for normality in each group to determine whether there were any outliers that would affect the results. Descriptive statistics were performed for each group to determine age range, restaurant work experience, previous food safety education, and whether the students prepare more than 50% of their daily meals. To measure baseline food safety knowledge, a one-way analysis of variance (ANOVA) was conducted on the

pre-intervention test scores. After finding that there were no significant differences in pre-intervention test scores among the groups, an ANOVA with post hoc analyses was conducted on the post-intervention test scores to determine whether there was a significant difference in performance among subjects in the three groups to see how the interventions improved food safety knowledge. A paired t-test was performed for each the three groups to determine whether there was a difference between pre- and post-intervention test scores. Simple regression analysis was conducted to determine the influence, if any, of the four traits (age, restaurant work experience, online or classroom food safety education, whether students prepare more than 50% of their daily meals) on performance in the pre-intervention test. Statistical significance was determined using a p value $<.05$.

CHAPTER IV

RESULTS

Two hundred forty-three students were enrolled in the seven class sections used in this research. During the investigator's first visits to each of the class sections, 163 students completed pre-intervention food safety quizzes and demographic questionnaires. Thirty-five (15.3%) of those students were either absent from class or chose not to complete a quiz during the investigator's second visit to their class section. One hundred thirty-eight subjects remained in the sample population until five outliers in the video group were identified by normality tests and excluded from further data analysis. The sections were assigned so that all students in a particular section received a video intervention (n=59), text-only intervention (n=41), or no intervention (n=33).

The majority of study subjects (91%) were between 17 and 29 years old. Experience working in a restaurant was reported by 60.2% of subjects; 38.3% of subjects said they had received formal food safety education either in a classroom or online. The majority of respondents (57.9%) said someone else (e.g., restaurants, food service, family members, friends) prepared more than 50% of the meals they consumed each day (Table 1).

There was no significant difference between pre-intervention test scores among the three groups (p=.057). The mean pre-test score for the video group was 36.76%; the mean post-test score was 77.31%. (Table 2). The text group scored a mean of 31.89% on the pre-test and 68.29% on the post-test. Subjects in the control group scored slightly lower on the post-test (27.73%) than on the pre-test (29.60%).

Tests of Hypotheses

Hypothesis 1: Students who viewed only the food safety video will perform better on a post-intervention test than students who read the same food safety information in text-only form.

When tests of normality were conducted on the post-intervention quiz scores, five outliers were identified in the video group. After these subjects (49, 55, 68, 73, 91) were removed from data analysis, the video group scored significantly higher on the post-intervention test than the text group (p=.006) and the control group (p<.001).

Hypothesis 2: Students who received food safety information in either video or text form will score higher on a post-intervention test than they did on a pre-intervention test.

The video group scored significantly higher (p<.001) on the post-intervention quiz than the pre-intervention quiz. The video group increased its mean score from pre- to post-test by 40.55 points for a 110.3% improvement. The text group also scored significantly higher (p<.001) on the post-intervention quiz than the pre-quiz. The text group increased its mean score from pre- to post-test by 36.40 points for a 114.1% improvement.

Hypothesis 3: Students who have worked in a restaurant, received classroom or online food safety instruction, who are 30 years of age or older, or prepare more than 50% of the meals they consume each day will score higher on the pre-intervention test than students who have none of these traits

Regression analysis found that previous food safety education in the classroom or online was found to be the only significant predictor of performance on the pre-intervention test (p=.004), and students who had this trait scored higher than other students.

Other Findings

Performance by the control group

The control group that received no intervention scored slightly lower on the post-test than on the pre-test, but the difference was not significant (p=.466). The control group's mean score decreased by 1.86 points from pre to post-test for a 6.28% decrease.

The key food safety Mythbusters questions

Text and video interventions appeared to succeed well in getting across the basic *Mythbusters* information, as evidenced by the performance of all groups combined on the four key questions. Questions 1, 2, and 7 showed the three largest percentage improvements in pre- to post-intervention scores of 304%, 260%, and 265%, respectively. Question 6 had a 90% improvement from pre- to post-intervention test

scores; it was the fourth highest scorer in pre-testing for all three groups combined (Figure 1).

