

# Dietary Changes Among First Year University Students: The Peer-to-Peer (P2P!) Nutrition Project

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**Abstract:** Research is lacking in whether college nutrition courses lead to dietary improvements. Literature indicates that behavioral theory-based interventions can lead to nutritional improvements and that motivational interviewing and peer teaching can be effective for student-learning, but interventions combining these findings is scarcely reported in the literature. The purpose of this study was to evaluate dietary and nutrition self-efficacy changes among first year students (n=35) throughout a semester enrolled in a first-year university personal nutrition seminar course; and to assess whether intervention method (motivational interviewing versus traditional nutrition education) delivered by peers, impacted kilocalories, total fat, saturated fat and nutrition self-efficacy as reported at the end of the semester. Students completed pre-and post-measures including three-day food records, diet analyses, and surveys, and were randomly assigned to meet with peer nutrition counselors (upper division nutrition majors) who conducted sessions using either motivational interviewing or traditional nutrition education. Paired *t*-tests showed decreases in kcals, total fat, and saturated fat for the motivational interviewing group from pre-to-post-measure, but differences were not statistically significant ( $P>.05$ ). The traditional nutrition education group showed statistically significant decreases in kcals, total fat, and saturated fat ( $P<.05$ ) from pre-to-post-measure. Differences in nutrition self-efficacy for the motivational interviewing group was statistically significant ( $P<.05$ ), but was not for the traditional nutrition education group ( $P>.05$ ) from pre-to-post-measure. When comparing statistically significant changes in diet and nutrition self-efficacy between the two intervention techniques, analysis of covariance showed no statistically significant differences in kilocalories, total fat, saturated fat or nutrition self-efficacy at post-measure ( $P>.05$ ), therefore, intervention technique did not impact dietary or nutrition self-efficacy changes. Additionally, student perceptions of the peer-to-peer intervention used to attempt dietary change was evaluated. Positive perceptions of the peer-to-peer nutrition project indicated that the project is a viable teaching methodology and may be used by registered dietitians employed in various settings, particularly in other universities teaching similar types of nutrition courses. Results showed that incorporating peer-to-peer nutrition education in university courses may be effective in facilitating dietary changes and improved nutrition self-efficacy in college freshman.

**Keywords:** College student nutrition, motivational interviewing, peer-teaching.

## INTRODUCTION

Many college students exhibit unhealthy dietary behaviors, which put them at risk for heart disease, diabetes and nutrient deficiencies [1]. Most exceed the daily limit on fat, sugar and sodium intake, while few students meet the recommended intakes for many vitamins and minerals [1-5]. Targeting students early in their college career and finding successful ways to improve their dietary intake may help decrease rates of chronic disease and obesity within the population.

Many nutrition interventions succeed at increasing knowledge, but very few show actual improvements in dietary behaviors [3]. Self-efficacy, confidence in one's personal ability to perform a behavior, is one link between

translating knowledge into actions [6-8]. Studies show that self-efficacious people reduce barriers more effectively and feel more confident about translating their plans into behaviors [6, 8]. Therefore, student nutrition interventions should focus on improving self-efficacy, in addition to knowledge, if they are to be successful.

Research shows that interventions grounded in behavioral theory significantly improve health behaviors [9, 10]. Motivational interviewing (MI), a client-centered approach to behavioral therapy, explores one's barriers to change and aims to increase self-efficacy as a means to changing behaviors [11]. It is widely recognized as an important component of medical nutrition therapy for obesity and other health related behaviors [9], and research shows the positive effects of MI on college students [4]. Peer teaching has been used in a wide range of subjects and, although limited in the area of nutrition, research that uses peers as teachers show it is an effective way for students to learn [2, 12-14]. For example, in a qualitative study that examined graduate students in nutrition teaching undergraduates, improvements in health behaviors were

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observed [2], and similar research using adolescent peers as teachers confirms the positive influence peers have on changing adolescent health behaviors [12].

