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RESEARCH CONTRIBUTIONS:

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Foodservice Director and School Administrator's Knowledge, Attitudes and Interest/ Motivation towards Family-Style Meals in School Foodservice Settings

PEDAGOGY CONTRIBUTIONS:

The World Readiness Program in The Culinary Arts, a Case Study: Can Motivation and Academic Competency be Improved by Teaching Kids Food Studies on a Shoestring Budget?

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Hourly employees' perceptions about farm to school program barriers and keys to success: Differences by state and number of meals served

Farm to school (FTS) programs are growing in popularity among school districts and provide opportunities for school nutrition programs to source ingredients locally. Hourly employees working with FTS programs prepare, promote, and serve local produce to students daily. However, little research has focused on their perceptions of FTS programs. A questionnaire was used to assess barriers and keys to success when implementing and maintaining FTS programs from perspectives of hourly, non-management school foodservice employees. An examination of survey responses suggests differences exist between barriers and keys to success by geographic location and school nutrition program participation rates.

Foodservice Director and School Administrator's Knowledge, Attitudes and Interest/Motivation towards Family-Style Meals in School Foodservice Settings

Many schools serve meals in a traditional cafeteria style but family-style service is limited. The aim of this study was to assess knowledge, attitudes, previous exposure, and interest/motivation of foodservice directors/managers towards a family-style meal service in school settings. The survey was pilot-tested with a random sample of 20 foodservice directors/managers and subsequently administered to a convenience sample of 718 foodservice directors/managers. Test-retest reliability coefficients were weak to substantial ($r = 0.16$ to 0.80). Principal components analysis confirmed a six-factor model. Internal consistencies were substantial ($\alpha = .73$ to $.91$). Future research should focus on additional testing of the survey instrument on a broader scale.

Pedagogy Manuscripts

The World Readiness Program in the Culinary Arts, a case study: Can motivation and academic competency be improved by teaching kids Food Studies on a shoestring budget?

A novel pedagogical approach using food as the vehicle was designed and implemented to gauge the effectiveness of the culinary arts to increase preparedness for college for 15 under-resourced high-school students. The curriculum was developed to improve competencies and increase students' self-confidence and academic proficiency. A mixed-method approach was used for analysis. Phenomenological and observational data revealed students' perceived high self-assessment of academic confidence, though these feelings were not supported by the pre and post quantitative 6th grade level math and science test results. We believe improved results could be obtained through this program with earlier intervention in the education process.

Research Contribution

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HOURLY EMPLOYEES' PERCEPTIONS ABOUT FARM TO SCHOOL PROGRAM BARRIERS AND KEYS TO SUCCESS: DIFFERENCES BY STATE AND NUMBER OF MEALS SERVED

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ABSTRACT

Farm to school (FTS) programs are growing in popularity among school districts and provide opportunities for school nutrition programs to source ingredients locally. Hourly employees working with FTS programs prepare, promote, and serve local produce to students daily. However, little research has focused on their perceptions of FTS programs. A questionnaire was used to assess barriers and keys to success when implementing and maintaining FTS programs from perspectives of hourly, non-management school foodservice employees. An examination of survey responses suggests differences exist between barriers and keys to success by geographic location and school nutrition program participation rates.

Keywords:
hourly non-management school foodservice employees; farm to school; barriers; participation rates

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INTRODUCTION

The foodservice industry is divided into two major segments; commercial (e.g. fast food and full-service restaurants) and non-commercial (e.g. hospital and school foodservice). Commercial operations are profit driven whereas non-commercial foodservices typically are considered a support unit within a larger organization. The National Restaurant Association forecasted revenue of the non-commercial foodservice industry would reach approximately 58 billion dollars in 2013 (National Restaurant Association, 2013). School foodservice, with forecasted sales of approximately 14.2 billion dollars in 2012 (National Restaurant Association, 2012), represents a large part of the non-commercial foodservice industry. This includes kindergarten through 12th grade schools which, in 2012, served approximately 43.9 million meals per day through the school breakfast and national school lunch programs (United States Department of Agriculture (USDA) Food Nutrition Service (FNS), 2012a, 2012b).

