

Evaluation of “College CHEF,” a Campus-based, Culinary Nutrition Education Program

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ABSTRACT

Aim: Evaluate the impact of a campus-based culinary nutrition education program, the College CHEF: Cooking Healthfully Education for Life-long Change, to determine if there were significant differences pre- to post- intervention with participants’ attitudes, behaviors, and knowledge with healthy eating/cooking.

Background: College students have high rates of overweight and obesity and tend to have unhealthy dietary practices. Culinary nutrition programs may provide students a means to improve related attitudes, behaviors, and knowledge.

Methods: College students residing on campus were recruited. Participants completing both pre- and post-measures were included in analysis: Control (n= 17) and intervention groups (n = 15). Quasi-experimental pre-, post- design: Surveys were administered to both groups at baseline and post-intervention in October-November 2015.

Results: There was a statistically significant improvement in fruit and vegetable consumption ($p = .03$) and with knowledge of cooking terms and techniques ($p < .001$).

Conclusions: Campus-based culinary nutrition education programming has potential to positively impact college students’ fruit and vegetable consumption and cooking knowledge. Future programs should incorporate strategies such as additional opportunities to engage in hands-on practice and building cross-campus collaborations to promote sustainability.

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In the United States, more than one third of college students are overweight or obese (American College Health Association [ACHA], 2016). Too few young adults participate in healthy behaviors such as eating nutritiously on a regular basis, which reduces the risk of obesity and associated morbidity and premature mortality (Epton et al., 2014). Current rates of obesity in young adults have been in part attributed to an increase in: Snacking, eating away from home, and portion sizes (Duffey & Popkin, 2011; Piernas & Popkin, 2011). In general, college students do not meet the recommendations for daily fruit and vegetable intake, with 9 out of 10 students reportedly consuming less than five servings of fruits and vegetables per day (ACHA, 2016). College students are less aware than older adults of the health benefits associated with fruit and vegetable consumption and meeting dietary recommendations (Chung, Hoerr, Levine, & Coleman, 2006). Further, college students commonly underestimate what constitutes portion sizes (Brown & Oler, 2000).

A 2007 study found that knowledge of dietary guidelines for fruit, dairy, protein, and whole grains was positively associated with healthy eating patterns in college students. This supports the idea that individuals who are generally healthy eaters have higher nutritional knowledge than those who are not (Kolodinsky, Harveberino, Berlin, Johnson, & Reynolds, 2007). Moreover, participation in a college nutrition class prevented weight gain in freshmen, indicating that college-level nutrition education classes support participants in translating nutritional knowledge into dietary changes (Matvienko, Lewis, & Schafer, 2001).

In recent years, campus-based culinary nutrition education programs have emerged as a means to provide college students with nutritional information as well as cooking skills and techniques (Levy & Auld, 2004; Warmin, 2009; Kerrison, 2014). Although research examining this unique programming among college students is limited, programs

which have encompassed both nutrition education and cooking in a hands-on format have been effective in improving cooking and eating behaviors, attitudes, knowledge (Levy & Auld, 2004), and self-efficacy related to cooking skills and techniques and healthy eating practices (Kerrison, 2014; Warmin, 2009). Programming, which emphasizes nutrition and incorporates hands-on cooking opportunities, is more effective with improving outcomes as compared to classes which only encompass nutrition education (Horodynski, Hoerr, & Coleman, 2004).

Therefore, the purpose of this study was to substantiate the use of a tailored, evidence-based culinary nutrition education program for college students entitled, “The College CHEF: **C**ooking **H**ealthfully, **E**ducating **F**or Life-long Change” to determine if there was a significant difference from pre to post- intervention with participants’ attitudes toward, behaviors with, and knowledge of healthy eating and cooking.

METHODS

Research Design

The study was a quasi-experimental, pre-test post-test design with a comparison group. A convenience sample was used for the intervention group comprised of students from three Living Learning Programs (LLPs), and a control group consisting of participants from three separate LLPs. LLPs are defined as programs where undergraduate college students with similar interests and/or academic majors live together within a residence hall, participating in academic and/or social programming (National Study of Living Learning Programs, 2007). The study was approved by the university’s Institutional Review Board.