Questions where video outperformed text

Overall, video was the superior learning tool in this study. Students in the video group improved their pre- to post-intervention test scores by a wider margin than the text or control group in eight out of 13 questions, including all four key questions most directly related to the myths (Figure 2).

Questions where text outperformed video

Subjects in the text group scored higher than the video group on questions that required recalling precise details. For example, the text group scored a higher percentage improvement than the video group from pre- to post-intervention testing for question 4 which asked where to check a turkey for proper internal temperature (317% improvement for text, 153% improvement for video); question 5 on the minimum safe internal temperature of a hamburger patty (250% improvement for text, 58% improvement for video); question 9 on the minimum amount of time for handwashing (72% for text, 57% for video); question 11 concerning US cases of foodborne illness each year (200% for text, 29% for video); and question 12 on the proper minimum internal temperature for chicken (400% for text, 133% for video).

Low scoring questions

Though text outperformed video on questions requiring detailed answers, these questions were low scorers. When data from all three groups were combined, question 3 from the food safety quiz concerning the proper way to clean and sanitize a cutting board scored the lowest number of correct answers in both the pre-intervention test (14 correct) and the post-intervention test (42 correct). However, from pre to post-testing, there was a 200% improvement. Questions 5 and 12 asked for the correct minimum internal temperatures to cook a hamburger patty and a chicken, respectively. The questions scored the highest number of "I don't know" responses (22 and 25) in the post-test for all three groups combined. Questions 5 and 12 were also among the four lowest scorers for correct answers in the post-test (Figure 3). Forty-eight students answered question 5 (cooking hamburger) correctly, and 68 students answered question 12 about cooking chicken correctly.

High scoring questions

Questions where students scored well on the pre-intervention test appeared to be those based on "common knowledge." Question 8 testing knowledge of washing hands when handling food scored the highest number correct in both pre- and post-testing (125 correct, 126 correct). This question had the lowest pre- to post-test improvement (0.8%) and was the only question to receive no "I don't know" answers in pre- or post-testing in all three groups combined. Question 13, asking if it is safe to eat a very rare hamburger, had the second highest pre-test score of 73 correct and the second lowest pre- to post-intervention test score improvement of 30% for all three groups combined.

CHAPTER V

DISCUSSION

Results of this study suggest that delivering food safety education by video is a more effective modality than text in terms of audience recall of food safety information one week later. This finding is similar to results of a 2001 study on methods for teaching tablet manufacturing that found no significant difference (p=.48) in students' pre-intervention quiz scores but found that students who were then shown a video on tablet manufacturing scored significantly higher in post-testing (p<.001) than students who were given the same material in text form or shown an unrelated video (12). However, it should be noted that researchers in that study administered the post-tests immediately after the interventions rather than one week later (12).

Subjects in this research appeared to have very limited baseline food safety knowledge relating to the four core messages of "Clean, Separate, Cook, and Chill" that were the foundation for the material presented in video and text form (4). The sample population's mean pre-intervention test scores were comparable (<37% in each of the three groups) to the average score of 39% scored by college students in a 2007 study of food safety awareness (8). The authors of that study said it appeared the 440 college students in their sample had "a weak understanding of several basic food safety concepts" including proper sanitation, cooking, and storage (8).

Both video and text interventions appeared to have been successful in overcoming a lack of basic food safety knowledge, at least in the short term. Subjects in both the

video and the text groups raised their pre-test scores significantly in their post-tests, indicating that, even one week after the inventions, the students had retained a substantial amount of the food safety information that had been presented to them. Moreover, the four key questions covering the food safety myths showed a substantial improvement in knowledge from pre- to post-testing, and three of those four questions scored the top three greatest improvements. Of the four key questions, 1 and 7 covered proper cooking and storage of food that other researchers have found to be two areas where consumers are lacking knowledge (8, 9, 21).