Use of local foods is a popular trend throughout the foodservice industry. Researchers have shown that consumers (Brown, 2003; Schneider & Francis, 2005; Zepeda & Leviten-Reid, 2004) and chefs (Curtis & Cowee, 2009) prefer local foods. Feenstra (1997) identified development of local food systems as a way to revitalize struggling communities. In support of that claim, Bregendahl and Enderton (2013) investigated the impact a state's regional food system could have on the local economy and found farmers reported more than $10,000,000 from sales of local products and creation of an average of 7.7 full time job equivalents per $1,000,000 of local food sales in 2013.

Over the past decade, many school districts and school nutrition programs have begun using farm to school (FTS) programs as a way to support the local economy and help children understand where and how food is produced (National Farm to School Network [NFTSN], n.d.). Specific FTS activities may include; visiting farms, growing school gardens, cooking demonstrations, introducing students to new fruits and vegetables, and/or incorporating local produce into school meals and snacks (NFTSN, n.d.). Popularity of these programs has grown considerably from an estimated 2,000 schools participating in 2010 (NFTSN, n.d.) to more than 38,500 schools estimated participating in FTS activities in the 2012-2013 school year, as indicated by the recent USDA FTS Census (USDA FNS, 2013). FTS programs may also help schools meet new school meal nutrition standards released in 2012 as part of the Healthy Hunger Free Kids Act which requires schools to increase amounts of fruits and vegetables offered, as students will typically prefer fresh forms of produce (USDA FNS, 2011; USDA FNS, 2012a).

Although popularity of FTS programs has increased in recent years, research indicates that some barriers to school nutrition and FTS programs still exist. Barriers to school nutrition programs and local food use include: competitive snack choices (e.g. chips, cookies, candy bars, and sodas) (Litchfield & Wenz, 2011), lack of kitchen equipment necessary for processing fresh fruits and vegetables (Vallianatos, Gottleib, & Haase, 2004), and lack of training and recipe education among foodservice employees (Cho & Nadow, 2004; DeBlieck, Strohbehn, Clapp, & Levandowski, 2010). Barriers specific to FTS programs have also been identified by school foodservice directors as lack of availability and insufficient quantity (Gregoire & Strohbehn, 2002) as well as cost and procurement regulations (Colosanti, Matts, & Hamm, 2012); food distributors identified budget constraints, a short growing season, and inability to make a profit (Izumi, Wright, & Hamm, 2010a), and farmers identified logistical challenges including small volume sales (Izumi, Wright, & Hamm, 2010b).

In a review of research examining effectiveness of FTS programs, Joshi, Azuma, and Feenstra (2008), referred to foodservice employees as "dietary gate-keepers" (pg. 241) and indicated more research with this audience was needed. Despite this recommendation, little research has focused on the barriers to FTS programs from perspectives of hourly non-management school foodservice employees. These are the employees that prepare, promote, and serve fresh fruits and vegetables purchased as part of FTS programs. They have personal daily contact with the students thus their support is critical to the success of FTS programs. Therefore, the purpose of this study was to assess barriers to FTS programs faced by hourly foodservice employees. The specific research objectives of this

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project were to: (1) identify barriers and keys to success when implementing and maintaining FTS programs; and (2) identify differences in barriers and keys to success based on geographic location and number of meals served.

METHODS

Traditional mail based questionnaires were used for this study due to the potential limited access to and skills with computers among hourly non-management school foodservice employees. According to Dillman, Smyth, and Christian (2009) mail surveys can be effective in obtaining a response rate of 50-70%. A recent study by Ungku-Zainal-Abidin (2013) had a 35% response rate when mailing questionnaires to hourly non-management school foodservice employees. In her study and this study, nutrition program directors were contacted and asked to distribute the survey to hourly non-management foodservice employees. Approval from the appropriate university review board was received prior to conducting this study.

Sample Selection

The target population was hourly non-management school foodservice employees with hands-on experience preparing local produce as part of the FTS program. Because some schools in a district may participate in FTS programs and others may not, individual school buildings were recruited for this study. According to Ary, Jacob, and Sorensen (2010), probability sampling can be difficult and expensive. Therefore, the following non-probability sampling process was used.