Although an abundance of research examines various nutrition interventions on dietary knowledge and intake in college students, there is little that demonstrates the efficacy of nutrition interventions [15]. The Peer-to-peer (P2P!) Nutrition Project was developed and implemented to address this gap in the literature. The purpose of this study was to examine whether there were differences in pre- and post-self-reports of kilocalories, total fat, saturated fat and nutrition self-efficacy (NSE) among first year students (FYS) after a 16-week semester personal seminar course that included peer lead interventions using either MI or traditional nutrition education (NE) conducted by upper level nutrition and dietetics (ND) students. The study also sought to determine if one method of peer teaching, either MI or traditional NE, was more effective at producing dietary and NSE improvements. Lastly, the researchers sought student feedback to determine their perception of the project's effectiveness, including whether the P2P! Nutrition Project should be continued in future semesters.

The research questions were as follows: 1. What self-reported dietary and NSE differences take place during a semester among students who are peer-counseled using MI traditional NE? 2. Does one counseling technique (MI or traditional NE) produce significantly better dietary changes and improved NSE among FYS than the other? 3. What are student perceptions of the P2P!?

## MATERIALS AND METHODOLOGY

### Design

The researchers teach in a didactic program in dietetics (DPD) at a public four-year southeastern university. One researcher taught a nutrition counseling course for upper level nutrition and dietetics (ND) majors and wanted to provide an experiential service learning opportunity for students to foster nutrition counseling skills. The other researcher taught two sections of a personal nutrition seminar, a general education course for FYS and sought a pedagogical method that might increase the likelihood of students using their new nutrition knowledge and adopt positive nutrition behaviors. A quasi-experimental design utilizing a pre-test-post-test comparison was used in the study. The university institutional review board approved the study and only volunteers who provided informed consent were included.

### SAMPLE

The participants described in this study consisted of a convenience sample of FYS (i.e. clients) enrolled in two sections of a personal nutrition seminar course at a public four-year university. Students received a summary of the research project, consent information and were then given the opportunity to volunteer. FYS (clients) received instruction throughout the course of the semester. A personal nutrition course schedule is found in Table 1. Course content for both sections, taught by the same instructor, was kept as similar as possible. Course content focused on improving personal NSE, nutrition behavior skill-building, and included study of nutrients and lifestyle behaviors as related to

nutrition. The textbook used for the course was *Nutrition & You* by Joan Salge Blake.

## MEASURES

A dietary self-assessment was assigned to all FYS enrolled in both sections of the personal nutrition seminar course. The dietary self-assessment included completion of a three-day food record, entering their food record into the United States Department of Agriculture's (USDA) online MyPyramid food tracker analysis program, and generation of MyPyramid reports. The reports used for the current study included the nutrient analysis, MyPyramid analysis and Dietary Guidelines analysis. MyPyramid food tracker was selected because it was a free web-based program that could be easily accessed by non-ND majors (i.e. FYS taking the personal nutrition seminar course). Students completed the dietary self-assessment near the beginning (pre-measure) and end (post-measure) of the semester.

Both sections of FYS students received the same directions for completing the dietary self-assessment assignment, including the food record. To increase the likelihood of more accurate estimation of portion sizes of food, the instructor/researcher explained servings sizes of various food, discussed and provided a copy of a serving size handout and showed samples of servings from the MyPyramid food photo gallery when she went over the assignment. In addition, the hyperlink to the MyPyramid analysis tutorial was posted in the course management system for students to refer to for the MyPyramid food entry and report components of the assignment.

The second measure was an electronic survey developed by the researchers. The survey was modified from the USDA's Diet and Health Knowledge Survey with the addition of a previously validated nutrition self-efficacy (NSE) scale [16] and questions related specifically to P2P!. The survey measured FYS perceptions of their diet adequacy, nutrition knowledge, nutrition self-efficacy and perceptions of the Peer-to-Peer (P2P!) Nutrition Project. FYS completed this survey near the beginning (pre-measure) and end (post-measure) of the semester.

## INTERVENTION

The P2P! Nutrition Project was designed by the researchers to help facilitate positive nutrition behavior changes of FYS enrolled in a first year nutrition seminar course while providing a service opportunity for upper level ND students enrolled in a peer nutrition counseling DPD course. P2P! involved four short, personalized nutrition counseling sessions conducted by upper level ND students (peer nutrition counselors) over a three month period. FYS were randomly assigned to a peer nutrition counselor that used MI or traditional NE. Pairs of students (one upper division nutrition counselor and one FYS) scheduled sessions on their own time that was most convenient for their schedules. FYS were instructed to take their first (pre-measure) dietary analysis reports (nutrient, MyPyramid and Dietary Guidelines analyses) to their initial nutrition counseling session with their assigned peer nutrition counselor. Upper level ND students were instructed to address areas uncovered in the pre-test diet analysis reports for both MI and traditional NE sessions, applying knowledge gained from the nutrition counseling course to the sessions.