Although there was a substantial improvement in pre- to post-intervention scores for the video and the text groups, students had difficulty grasping and recalling information that was more detailed, regardless of the intervention. For example, in question 3 of the post-test, most students could not remember that one needs a weak bleach solution *in addition to* hot water and soap to properly clean and sanitize a cutting board. Similarly, Questions 5 and 12, relating to proper minimum internal temperatures to cook ground beef (160° F) and chicken (165° F) were also among the most missed in the post-tests (Figure 3). However, for questions 5 and 12 as well as question 4 that asked about where a turkey should be checked for proper internal temperature, there was a greater percentage improvement in the text group over the video group. This finding implies that detailed information might be better recalled from text rather than video. Possible ways to overcome this issue when producing a video would be to reinforce the audio with text appearing on the screen, provide an accompanying brochure for the audience to take home, or direct the audience to an appropriate Web site.

The five outliers on the post-test scores were found in the video group based on the normality tests. The decision was made to remove them from data analysis because the five subjects had an average of three "I don't know" answers per person on the post-intervention test as compared to the remaining subjects in the video group who had an average of 0.27% "I don't knows" per person. The liberal use of the "I don't know" option in the post-test by the outliers, relative to the other subjects in the video group, seemed to indicate that the five outliers might not have made a good faith effort to answer the questions in the post-intervention test.

There were several limitations to this research. When the class sections were being assigned to each of the three groups, the investigator made an effort to make the sample groups as even in number as possible by checking the student enrollment for each section. However, not every student who was present or participated in the first week of data collection during the pre-test and the intervention completed the second week of data collection. Ultimately, the experimental and control groups were not of equal number, but each group had a minimum of 33 subjects and a maximum of 59 subjects. Gender was evenly distributed (76 females, 57 males).

Another possible limitation of the research is that the presenter for the video was substantially older than the majority of the subjects in the sample population. This could have made them less receptive to the food safety information in the video. Two of the studies reviewed for this research found that a role model was the most influential factor in whether an audience retained and acted upon health information contained in a video intervention (16, 17).

The results of this research might not be applicable to all age groups because the sample population was overwhelmingly in the age range of 17 to 29 years. Therefore, it is not known how children or older adults would have performed on pre- and post-intervention tests in this study. However, using a video for food safety education might be effective in those two populations, particularly if the audience consists of pre-readers or older adults with literacy issues or visual impairments.

A follow-up time of greater than a week would be preferable to determine the long-term efficacy of food safety education from video versus text, but there are potential pitfalls due to lack of control of subjects between pre- and post-testing. For example, even with just a gap of a week between pre and post-testing, it is not known whether students in the sample population sought additional food safety information that might have favorably affected the results of the post-test. The investigator asked section teachers not to let the students know that they would be retested a week later. During the second visit to the class sections, the investigator did not observe any indication that students were expecting to be retested. Also, students had no incentive for studying food safety information during the week between the investigator's first data collection visit and the second visit because the students had been told during pre-intervention testing that the tests were not for a grade in the class. The pre- and post-intervention scores on the tests by the control group, which were almost identical, indicate that it is unlikely the students in any of the three groups sought out additional food safety information before the investigator's second visit.

Another limitation of this study is that the pre- and post-quiz was designed specifically for this research; therefore, it is new and has not been tested on a large

sample population. However, the questions were reviewed by faculty members and tested with a small group of college-aged students for clarity and readability before the data collection began. Also, the investigator was present during all data collection visits and did not observe any student expressing confusion over the wording of a question.

Future studies on the efficacy of food safety education in text versus video formats should be undertaken with a larger, more diverse sample population where it would be possible to analyze how younger and older populations as well as various ethnic groups respond to different educational formats.

This study found that video is more effective than text when used to deliver simple, direct messages. However, the data also indicate that more detailed information, such as proper internal cooking temperatures, might be best delivered in text form. Consumers are likely to benefit most from a multimedia approach to food safety education that includes videos, accompanying brochures, and related Web site content.