Setting, Program Recruitment, & Population

The study occurred at a large, co-educational, southeastern public university. Four months prior to program implementation, the researcher sent an invitation to all LLP Directors on campus (N = 18) to notify them of the opportunity to participate in the College CHEF. Seven LLP directors responded expressing interest, three of whom were invited to have their LLPs participate in programming, and three of whom were selected to serve as the control group. Those LLPs selected for the intervention group were those whose schedules were able to conform to when the programming was going to be offered, as well as those whose program directors who were willing to play an active role in recruitment and in encouraging and reminding students to participate on a weekly basis. One of the intervention groups was comprised of two LLPs, both of which were for students interested in kinesiology/health/wellness professions. The other intervention group consisted of first generation learners. Recruitment emails were sent out to the three intervention LLPs (N = 40 (Health LLP); N = 27 (Wellness LLP); and N = 79 (First Generation LLP). The control groups were chosen based on which LLP directors were willing to comply with the survey deadlines and research procedures. Recruitment emails were sent out to the three control groups whose LLPs were comprised of the following number of total members: N = 131 (Engineering LLP); N = 48 (Fine Arts LLP); and N = 50 (Greenhouse LLP; personal communication with the university’s LLP coordinator, March 1, 2015).

For the combined intervention groups, there were 30 participants who completed the baseline survey, 24 individuals who attended the first session, and 15 who attended at least three CHEF sessions and completed the pre- and post- survey. In the control group, there were 47 participants who completed the baseline survey, and 17 individuals included for analysis who completed both the baseline and post- survey. See Table 1. Only individuals who completed both the pre- and post- surveys, and for the intervention groups, those who completed both surveys and attended at least three of the four sessions were included in the analysis. Due to small sample size and homogeneity of groups at baseline, the intervention groups were combined for data analysis purposes, resulting in two groups: the intervention group (N = 15); and the control group (N = 17).

Program Description.

The College CHEF was a social cognitive theory-driven, evidence-based culinary nutrition education program for college students which sought to improve attitudes, behaviors, and knowledge associated with healthy eating and cooking (McMullen, Ickes, Noland, Erwin, & Helme, 2016). Programming was developed through conducting

primary and secondary needs assessments driven by the PRECEDE-PROCEED (Predisposing, Reinforcing and Enabling Constructs in Educational Diagnosis and Evaluation – Policy, Regulatory, and Organizational Constructs in Educational and Environmental Development) model prior to implementation (McMullen et al., 2016). The College CHEF took place in a state-of-the-art kitchen housed on the university’s campus, in a space tailored to student-driven cooking classes. Four 2-hour sessions were held weekly over the course of one month for each intervention group. The sessions for both intervention groups were led by the researcher and aided by a university-employed dietician/health educator, as well as an undergraduate dietetic student. Both the nutrition educator and dietetic student met with the researcher three times prior to program implementation to review all procedures and outline skills and techniques to be taught within each session. Content delivery and skill practice were intended to be identical between the two intervention groups. Each session began with a thirty-minute nutrition education session, followed by a demonstration of skills required to make the recipes. The skills portion of each session lasted approximately 75 minutes. This was followed by “Breaking Bread,” during which all participants and instructors ate together. Participants and instructors dined at a large table during this portion of programming, sharing their experiences with making the session’s meal.

At the start of each session, the researcher randomly chose two participants’ names and awarded them both with a small health-related prize to encourage attendance. This was followed by the nutrition education portion of programming which covered such topics as: Understanding and applying MyPlate principles, how to interpret food labels, serving sizes, short- and long-term benefits associated with cooking and eating healthy foods, budgeting with grocery shopping, and meal planning and preparation. Skills taught included: Recipe reading, how to hold and use cooking knives and how to utilize basic cooking tools and equipment, techniques for grilling, boiling, roasting and measuring and mixing. Weekly, students were provided supplemental handouts reinforcing topics covered in class, laminated recipe cards to reflect what had been made in class, reusable containers for their leftovers and the meal that they made. Students lived in dorms with kitchens and access to cookware. In addition, students lived within walking distance of a grocery store. These resources were emphasized throughout the nutrition and skill-based components of programming.