The difference between the two intervention techniques were that the MI counselors allowed FYS to select own their dietary goals and be more self-directed in their sessions whereas traditional NE counselors gave counselor-generated

prescriptive goals. Each upper level ND student kept track of the counseling sessions and progress in a file folder that was turned in at the end of their nutrition counseling course.

**Table 1. Personal nutrition seminar course content.**

Class	Topic and In-class Learning Exercises	Assigned Reading
1	Introduction to Course	
2	Nutrition for your Pie Hole!	Chapter 1
3	Nutrition for your Pie Hole! Reliable Sources	Chapters 2 & 3
4	Your Diet Toolbox <i>How to Complete Food Log</i>	Chapters 4 & 5
5	Your Diet Toolbox	
6	Your Diet Toolbox <i>How to Complete Nutrition/Dietary Self-Assessment</i>	
7	Managing Your Mass <i>Receive Causes of Obesity Assignment</i>	Chapters 20 & 21
8	Managing Your Mass	Chapter 22
9	Solving the Obesity Problem Seminar	Seminar Readings – see Bb
10	Exam 1: Chapters 1, 2, 3, 4, 5, 20, 21, 22, Obesity Seminar	
11	Feedback on Exam 1 Hungry Heart (Food Insecurity)	Chapter 28
12	Hungry Heart (Food Insecurity) <i>Making America Stronger</i> video and discussion <i>Receive Sustainability Research Project Assignment</i>	
	Advising Day – No Classes	
13	Sustainability	
14	Sustainability	
	Mid-term Break – No Classes	
15	Sustainable Foods Seminar	Seminar Readings – see Bb
16	Exam 2: Chapter 28, Food Inc., Seminar	
17	Work on Sustainability Research Project:	
18	Feedback on Exam 2 Macronutrients: Carbs Glorious Carbs!	Chapters 7, 8, 9
19	Macronutrients: Lipids and Oils and Fats, Oh My!	Chapters 10, 11, 12
20	Macronutrients: The Particulars about Protein It's Soy Good Taste Test	Chapters 13, 14, 15
21	In class: Peer Review of Sustainability Research Project Drafts	
22	Special Campus Event – attend in lieu of class	
23	Micronutrients: Vitals on Vitamins and Minerals	Chapters 17, 18
24	Vitamingo! Review Game	
25	Final preparations/finalize draft of research project	
26	Sustainability Research Project Presentations	
27	Sustainability Research Project Presentations	
28	Final Exam Review	

**ANALYSIS**

Statistical Package for the Social Sciences (SPSS) statistical software was used for statistical analyses. For this study, statistical significance was  $\alpha = .05$  and the level of confidence was set at 95%. Extreme values (students with exaggerated food log results) were not included in analyses. Students who did not have both pre-and post-measures, students who were missing 50% or more of either pre-or-post survey answers, and non-volunteers (failed to provide consent) were also excluded from analyses ( $n=35$ ).

For the first research question, descriptive statistics were conducted for gender of FYS, type of intervention, kilocalories (kcal), total fat, and saturated fat. Dietary analysis reports generated from MyPyramid analysis were used to determine whether pre- and post-kcal and select nutrient consumption would change during the course of the semester. A series of paired *t*-test were conducted between pre- and post-measures to determine whether this change was statistically significant. Researchers gained permission to use a validated nutrition self-efficacy (NSE) scale within an electronic survey to evaluate changes in NSE among FYS at the beginning and end of the personal nutrition course. A computed score of the NSE was created in SPSS. Internal consistency of the NSE scale was pre- and post-measure,  $\alpha = .889$  and  $.912$ , respectively. Stem items elicited responses ranging from 1 (definitely not) to 4 (exactly true) with a computed score ranging from 5 to 20. The higher the score, the higher the self-efficacy. A paired *t*-test was also used to determine whether changes in NSE were statistically significant from pre-to-post-measure. For the second research question the researchers examined whether one intervention technique (MI or traditional NE) would produce statistically significant differences on post-measures of kcal, total fat, saturated fat, or NSE over the other. Post-measures were used as the dependent variables, intervention techniques were used as independent variables and the corresponding pre-measures were used as covariates. Homogeneity of regression was conducted to test interaction between pre-measures for each of the dietary components, NSE and intervention techniques. Withno interaction between covariate and independent variable for each measure, a set of one-way analysis of covariance (ANCOVA) were conducted to determine whether the intervention technique could be attributed to significant

dietary changes or changes in NSE. For the last research question, descriptive statistics of results from select student questions from the post-assessment surveys were evaluated to assess the student perceptions of the P2P! Nutrition Project, including whether the project was of value such that it should be continued in future courses.