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TABLES

Table 1 - Demographic Data for Three Groups

	Video Group n=59	Text Group n=41	Control Group n=33	TOTAL n=133
Age (%)				
17-29 years old	91.5	90.2	90.9	91.0
30+ years old	8.5	9.8	9.1	9.0
Restaurant experience (%)				
Yes	66.1	61.0	48.5	60.2
No	33.9	39.0	51.5	39.8
Food safety education (%)				
Yes	40.7	36.6	36.4	38.3
No	59.3	63.4	63.6	61.7
Does less than 50% of personal food prep (%)				
Yes	62.7	56.1	51.5	57.9
No	37.3	43.9	48.5	42.1
Gender (%)				
Female	59.3	43.9	69.7	57.1
Male	40.7	56.1	30.3	42.9

Table 2 - Average Pre- and Post-Intervention Test Scores for Three Groups

	Video Group	Text Group	Control Group
Pre-test % Correct	36.76	31.89	29.60
Post-test % Correct	77.31[ab]	68.29[bc]	27.73[ac]

a = significance between Video and Control groups ($p<.001$)
b = significance between Video and Text groups (($p=.006$)
c = significance between Text and Control groups ($p<.001$)

FIGURES

Figure 1 - Percentage improvement on key questions (1, 2, 6, 7) in post-intervention test for all groups combined