First, the state with the largest estimated number of schools with FTS programs according to the NFTSN (farmtoschool.org, 2013) from each of the eight NFTSN regions (West [California], Mid-Atlantic [Maryland], Midwest [Oklahoma], South [Texas], Southwest [New Mexico], Great Lakes [Minnesota], Northeast [Connecticut], and Southeast [North Carolina]) was selected. Second, the state contact for the FTS program (listed on farmtoschool.org) was contacted and asked to provide a list of schools participating in FTS programs as well as contact information for the school foodservice or child nutrition director at those schools. Five of the eight states (California, Texas, New Mexico, North Carolina, and Connecticut) responded to the request and provided contact information for schools in their state participating in FTS programs. Potential participant information for the remaining three states (Minnesota, Maryland, and Oklahoma) was obtained from the state FTS website or the USDA FTS Census (USDA FNS, 2013). The researchers were unable to make contact with any foodservice directors in New Mexico. Therefore, Colorado, the state with the next largest number of schools participating in FTS from that region, was selected to participate.

Contact information for potential participant school districts (n = 238) was gathered using a search engine (Google) to locate school district websites and contact information for the foodservice directors. Schools from urban and rural areas in each state were selected in order to have representation of small (0-200 meals served daily), medium (201-400 meals served daily), and large (more than 400 meals served daily) schools. This same method of school size categorization was used in a similar study by Smith, Wleklinski, Roth, and Tragoudas (2013).

An email describing the purpose and objectives of the study was sent to the foodservice director from each of the potential participant school districts previously identified within each of the size categories. Directors were then asked if they were willing to distribute questionnaires to their employees. Directors who agreed (n = 21) were sent an email and asked to provide the following information: (1) list of all elementary schools in their districts preparing local produce from FTS programs for school meals, (2) number of hourly non-management school foodservice employees at each school with hands on experience preparing and serving local produce, (3) approximate number of years each school had been participating in FTS, and (4) addresses for use in mailing questionnaires. Researchers then used this information and selected 12 schools from each state. Due to variance in the number of districts willing to participate from each state, one state had all 12 schools from the same district while others were from multiple districts. When selecting individual schools within a district, researchers used location (schools from different cities) and number of employees (schools with largest number of employees) as criteria. This was done in order to increase variance amongst school locations.

Questionnaire Content

The questionnaire covered several topics examining employees' perceptions of barriers and keys to success when implementing and maintaining FTS programs. Specifically, it was comprised of the following items: two items concerning participant's basic knowledge of FTS programs, 11 items concerning perceived benefits to using local produce in schools, 23 items concerning perceptions of influences on the success of using local produce in school meals, 13 items concerning basic information about the participant's school and the district's school meals programs, 18 items concerning perceptions of differences in using local produce as compared to non-local produce in school meals, six items concerning perceptions of the quality of local produce compared to non-local produce, and 12 items requesting demographic information of the participants. Perceptions about benefits, successes, differences, and quality of local produce compared to non-local produce were all gathered using a five point Likert-type scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). As suggested by Ary, Jacobs, and Sorensen (2010), the internal reliability of the measurement scales was determined using Cronbach's alpha. The measurement scales for benefits (α=0.86, n=11), keys to success (α=0.942, n=23), barriers (α =0.800, n=18), and quality (α=0.920, n=6) were all found to have internal reliability (George & Mallery, 2003 [as cited in Gliem & Gliem, 2003]).

Pilot Test

Following the suggestions of Dillman, Smyth, and Christian (2009), a pilot test was conducted in order to ensure the questionnaire was ready to be used with a large sample. The questionnaire was completed and reviewed first by five experts in the field of school nutrition and foodservice management, and then by 12 hourly non-management school foodservice employees who had hands-on experience working with local produce in FTS programs. Suggestions from experts and hourly employees were incorporated into the questionnaire before distribution. For example, it was suggested that a "don't know" option be added to the scale for measuring barrier items; this option was added as suggested.

Questionnaire Distribution

Questionnaires were distributed by mail to all school foodservice or child nutrition directors using the suggested steps outlined by Dillman, Smyth, and Christian (2009) and found successful by Ungku-Zainal-Abidin (2013). First, prior to the questionnaire being sent a pre-notice email was sent to the recruited foodservice directors notifying them that a packet of questionnaires would be arriving shortly. Second, hard copies of the questionnaires were sent to the foodservice director along with a letter describing the method for distribution and collection. The foodservice director was instructed to distribute the questionnaires to all hourly foodservice employees who

had hands-on experience using local produce from the FTS program. After completing the questionnaire, employees were instructed to fold and seal the questionnaire prior to placing it in a large collection envelope. After one week, the foodservice director collected all completed questionnaires and placed them in a large postage paid business reply envelope and placed them in the mail. This distribution and collection process was used to ensure participant confidentiality and to help participants feel comfortable in providing open and honest feedback as their directors were unable to see responses.