**RESULTS**

Of 58 first year seminar students, thirty-five (14% male, 86% female) were included in the analysis. Eighteen (51%) were assigned to the MI sessions and seventeen (49%) were assigned to the traditional NE sessions.

Paired *t*-tests showed decreases in kcal, total fat, and saturated fat for the MI group from pre-to-post-measure, but differences were not statistically significant at the .05 significance level (see Table 2). The traditional NE group showed statistically significant decreases in kcal, total fat, and saturated fat ( $P<.05$ ) from pre-to-post-measure. Differences in NSE for the MI group was statistically significant ( $P<.05$ ), but was not for the traditional NE group ( $P>.05$ ) from pre-to-post-measure.

To compare the dietary changes at post-measure between the two counseling techniques while controlling for pre-measures, the assumption of homogeneity of regression was examined. There was no interaction in homogeneity of regression between pre- and post-measures for kcal, total fat or saturated fat, or NSE-efficacy and intervention technique, respectively, therefore, a series of ANCOVA were employed. Levene’s test exhibited that the homogeneity of equal variance was held in each ANCOVA test. The results indicated that there were no statistically significant differences in kcal  $F(1, 32) = 2.968$ ; total fat  $F(1, 32) = 1.631$ , saturated fat  $F(1, 32) = 1.307$ : or NSE  $F(1,31) = 1.18$ , ( $P >.05$ ) respectively between the two methods after controlling for each corresponding pre-test. Therefore, intervention technique did not seem to have a statistically significant effect on kcal, total fat, saturated fat or NSE.

In terms of student perceptions of the P2P! Nutrition Project, the vast majority of students (91%) either strongly agreed or somewhat agreed that their peer nutrition counselor was effective in helping improve their eating habits, the remainder indicating that they either somewhat or strongly disagreed or did not know. Most (92%) of the

**Table 2. Mean, standard deviation and t-test result of self-reported MyPyramid dietary intake and nutrition self-efficacy (NSE) of students at pre- and post-measure for both MI and NE Groups.**

Variable	MI Group		P	NE Group		P
	M (SD) Pre (n=18)	M (SD) Post (n=18)		M (SD) Pre (n=17)	M (SD) Post (n=17)	
Energy (kcal)	1861 (438.52)	1813 (638.89)	.64	1951 (695.28)	1578 (574.19)	<b>.02</b>
Total fat (g)	75 (22.47)	70 (28.49)	.33	82 (29.72)	63 (28.17)	<b>.02</b>
Saturated fat (g)	24 (7.93)	22 (10.81)	.31	27 (11.01)	21 (10.23)	<b>.01</b>
NSE	15.18 (3.81)	15.87 (2.89)	<b>.04</b>	16.11 (2.56)	17.33 (3.16)	.36

Note: Significance of  $P < .05$  is shown in boldface.

students indicated that their peer nutrition counselor encouraged them to improve their eating habits. Most (89%) students also reported having a good relationship with their peer counselor and the same proportion indicated that their peer nutrition counselor helped them to understand the Dietary Guidelines for Americans. Descriptive results showed that 97% of students either strongly or somewhat agreed with the statement, "Generally speaking, over the course of the semester, I met my nutrition goals." With regard to the question "Should this project be continued in future semesters?" the results were as follows: 56% strongly agreed; 22% somewhat agreed; 8% disagreed, 11% strongly disagreed and 3% did not know.