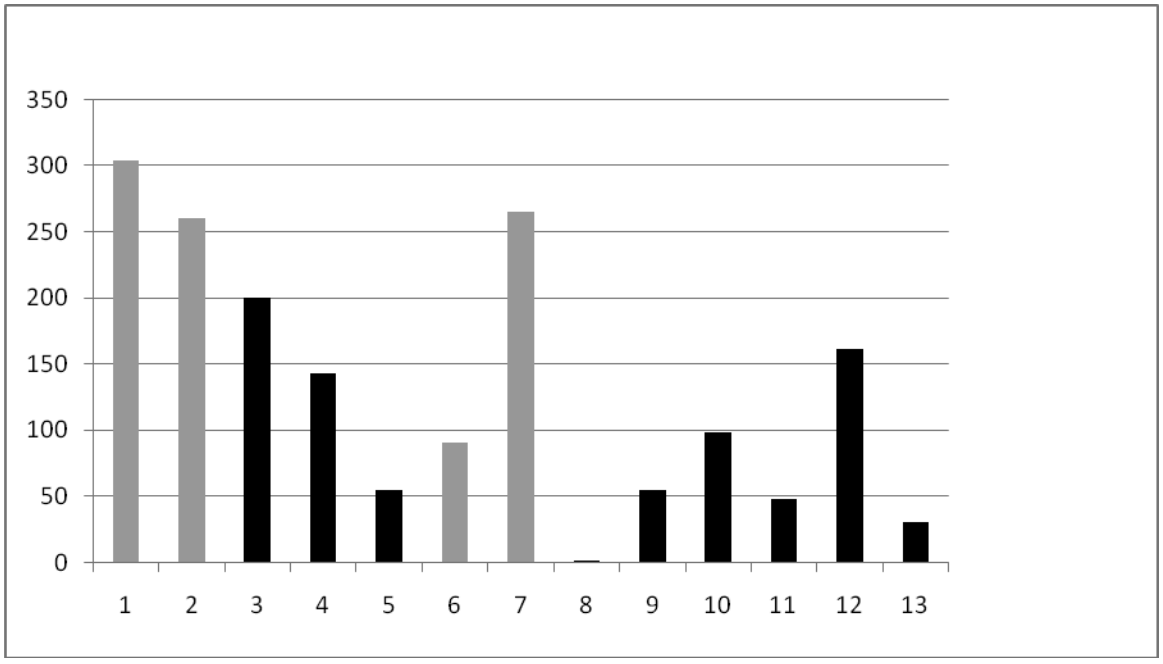


Figure 2 - Percentage improvement pre- to post-intervention test scores by group

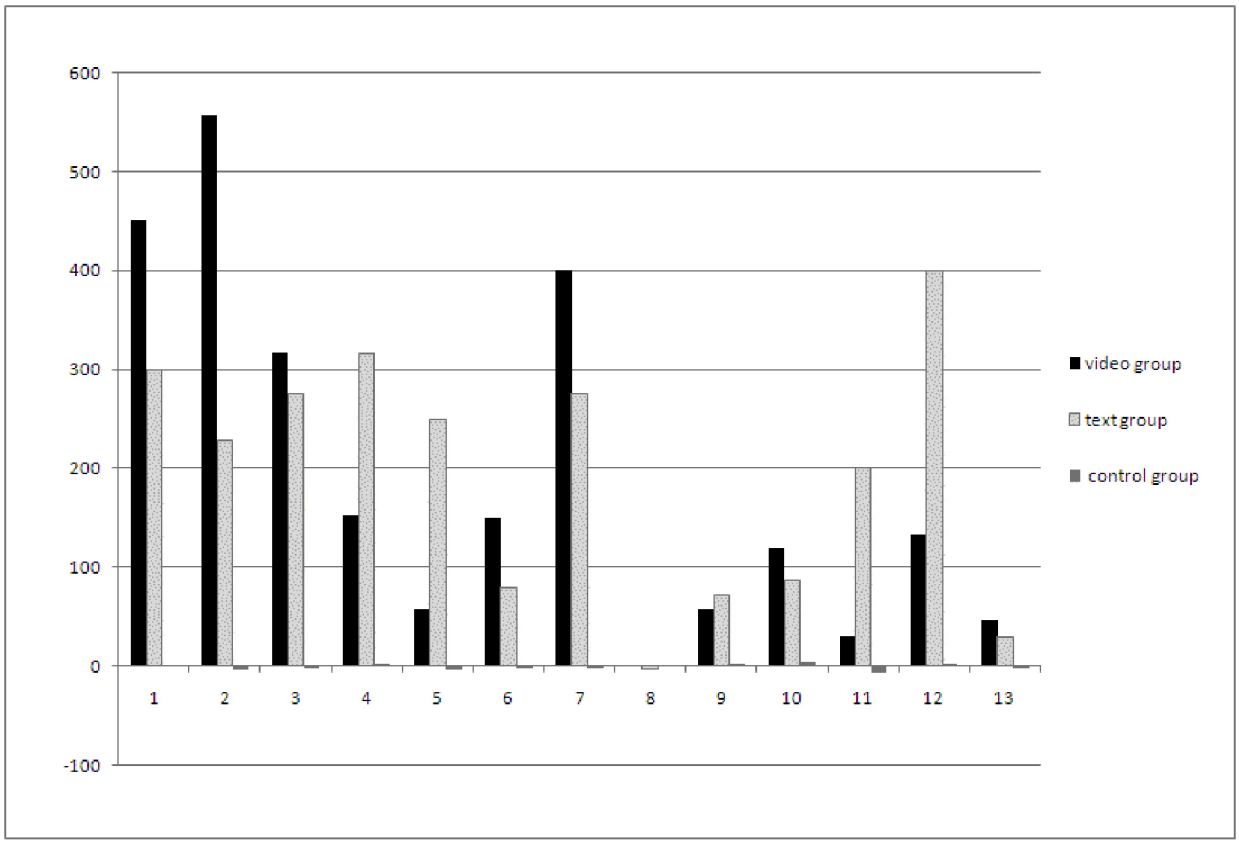
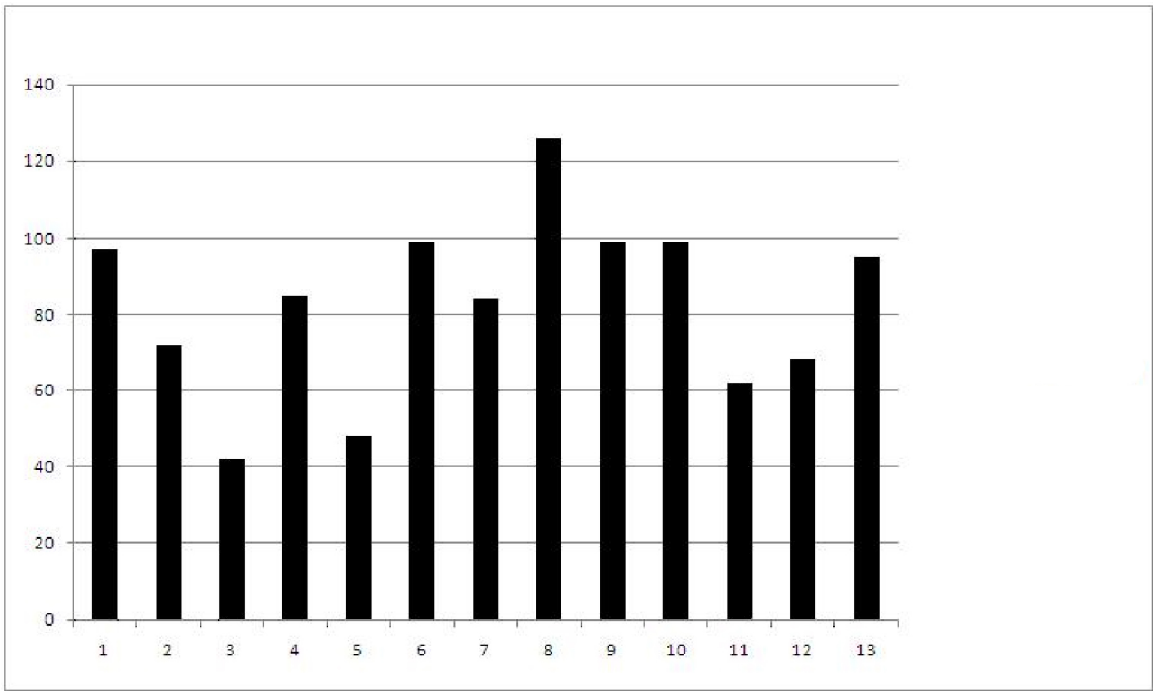