Data Collection

Baseline surveys were administered to the intervention and control groups online during October 2015 and post-surveys were sent out during October/November 2015. A follow-up reminder email was distributed to all participants one week later to increase response rate. For both surveys, after two weeks, those who had not completed the survey were considered non-responders and were not included in data analysis. Each participant chose a unique four-digit number which they were prompted to enter at the beginning of each survey to track pre- to post-completion. In an effort to encourage survey participation, there were five \$20 Visa gift cards awarded to five randomly selected control participants who completed both the pre- and post- measures.

Measures

The survey that served as the pre- and post- measure for the intervention and control groups was previously tested for reliability and validity, important in gaining reliable, potentially generalizable data (Larson, Perry, Story, & Neumark-Sztainer, 2006; Michaud, 2007). Survey measures were utilized to gauge participants’ cooking and eating knowledge, attitudes, and behaviors.

The Cooking Attitudes subscale. This subscale consisted of six statements concerning the ease of cooking at home, cooking for health, and following recipes. For each statement, participants selected the extent to which they agreed or disagreed. An example of a statement was, “I like trying new recipes.” A 5-point Likert scale was used: Strongly Agree = 5; Agree = 4, Neither Agree nor Disagree = 3; Disagree = 2; and Strongly Disagree = 1. Items 1, 3, and 5 were reverse coded so that the negatively worded questions’ outcome reflected the appropriate Likert-scale rating. These statements were, “I do NOT like to cook because it takes too much time;” “Cooking is frustrating;” and, “It is too much work to cook.” the possible subscale range was 6-30, with higher scores reflecting more positive attitudes toward cooking.

The Cooking Behaviors subscale. This subscale consisted of four statements pertaining to cooking using basic

ingredients, convenience items, and with leftovers. For each statement, participants selected how many times per week they carried out that particular behavior. An example of a statement was, “Prepare meals from basic ingredients (fresh produce, raw chicken, etc.)” For this subscale, responses were coded as: Six to seven times per week = 5; Three to five times per week = 4; Two times per week = 3; Once each week = 2; and Not at all = 1. The possible point range for the subscale was 4 - 20, with higher scores reflecting healthier cooking behaviors.

The Fruit and Vegetable Consumption subscale. This subscale consisted of two statements pertaining to how many times per week participants consumed the daily recommended servings of fruits and vegetables. An example of a statement was, “Consume at least five servings of fruit per day.” For this subscale, responses were coded as: Six to seven times per week = 5; Three to five times per week = 4; Two times per week = 3; Once each week = 2; Not at all = 1. The possible point range for this subscale was 2-10, with higher scores reflecting more frequent consumption of fruits and vegetables.

The Eating Behaviors subscale. This subscale consisted of three statements inquiring how many times per week participants ate breakfast, lunch, and dinner away from home. The subscale asked respondents to indicate the extent to which they felt confident with each behavior. An example of a statement was, “Eat breakfast away from home.” For this subscale, responses were coded as: Not at all = 5; Once each week = 4; Two times per week = 3; Three to five times per week = 2; and Six to seven times per week = 1. The possible point range for the subscale was 3 - 15, with higher scores reflecting healthier eating behaviors.

The Knowledge of Cooking Terms and Techniques subscale. This subscale consisted of eight multiple choice questions relating to basic cooking skills and techniques. Each multiple choice question had four possible responses, one of which was, “Don’t Know.” Those questions for which participants marked their response as “Don’t Know” were counted as incorrect. Items included, “What is the term for preparing all ingredients, gathering equipment, and organizing your work area before beginning to cook? A: Production Stage; B. Blanching; C. Mise en place; or D. Don’t Know.” Participants received a “0” for each incorrect answer and a “1” for each correct answer, with a possible score range of zero to eight, with higher scores reflecting an increased knowledge of cooking terms and techniques.