## DISCUSSION

This study examined self-reported dietary and NSE differences that took place during a semester among students who were peer-counseled using MI or traditional NE techniques. Results showed significant decreases in kcals, total fat and saturated fat among FYS counseled using traditional NE. There were decreases in kcals, total fat and saturated fat among students who were counseled using the MI technique, but the decreases were not statistically significant. While the kcals, total fat and saturated fat decreased from pre-to-post-measure per self-reports for both the MI and traditional NE groups, the values for both groups were lower than expected. For example, the mean intake of kcals of participants at pre-measure for both groups was already below the low-range 2000 calorie recommendation and still decreased over the course of the semester. One would expect calories among young adults to be higher given their easy access to typical university dining hall and fast food options. The lower calorie reports could be due to errors in reporting, selection of food substitutions not representative of their food records, or possibly nutrition concerns for this population. Another possibility is that because of the small sample size, a small number of student under-reporting calorie intake could skew the average and account for lower-than-expected values (for example, if a student was ill and did not eat very much and hence reported lower-than-average calorie intake). The results of the kcals and nutrient intake analyses raise more questions about the dietary habits and indicates a need for case analysis to examine further nutrition and dietary behaviors among participants. Overall, the results seem to indicate that a personal nutrition course that incorporates a peer-teaching component can facilitate dietary changes in university students.

NSE differences for each intervention group showed that FYS counseled using traditional NE had higher post-NSE scores compared to pre-measures, but the increase was not statistically significant. However, FYS who were counseled using MI techniques reported a statistically significant higher NSE at post-measure. When comparing the two counseling techniques while controlling for pre-NSE measures, evidence did not suggest that the higher NSE could be attributed to either of the techniques. Results of these analyses indicate that an undetermined component of the class, or even the class itself may be responsible for an increase in NSE. Since self-efficacy has shown to be associated with healthy nutrition, [17] an increase in NSE

during the critical first year of college underscores the importance of such beneficial changes that can accumulate during the college years and later in life. As shown in this study, a nutrition course with a peer-teaching component can facilitate an increase in NSE.

Student perceptions of the P2P! project were positive overall. Most students reported that their peer nutrition counselor was encouraging, helped them meet the Dietary Guidelines for Americans, and that the project should be continued. The positive reports indicate that P2P! might be acceptable to use in other universities with DPD.

This study is not without limitations. The study relies on a convenience sample and has a small sample size, limiting generalizability. In addition, the course itself, aside from the counseling sessions, could be considered an intervention and may have impacted dietary changes. The study relied on self-reports of dietary intake and entering food logs into the MyPyramid Diet Analysis program properly, leaving potential for entry errors.

## CONCLUSION

Results indicate that college courses can be effective in dietary change and improving NSE. Given that students responded positively to the P2P! Nutrition Project, the researchers recommend implementing peer-to-peer nutrition education in various settings. First, in the university setting, DPD programs may consider replicating the current study. It is suggested that a control group receiving no counseling sessions be used in future studies. MI should be researched further as an intervention for treatment groups, perhaps more frequently, given its success in dietetics practice. It may be of value to measure a "dose response" of the number of counseling sessions provided and changes in dietary behavior. Implementing a peer-to-peer program provides an opportunity for DPD students to engage in service learning, to apply their knowledge and foster nutrition counseling skills, preparing them for future practice. In addition, peer-to-peer teaching can be (and has successfully been) used in healthcare settings. For example, peer counselor breastfeeding programs have been shown to increase breastfeeding rates in Special Supplement Program for Women, Infants and Children Program [18]. Therefore, based on the current study's findings, further research is needed to explore the benefits of MI and peer teaching in affecting dietary behavior change and NSE in a wide array of employment settings for registered dietitians.

## ABBREVIATIONS AND OPERATIONAL DEFINITIONS

- FYS = (first year students) are students enrolled in personal nutrition seminar at the university during their first year of study.
- Kcals = (Kilocalories) energy in foods.
- MI = (motivational interviewing) is a client-centered approach to behavioral therapy.
- ND = (nutrition and dietetics) is the program major at the university where the study was conducted.

- NE = (nutrition education) is one or more techniques used to help clients improve food choices. In this study, it refers to teaching clients about MyPyramid.
- NSE = (nutrition self-efficacy) is one's confidence of making good nutrition choices.
- DPD = (didactic programs in dietetics) are programs that provide required dietetics coursework leading to a bachelor's or graduate degree and are eligible for accreditation by the Accreditation Council for Education in Nutrition and Dietetics.
- USDA = (United States Department of Agriculture) A federal agency that oversees farming, agriculture, forestry, and food.

### CONFLICT OF INTEREST

There is no conflict of interest.

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None declared.

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