Figure 3 – Post-intervention test scores by question.



APPENDIX 1

PRE-INTERVENTION QUESTIONNAIRE

By taking this survey, you are expressing permission to participate. Participation is voluntary. Do not write your name on this survey. Results will be combined. No individual answers will be released, and no identifying information will be kept or recorded. Please answer each question honestly. Thank you for your participation!

When does this class meet? _____

What are the last four digits of your cell phone? (please fill in your answer in the spaces provided – if you don't have a cell, use the last four digits of your home/land line) ____ ____ ____ ____

These are the last four digits of my (circle one) cell # home/land line

What is your age group?

A. 17-29 years old B. 30 years and older

Have you ever worked for or are you currently working for a restaurant or other food service business?

Yes No

Have you ever received any specific food safety training either in a classroom or online? Note: this does NOT include informal food safety training from family members or friends.

Yes No

What is your gender?

Female Male

More than 50% of the food I eat in a typical day is prepared by other people (restaurants/take-out, cafeterias, family members, friends, roommates, etc.):

True False

APPENDIX 2

PRE- AND POST-INTERVENTION FOOD SAFETY QUIZ

Instructions: **Your answers to these questions are for research purposes only. Your scores will not be shared with your teacher and are not part of your grade for this class.** Please read the questions carefully before answering them. Please answer the questions in order. Once you have circled your answer and moved on to the next question, please do not go back and change your answer.

1. It's best to let hot foods cool on your kitchen counter before storing them in the refrigerator.

True False I don't know

2. Rinsing raw chicken or turkey under cool running water before cooking is a good food safety practice.

True False I don't know

3. Washing cutting boards with hot water and soap after each use is the safest practice to clean and sanitize them in order to get rid of harmful bacteria.

True False I don't know

4. You are cooking a turkey. Where should you stick the food thermometer to check for proper minimum internal temperature to determine if the turkey is safe to eat?

a. the thickest part of the breast
b. the innermost part of the wing and the thigh
c. a and b
d. I don't know

5. To be considered safe to eat, a hamburger patty should be cooked to a minimum internal temperature of:

a. 145° F
b. 160° F
c. 165° F
d. I don't know

6. Scrubbing cutting boards with a mixture of lemon juice and salt is the safest practice to clean and sanitize them to get rid of harmful bacteria.

True False I don't know

7. If you don't have a meat thermometer, another way you can tell if a hamburger patty has been cooked to a safe minimum internal temperature is to look at the middle of the patty. If the center looks brown, then the hamburger is safe to eat.