Data Analysis

Data from questionnaires were entered and analyzed using a statistical software package (SPSS 21) for analysis. Data coding and entry followed guidelines from Salant and Dillman (1994). Frequencies were computed and data were verified to ensure proper coding and manual entry. Descriptive statistics (frequencies, means, and standard deviations) were used to analyze the distribution of the data. Means for each of the variables (barriers and keys to success) were calculated and used to identify the most common perceived barriers and keys to success for implementation and maintenance of FTS programs. ANOVA was then used to determine differences in barriers and keys to success among geographic regions and number of meals served.

RESULTS AND DISCUSSION

Demographics

A total of 369 questionnaires were mailed to 21 foodservice directors of participating schools. A total of 213 usable questionnaires were returned for a response rate of 58%. The majority of participants were female (94.8%, n=202) and almost half (41.8%, n=89) between the ages of 50-64. The largest percentage of participants had a high school diploma (45.5%, n=97) or some college (30%, n=64), had been involved with FTS programs for more than 2 years (54.9%, n=117), and worked 30-40 hours per week (51.6%, n=110) (Table 1). In Strohbehn, Jun, and Arendt's (2014) national survey of hourly school foodservice employees, similar participant demographics were found with 95% female participants, and over 50% of participants between the ages of 41-60. Table 2 contains participation data by state including information concerning the number of districts, schools, and participants from each state. For example, participants from California worked at eight different schools within three districts; there were a total of 21 employees from California who participated in the study. The number of employees from each of the eight California schools varied from one to five. Participants working at schools in all eight of the selected states participated in the study with largest percentage from the Midwest, 17.8%.

Table 3 contains characteristics of the participating schools. Participants worked at schools that were mostly self-operated (69.5%, n=148) and served an average of 201-400 (54.9%, n=117) lunch meals per day. When indicating the number of years that the school supported a farm to school program, 4.2% (n=9) of participants indicated one year or less, 9.4% (n=20) indicated one to two years, 20.7% (n=44) indicated two to three years, and 26.8% indicated more than three years. Interestingly, 34.7% indicated that they didn't know how long their schools had been participating in the FTS program. However, some employees may have previously worked at a school with a FTS program because more than half (54.9%, n=117) indicated they had been involved with FTS for more than two years. This lack of knowledge could be a result of hourly kitchen employees' lack of involvement in administration and management of the FTS program or aspects of FTS concentrated outside of the school meals program. When identifying FTS activities that schools participated in, 73.2% (n=156) identified "incorporating local produce into the school lunch program" as an activity in which their school currently participated. However, because this was a requirement for study participation and verification was done prior to recruitment, this finding indicates a lack

Table 1: Demographic Characteristics of Participants (n=186-213)[a]

Characteristics	n	%
Gender		
Male	8	3.8
Female	202	94.8
Age		
18-25 years	4	1.9
26-34 years	25	11.7
35-49 years	77	36.2
50-64 years	89	41.8
65 years and over	12	5.6
Education		
Some high school	11	5.2
High school diploma (or equivalent)	97	45.5
Some college	64	30.0
Associate's degree	27	12.7
Bachelor's degree	8	3.8
Graduate degree	2	0.9
Ethnicity		
American-Indian or Alaska Native	2	0.9
African-American or Black (Non-Hispanic origin)	18	8.5
Asian	2	0.9
Caucasian/White	152	71.4
Hispanic	28	13.1
Multiracial	5	2.3
Other	1	0.5
Number of years involved with farm to school programs		
1 year or less	36	16.9
1 to 2 years	33	15.5
2 to 3 years	43	20.2
More than 3 years	74	34.7
Number of hours worked per week		
Less than 10 hours	15	7.0
10 to 19 hours	34	16.0
20 to 29 hours	42	19.7
30 to 40 hours	110	51.6
More than 40 hours	7	3.3
Personal connection to food production[b]		
I grew up on a farm	35	16.4
I currently have a garden	69	32.4
My family grew a garden when I was growing up	117	54.9
I currently can or freeze garden produce for later use	73	34.3
I currently live on a farm	8	3.8
Other (please specify)	28	13.1
Frequency of visits to seasonal farmers markets for personal reasons		
Twice a week	2	0.9
Weekly	27	12.7
Bi-weekly	20	9.4
Monthly	58	27.2
Twice a year	34	16.0
Once a year	24	11.3
Never	48	22.5

[a] Totals may not equal 213 and percentages may not equal 100 due to missing data.