Demographic Variables. Twelve demographic questions included age (in years), grade status (freshman/sophomore/junior/senior), sex (male, female, transgender, other), and race/ethnicity (White, non-Hispanic; Black, non-Hispanic; Hispanic or Latino; Asian or Pacific Islander; American Indian/Alaskan Native, or other).

Data Analysis

Descriptive statistics were summarized for intervention and control group demographic variables (Table 1). Scores from each survey subscale were summed for both groups to calculate composite scores, means and standard deviations at pre- and post- survey, as well as for each subscales’ individual items (Table 2). Group differences were assessed via paired t-tests reporting the significance within and unpaired t-tests reporting the significance between the control and combined intervention group for each subscale through comparing the mean differences in change scores pre- to post-intervention (Table 3). Significance was set at $p < .05$ apriori. Analysis was conducted in SPSS version 23.0 (IBM Corp, 2013).

RESULTS

Demographics

There were fifteen intervention and seventeen control group participants. The mean age was 18.0 ± 0.00 for the intervention group and 18.3 ($SD = 0.59$) for control group participants. All intervention participants were freshmen, while the control group was comprised of 82% freshmen ($n = 14$) and 18% sophomores ($n = 3$). Sex varied between the groups, with the combined intervention group consisting primarily of females (67%, $n = 10$), while the control group comprised primarily of males (71%, $n = 12$). All control and intervention participants defined their ethnicity as “White.”

Cooking Attitudes Subscale

Using paired t-tests, pre- (24 ± 2.74) to post-scores (24 ± 3.76) among intervention participants were not significant ($p = 1.00$) within the Cooking Attitudes Subscale. Similarly, pre- (23.94 ± 3.95) to post-scores (23.48 ± 4.22) for control participants were not significant ($p = 0.50$).

Cooking Behaviors Subscale

Pre- (9.07 ± 4.04) to post-scores (9.07 ± 3.73) among intervention participants were not significant ($p = 1.00$) within the Cooking Behaviors Subscale. Similarly, pre- (9.65 ± 4.34) to post-scores (9.35 ± 3.72) for control participants were not significant ($p = .68$).

Fruit and Vegetable Consumption Subscale

Pre- (4.73 ± 2.71) to post-scores (6.13 ± 2.20) among intervention participants were significant ($p = .008$). Pre- (5.31 ± 3.03) to post-scores (4.82 ± 2.96) for control participants were not significant ($p = .74$) within the Fruit and Vegetable Consumption Subscale.

Eating Behaviors Subscale

Pre- (7.27 ± 2.63) to post-scores (8.73 ± 3.20) among intervention participants were not significant ($p = .16$) within the Eating Behaviors Subscale. Similarly, pre- (8.47 ± 1.74) to post-scores (8.12 ± 1.76) for control participants were not significant ($p = .36$).

Knowledge of Cooking Terms and Techniques Subscale

Pre- (5.29 ± 1.44) to post-scores (7.38 ± 1.18) among intervention participants for the Knowledge of Cooking Terms and Techniques subscale were significant ($p = .000$). Pre- (5.40 ± 1.62) to post-scores (5.56 ± 1.70) for control participants were not significant ($p = .49$).

CONCLUSION

The purpose of this study was to evaluate the impact of a campus-based, culinary nutrition education program to determine if there was a significant difference from pre- to post- intervention with participants' attitudes toward, behaviors with, and knowledge of healthy eating and cooking. Findings from this study indicated significant improvements in fruit and vegetable consumption and knowledge of cooking skills and techniques among college students participating in the intervention. These results are encouraging given that most college students do not consume the recommended number of fruits and vegetables per day and that increased nutritional knowledge is associated with healthy eating patterns (ACHA, 2016; Kolodinsky et al., 2007).