True False I don't know

8. When handling foods, when should you wash your hands?

a. after handling raw foods
b. before and after handling either raw or cooked food
c. before handling either raw or cooked food
d. I don't know

9. What is the minimum amount of time that you should spend washing your hands with warm water and soap?

a. 10 seconds
b. 20 seconds
c. 30 seconds
d. I don't know

10. What is the maximum amount of time cooked leftovers can be left sitting out at room temperature and still be safe to eat?

a. 2 hours
b. 3 hours
c. 4 hours
d. I don't know

11. About how many people get sick from a foodborne illness each year in the US?

a. millions
b. hundreds of thousands
c. thousands
d. I don't know

12. Before chicken is considered safe to eat, it should be cooked to what minimum internal temperature?

a. 170° F
b. 165° F
c. 160° F
d. I don't know

13. A hamburger patty served very rare is considered safe to eat IF:

a. the hamburger meat has no bad odors
b. the meat is very fresh and has been properly refrigerated
c. it's never safe to eat ground meat served very rare
d. I don't know

APPENDIX 3
POST-INTERVENTION QUESTIONNAIRE

By taking this survey, you are expressing permission to participate. Participation is voluntary. Do not write your name on this survey. Results will be combined. No individual answers will be released, and no identifying information will be kept or recorded. Please answer each question honestly. Thank you for your participation!

When does this class meet? _____

What are the last four digits of your cell phone? (please fill in your answer in the spaces provided – if you don't have a cell, use the last four digits of your home/land line) ____ ____ ____ ____

These are the last four digits of my (circle one) cell # home/land line

What is your age group? (please circle your answer)

A. 17-29 years old B. 30 years and older

What is your gender? (please circle your answer)

Female Male

Last week in this class, I participated in this research by filling out a food safety questionnaire.

Yes No

APPENDIX 4

DOCUMENT READ BY TEXT GROUP

Food Safety Mythbusters

It's important to learn how to reduce your risk of foodborne illness because every year millions of people get sick from something they ate.

We are the Partnership for Food Safety Education and we're here to test your home food safety IQ by looking at four common myths. But first, a handy reminder: always wash your hands thoroughly with warm water and soap for at least 20 seconds before and after handling food.

Myth: Lemon juice and salt will clean and sanitize a cutting board.

Fact: Lemon juice and salt taste great in salad dressing, but they won't do enough to kill disease-causing bacteria on cutting surfaces. Here's the solution to Fight BAC!: Mix one tablespoon unscented liquid chlorine bleach with one gallon of water. Set aside. After thoroughly washing cutting boards and kitchen counters with soap and hot water, pour on some of the diluted bleach solution and let stand for a few minutes. Let surfaces air dry or blot them with clean paper towels and you're done! A thrifty and effective way to help protect your family from foodborne illnesses.

For more information, go to www.fightbac.org and click on "safe food handling," then "clean."

Myth: Putting chicken in a colander and rinsing it with water will remove bacteria like *Salmonella*.

The truth is, that's just taking disease-causing bacteria for a swim – and you can splash bacteria around your kitchen. To FightBac -- get cookin'! Cooking poultry to a safe minimum internal temperature will kill bacteria that can cause illness. To tell if your bird is safe to eat, don't wing it – use a food thermometer.

To get a proper reading, check the thickest part of the breast and the innermost part of the thigh and wing. Make sure to avoid touching bone, cartilage or fat. When the thermometer reads a minimum of 165 degrees fahrenheit, the chicken is safe to eat – and that's something to crow about!

For more information, go to www.fightbac.org and click on "safe food handling," then click on "separate."

Myth: Once a hamburger turns brown in the middle, it is cooked.

Fact: Just because a hamburger is brown in the middle, doesn't mean it's time to slather on the ketchup and mustard. Eating undercooked meat can put you at risk for foodborne illness.

FightBac and stick it to germs with a food thermometer placed in the center of the hamburger patty. When the thermometer says 160 degrees fahrenheit, ground beef is cooked to a safe minimum internal temperature.

For more information, go to www.fightbac.org and click on "safe food handling," then click on "cook."

Myth: You should not put hot food in the refrigerator.

Fact: You can put hot foods in the refrigerator and it's best to do it as quickly as possible. That's because you might forget and leave food sitting out at room temperature for more than two hours. Food left out that long -- or in 90 degrees or higher for more than 1 hour -- has to be discarded because harmful bacteria have had a chance to grow.

To speed up the chilling process for large quantities of hot foods, divide into shallow containers before refrigerating. Remember: Fight BAC! and don't let your leftovers loiter!

For more information, go to www.fightbac.org and click on "safe food handling," then click on "chill."