[b] Total responses may exceed 213 due to multiple responses.

Table 2: Participation by Region/State				
State	**School Districts**	**Schools**	**Total Respondents**	**Range of Respondents Per School**
California	3	8	21	1 - 5
Colorado	2	11	19	1 - 3
Oklahoma	3	12	39	1 - 5
Minnesota	3	9	26	1 - 4
Texas	3	6	29	4 - 6
North Carolina	3	7	28	3 - 5
Maryland	1	7	25	1 - 7
Connecticut	3	7	26	3 – 5
Total	21	67	213	

of knowledge on the part of hourly employees concerning implementation of FTS programs in their schools.

From a given list, activities indicated by participants as frequently conducted were: "purchasing fresh produce from local farmers" (68.5%, n=146), and "educating students about local produce" (48.8%, n=104). Among the least reported activities were: "Farmers visiting classrooms" (3.3%, n=7), "chefs visiting classrooms" (5.6%, n=12), and "visits to farmer's markets" (8%, n=17). Interestingly, when asked about their personal connection to food production, the majority (54.9%) indicated that although their family had a garden while they were growing up, only 32.4% indicated that they currently grow a garden and 22.5% indicated that they never visit farmer's markets for personal reasons.

Barriers to Farm to School Programs

Participants were asked to rate their levels of agreement to a list of 18 barriers related to the use of local produce versus non-local produce in school meals using a five point Likert-type scale (1= strongly disagree, 2= disagree, 3= neutral, 4= agree and 5= strongly agree). Participants were also given the option to select "don't know". Table 4 includes mean scores and standard deviations for all 18 barrier items. Those barrier items respondents most agreed with included "local produce has a different appearance than non-local produce" (mean rating of 3.67 ± 0.90), "the quality of local produce is better than non-local produce" (3.61 ± 0.96), and "local produce is less available than non-local produce" (3.34 ± 0.96). Those items respondents most disagreed with as barriers included "there are no differences between local and non-local produce" (2.65 ± 1.00), "it is difficult to serve local produce items to a diverse student body" (2.45 ± 0.78), and "staff are less knowledgeable about how to serve local produce compared to non-local produce" (2.42 ± 0.92). The majority of barriers were rated between the "neutral" and "disagree" range indicating participants did not agree with the barriers listed. In another study (Stokes & Arendt, manuscript in progress), school foodservice employees who were interviewed appeared reluctant to identify any challenges or barriers about FTS programs but upon asking probing follow up questions, employees did discuss several barriers to FTS programs.

Keys to Success to Farm to School Programs

The same five point Likert-type scale was used to assess participants' levels of agreement to 23 items regarding keys to success when implementing FTS programs. Table 5 contains complete details concerning mean scores for keys to success items. Participants agreed (mean score of 4 or 5) with five of the 23 items including: "staff encouraging students to try local produce" (4.15 ± 0.78), "exposing students to local produce consistently" (4.08 ± 0.72), "presenting local produce attractively to students" (4.08 ± 0.74), "using appropriate preparation methods to prepare local produce" (4.04 ± 0.77), and "incorporating local produce into existing recipes" (4.01 ± 0.75). The remainder of the success items were rated in the neutral range with the three lowest being, "explaining to students how to prepare local produce" (3.67 ± 0.90), "serving local produce with condiments" (3.66 ± 0.82), and "there is positive peer pressure amongst students to try local produce" (3.21 ± 1.01). The lowest mean score was for positive peer pressure; this could be related to employees' job duties and lack of student contact at the time when peer pressure occurs. For example, employees may be focused on serving on the lunch line and not hear positive and or negative peer pressure taking place amongst students, or peer pressure may occur in the lunch room where foodservice employees are not present. Although participants were generally neutral towards many of the success items, they did not disagree with any. These results imply that hourly employees have a generally positive outlook toward the success of FTS programs and believe that things can be done in order to make the program a success. These results are consistent with findings from Deblieck, Strohbehn, Clapp, and Levandowski (2010) who also indicated that hourly employees of a college FTS program had generally positive attitudes toward FTS programs.