The nutrition education portion of each session emphasized where to find healthy food options on campus, as well as simple ways to incorporate fruits and vegetables into one's diet. It may have been impactful to have had an additional session in which intervention participants were guided on a grocery store tour to further enforce principles from class pertaining to shopping for nutritious food on a budget, as there are grocery stores within walking distance of campus. Previous programming which included evidence-based information through the application of the Cooking Matters at the Store curriculum indicated that participants who are led through a grocery store tour have a better understanding of concepts such as food shopping based on unit prices (Kerrison, 2014). Helping participants apply information learned in sessions in a practical way such as grocery shopping could have further reinforced concepts learned, and had the ability to impact long-term sustainability associated with changing nutrition behaviors, as well as improve outcomes that were not significant.

Although basic knife and cooking skills were reviewed and reinforced throughout sessions, there was not a statistically significant change in improved cooking behaviors. Additional opportunities to allow for hands-on practice may contribute to improved cooking behaviors and should be incorporated into future interventions. A greater emphasis on the application of relevant cooking skills is key in improving associated behavior (Cutler, 2004). In future programming, creating as many opportunities as possible for participants to apply skills learned in class may have the ability to impact behavior, and should be taken into consideration.

The program's emphasis on hands-on cooking skills and dispensing pertinent nutritional knowledge may have contributed to the significant improvements in fruit and vegetable consumption and knowledge of cooking terms and techniques among intervention participants. These areas were further emphasized throughout programming by a number of tactics including: showing physical examples of fruit and vegetable portions, encouraging participants to try new fruits and vegetables during sessions, and providing simple ideas for how to incorporate fruits and vegetables into meals that participants commonly eat. These tactics were supported by previous literature which indicates that individuals who have more nutritional knowledge may eat more nutritiously (Kolodinsky et al., 2007).

One explanation for the lack of a significant difference on cooking attitudes for the intervention group is that the mean score was fairly high at baseline (24 ± 3.74 ; Range = 18-28), indicating a ceiling effect. This is reinforced by previous research, which has indicated that college students have generally positive attitudes toward cooking (Brown & Eggett, 2004).

Moreover, non-significant findings for the eating and cooking behaviors measured as part of the study may be attributed in part to the campus environment. A college campus provides ease of accessibility to unhealthy foods, which for some college students is more appealing, especially when they view peers enjoying less healthy options (Levitsky, Halbmaier, & Mrdjenovic, 2004). In addition, students tend to perceive less healthy options as less expensive, all of which may contribute to the cooking and eating behaviors of college students (Deliens, Clarys, De Bourdeaudhuij, & Deforche, 2014). Though college students know that fast food is often less healthy, they see it as easy, time-saving, and convenient (Brown & Eggett, 2004). Future programming should further emphasize budgeting, meal planning, and preparing healthy convenience food items in an effort to improve cooking attitudes and behaviors. The intervention participants all had access to a dorm-based kitchen as well as basic cooking supplies, which should be promoted through future programming to encourage behavior change. Further, long-term advocacy efforts should be considered to improve the healthy food options on campus.

Dormitories should be conducive to providing space and supplies for cooking and it would be of note with future studies to assess participants to determine if these resources are used to carry out skills and techniques learned in class. Campuses may consider collaboration with other organizations/sectors that may have facilities if dormitories

do not offer these types of resources. Cross-campus collaboration with health and wellness programming is gaining popularity as a means to create partnerships and maximize resources to enhance students' well-being (Fullerton, 2011). In that spirit, it may be of value for future programming to consider collaborating with on-campus organizations/departments. Freshman orientation-type courses could incorporate culinary, nutrition education programming as part of a life skills module. Also, future programming might seek out the collaborative opportunity to partner with an agriculture department/organization in an effort to have participants contribute to cultivating food which they could cook. Additionally, a dietetic department could provide 1-on-1 nutritional counseling for intervention participants in an effort to expand on nutritional knowledge learned through programming in an applicable, personalized manner.

Incentivizing behavior change programs may jumpstart individuals' initial motivation toward making decisions in support of a healthier lifestyle. Thus, determining what incentives work the best with college students and providing additional incentives to promote participation in programming may be impactful. Further, incentivizing the completion of both pre- and post- surveys may aid researchers in collecting data (Gneezy, Meier, & Rey-Biel, 2011). In addition, programming which requires participants to pay a small enrollment fee may be beneficial in improving attendance, given that participants may feel more committed to their investment; A previous behavior change-oriented study indicated that if participants were asked to pay a small fee to help cover the cost of behavior change-promoting tools, the ownership associated with the fee may contribute to an improvement in behavior (Krezanoski, Comfort, & Hamer, 2010).