Differences between Barriers and Keys to Success

Geographic Location: Significant differences in mean scores based on geographic location were identified for both barriers and keys to success items at a significance level of $p<0.05$; results are shown in Table 6 and Table 7. Significant differences were identified between the following states (representing each of the eight NFTSN geographic regions) for levels of agreement as to impact of these barriers: (1) "students have never been exposed to some of the local produce items" ($p=0.028$; Colorado [2.61] and Minnesota [3.67]), (2) "local produce is less available than non-local produce" ($p=0.008$; Oklahoma [3.18] and Connecticut [4.00]), (3) "a substitute is needed because an insufficient amount of local produce is received" ($p=0.002$; Connecticut [3.62] with North Carolina [2.43] and Maryland [2.74]), (4) "local produce is not as clean as non-local produce" ($p=0.001$; Minnesota [3.86] with Oklahoma [2.82], North Carolina [2.95], Maryland [2.68], and Connecticut [2.73]), (5) "there are no differences between local and non-local produce" ($p<0.0001$; Connecticut [2.00] with California [2.94], Oklahoma [2.91] , North Carolina [3.05] and Maryland [2.95]; Minnesota [2.15] with Oklahoma [2.91] and North Carolina [3.05]), (6) "it is more difficult to receive sufficient amounts of local produce compared to non-local produce" ($p<0.0001$; Connecticut [4.10] with. California [3.13], Oklahoma [3.00], North Carolina [2.89], and Maryland [3.00]).

Significant differences regarding mean scores of levels of agreement to keys to success items were also identified. The following success items had significant differences at the $p<0.05$ level: (1) "students sampling local produce" ($p=0.004$; Maryland [4.32] and North Carolina

Table 3: Characteristics of Schools (n=190-213)[a]

Characteristics	N	%
Foodservice management		
Self-operated	148	69.5
Contract Managed	42	19.7
Number of years with farm to school program		
1 year or less	9	4.2
1 to 2 years	20	9.4
2 to three years	44	20.7
More than three years	57	26.8
I don't know	74	34.7
Average number of meals served during lunch each day		
0 to 200	28	13.1
201 to 400	117	54.9
401 to 600	53	24.9
601 to 800	5	2.3
801 to 1000	4	1.9
more than 1000	5	2.3
Participation in farm to school activities[b]		
Educating students about local produce	104	48.8
Incorporating local produce into a la carte offerings	68	31.9
Chefs visiting classrooms	12	5.6
Offering local produce as part of "snack time"	55	25.8
Visits to farmer's markets	17	8.0
Incorporating local produce into the school lunch program	156	73.2
Purchasing fresh produce from local farmers	146	68.5
Taking students to visit farms	43	20.2
Incorporating local produce into school breakfast program	92	43.2
Farmers visiting classrooms	7	3.3
Taste testing local produce	69	32.4
Growing a school garden	39	18.3
Other (please specify)	7	3.3
Geographic region[c]		
West (Alaska, **California**, Hawaii, Idaho, Nevada, Oregon, Washington, Montana)	21	9.9
Southwest (**Colorado**, Utah, Wyoming, Arizona, New Mexico)	19	8.9
Midwest (North Dakota, South Dakota, Nebraska, Kansas, **Oklahoma**, Missouri, Iowa)	38	17.8
Great Lakes (**Minnesota**, Wisconsin, Illinois, Indiana, Michigan, Ohio)	26	12.2
South (Arkansas, Louisiana, Mississippi, Alabama, **Texas**)	27	12.7
Southeast (Florida, Georgia, Kentucky, **North Carolina**, South Carolina, Tennessee)	25	11.7
Mid-Atlantic (Delaware, District of Columbia, **Maryland**, New Jersey, Pennsylvania, Virginia, West Virginia)	23	10.8
Northeast (**Connecticut**, Maine Massachusetts, New Hampshire, New York, Rhode Island, Vermont)	23	10.8

[a] Totals may not equal 213 and percentages may not equal 100 due to missing data.
[b] Total responses may exceed 213 due to multiple responses.
[c] Bolded state indicates state chosen for study.