Limitations for this study include: A small, convenience sample; a lack of follow-up measures to determine long-term changes; and more females than males from the intervention group who completed the pre-, post- measures and attended three or more sessions. Gaps exist to determine the impact of culinary, nutrition education programming on men, as fewer males historically participate in programming of this kind often at a ratio of 2:1 women to men (Lin & Dali, 2012). Though it is promising that more men participated in the College CHEF than typically do in similar programming, the two-thirds of those who attended three or more sessions and completed the pre- and post- survey were females. In contrast, the majority of the control participants were males, serving as a potential limitation with generalizability. Another limitation with the intervention group was that they were comprised of many kinesiology/health/wellness students, which may not be generalizable to all incoming students without an interest in health and wellness.

An additional limitation includes the lack of a randomized control trial. However, it should be of note that this was a pilot study and there are challenges carrying out true experimental designs on college campuses, particularly without extramural funding. Future research should explore the impact of such an intervention with a more rigorous design. A further limitation is the lack of follow-up measures to assess ongoing change with attitude, behavior, knowledge and self-efficacy related to healthy cooking and eating. Longitudinal follow-up is warranted for a study of this kind, particularly to assess application of skills. Another limitation was the lack of an explanation on the pre- and post- surveys of what constitutes a serving size.

Future programming should incorporate recruitment tactics which encourage men to enroll, such as recruiting from groups which are male-based like men's athletic teams, fraternities, and dormitories with all male residents. Future studies should also include follow-up measures to determine the sustainability of programming's impact with regard to continued long-term behavior change. Given the attrition issues associated with intervention participants with survey completion, if incentives were tied to both the completion of follow-up and pre-, post- measures, it may increase attendance if participants knew there was an associated incentive. Future campus-based culinary nutrition programming could also incorporate follow-up communication monthly or bi-monthly for the year following the intervention to encourage students with outcomes related to programming, such as tailored feedback related to areas such as meal planning tips and dorm-based cooking. A program entailing more than four sessions (i.e. five or six) could allow for participants to have additional practice with applying skills and knowledge learned, which could improve associated outcomes. Further research is warranted to determine recommendations for dose and duration of similar programming on a college campus. Further, if programming were part of a class for college credit and attendance was mandatory, it may improve attrition issues, as was indicated in previous, similar programming (Warmin, 2009; Kerrison, 2014).

The findings from this study support the implementation of campus-based culinary nutrition education programming to support college students in improving their knowledge of cooking terms and techniques and their fruit and vegetable consumption. To further enhance cooking attitudes and behaviors as well as healthy eating, culinary programming should include: a longer duration, additional instructors and opportunities to engage in hands-on practice, and cross-campus collaborations. The positive outcomes from this study reinforce the need for campus-based culinary nutrition education programming in an effort to improve college students' behaviors, attitudes, and knowledge with healthy eating and cooking.

Table 1

Demographics for Control and Intervention Groups Included in Data Analysis

	Intervention Group (N = 15)	Control Group (N = 17)
<i>Sex</i>		
<i>Male</i>	27 % (n = 4)	71% (n = 12)
<i>Female</i>	73 % (n = 11)	29% (n = 5)
<i>Ethnicity</i>	100% (n = 15)	100% (n = 15)
<i>White</i>		
<i>Year in College</i>		
<i>Freshman</i>	100% (n = 15)	82% (n = 14)
<i>Sophomore</i>		18% (n = 3)
<i>Age (SD)</i>	18 (0.0)	18.3 (0.59)

Table 2

Scale and Item-by-Item Comparison Pre-, Post-, within Control and Intervention Groups

Scale/Items	Intervention (N = 15)		p	Control (N = 17)		p
	-Pre-	-Post-		-Pre-	-Post-	
	Mean (SD)	Mean (SD)		Mean (SD)	Mean (SD)	
Cooking Attitudes	24 (3.74)	24 (3.76)	1.00	23.94 (3.95)	24.38 (4.22)	0.50
I do NOT like to cook because it takes too much time.	3.67 (1.35)	3.60 (1.12)		3.71 (1.16)	3.65 (1.46)	
Meals made at home are affordable.	4.07 (0.88)	3.93 (0.88)		4.06 (0.56)	4.12 (1.13)	
Cooking is frustrating.	3.73 (0.88)	4.07 (0.96)		3.88 (0.93)	3.59 (1.33)	
I like trying new recipes.	4.20 (0.94)	4.20 (0.12)		4.35 (0.86)	4.00 (1.32)	
It is too much work to cook.	4.0 (1.07)	3.73 (1.03)		3.41 (1.14)	3.53 (1.42)	
Making meals at home helps me to eat more healthfully.	4.33 (0.90)	4.47 (0.64)		4.29 (0.69)	4.06 (1.30)	
Cooking Behaviors	9.07 (4.04)	9.07 (3.73)	1.00	9.65 (4.34)	9.35(3.72)	0.68
Prepare meals from basic ingredients.	2.33 (1.35)	2.03 (1.06)		2.24 (1.49)	2.24 (1.39)	
Prepare meals using convenience items.	2.53 (1.30)	2.03 (1.06)		2.53 (1.46)	2.47 (1.23)	
Reheat or use leftovers in another meal.	1.80 (1.01)	2.40 (1.06)		2.76 (1.03)	2.53 (1.07)	
Use fresh and convenience items in combination to prepare a meal at home.	2.20 (1.27)	2.20 (1.21)		2.06 (1.25)	2.12 (1.22)	

FV Consumption+	4.73 (2.71)	6.13 (2.20)	0.008*	5.31 (3.03)	4.82 (2.96)	0.74
Consume at least five servings of fruit per day.	2.40 (2.3)	3.01 (1.22)		2.53 (1.66)	2.47 (1.46)	
Consume at least five servings of vegetables per day	1.45 (1.29)	3.01 (1.10)		2.47 (1.62)	2.36 (1.54)	
Eating Behaviors	7.27 (2.63)	8.73 (3.20)	0.16	8.47 (1.74)	8.12 (1.76)	0.36
Eat breakfast away from home.	3.53 (1.41)	4.0 (1.20)		4.35 (1.00)	4.00 (1.12)	
Eat lunch away from home.	1.73 (0.88)	2.27 (1.49)		2.06 (0.83)	1.88 (0.58)	
Eat dinner away from home.	1.87 (0.92)	2.47 (1.13)		2.06 (0.83)	2.24 (1.00)	
Knowledge	5.29 (1.44)	7.33 (1.18)	0.000*	5.40 (1.62)	5.56 (1.7)	0.49

Frequency of Correct Answers for Knowledge Subscale

	Int. –Pre-	Int. –Post-	Cnt. –Pre-	Cnt. –Post-
Blanching	47%	80%	52%	77%
Sautéing	67%	100%	82%	82%
Dicing	87%	93%	82%	88%
Simmering	87%	100%	88%	77%
Roasting	3%	93%	41%	36%
Mise en place	20%	80%	6%	12%
Measuring	80%	93%	94%	94%
Measuring	87%	93%	94%	84%

* $p < 0.001$

+ FV = Fruit and vegetable

Table 3

Significance between Groups: Intervention (N = 15) and Control (N = 17)

Scale	Intervention Change Score Mean Difference (SD)	Control Change Score Mean Difference (SD)	t-test Difference Control & Intervention (p)
Cooking Attitudes	0.00 (4.05)	0.31 (2.70)	0.80
Cooking Behaviors	0.00 (3.06)	-0.3 (2.85)	0.78
FV Consumption+	1.4 (1.76)	-0.18 (2.16)	0.03*
Eating Behaviors	1.47 (3.87)	-0.35 (1.54)	0.11
Knowledge	2.40 (1.45)	0.18 (1.02)	0.000*

* p < .05

+ FV = Fruit and vegetable

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