[3.48]), (2) "slowly incorporating local produce into the menu" (p=0.015; Maryland [4.32] and Minnesota [3.48], (3) "employees desire to increase use of local produce" (p=0.020; Maryland [4.41] and North Carolina [3.64], (4) "offering local produce during "snack time" (p=0.006; North Carolina [3.24] and Oklahoma [3.97], Minnesota [4.00] and Maryland [4.04]), (5) "explaining to students how local produce can be served" (p=0.032; Maryland [4.18] vs. Connecticut [3.39]).

These results indicate that geographic location may affect employee's perceptions of barriers and keys to success when using local produce as part of the FTS program. For example, employees in Minnesota agreed that local produce was not as clean as non-local produce while employees in Oklahoma, North Carolina, Maryland, and Connecticut disagreed. Although it is difficult to know exactly what caused these differences many factors could contribute. Varied climates between regions, types of local soil, availability of local produce, local infrastructure to support FTS programs, and employee perceptions of FTS programs are just a few examples. It is also interesting to note that the three states located in northern regions (Connecticut, Maryland, and Minnesota) had the most significant differences with other states. This could possibly be explained by shorter growing seasons in these areas as compared to states with longer growing seasons (California, Texas, North Carolina, and

Table 4: Barriers to FTS Programs (n= 165-187)[a]

Barriers	Mean[b]	SD
1. Local produce has a different appearance than non-local produce	3.67	0.90
2. The quality of local produce is better than non-local produce	3.61	0.96
3. Local produce is less available than non-local produce	3.34	0.96
4. Students have never been exposed to some of the local produce items	3.32	1.05
5. It is more difficult to receive sufficient amounts of local produce compared to non-local produce	3.28	0.92
6. It is hard to know whether students prefer local produce raw or cooked	3.24	0.89
7. The amount of time required to wash local produce is longer than non-local produce	3.22	1.13
8. The size of local produce is less consistent than non-local produce	3.22	0.89
9. It is difficult to know student's preferences for local produce	3.18	0.85
10. It is easier to get students to try local produce than non-local produce	3.07	0.85
11. Local produce is not as clean as non-local produce	3.06	1.01
12. Processing (e.g. peeling, cutting, packaging) local produce takes more time	3.04	1.14
13. A substitute is needed because an insufficient amount of local produce is received	3.02	0.95
14. Local produce has a shorter shelf life than non-local produce	2.89	1.00
15. It is difficult for staff to identify local produce items compared to non-local produce	2.78	1.00
16. There are no differences between local and non-local produce	2.65	1.00
17. It is difficult to serve local produce items to a diverse student body	2.45	0.78
18. Staff are less knowledgeable about how to serve local produce compared to non-local produce	2.42	0.92
Overall Mean Score	**3.09**	**0.46**

[a] The actual number of responses varied due to missing data
[b] Likert-type scale was used as follows: 1= Strongly Disagree, 2= Disagree, 3=Neutral, 4= Agree, 5= Strongly Agree

Table 5: Keys to Success for FTS Programs (n= 199-211)[a]		
Keys to Success	**Mean[b]**	**SD**
1. Staff encouraging students to try local produce	4.15	0.78
2. Exposing students to local produce consistently	4.08	0.72
3. Presenting local produce attractively to students	4.08	0.74
4. Using appropriate preparation methods to prepare local produce	4.04	0.77
5. Incorporating local produce into existing recipes	4.01	0.75
6. Employees desire to increase use of local produce	3.98	0.83
7. Getting support from teachers and staff	3.98	0.93
8. Students sampling local produce	3.97	0.80
9. Employee motivation to serve local produce	3.94	0.87
10. Offering a substitute when an insufficient amount of one item is available	3.91	0.79
11. Training for staff on how to prepare local produce	3.90	0.87
12. Slowly incorporating local produce into the menu	3.87	0.84
13. Consistency in serving size of local produce	3.87	0.82
14. Explaining to students how local produce can be served	3.85	0.79
15. Knowledge of kitchen staff who are more experienced	3.79	0.74
16. Offering local produce during "snack time"	3.78	0.86
17. Getting support from parents	3.77	0.91
18. Getting support from students	3.76	0.86
19. Employees personal beliefs aligning with ideals of the FTS program	3.72	0.78
20. Getting to know local farmers	3.72	0.90
21. Explaining to students how to prepare local produce	3.67	0.90
22. Serving local produce with condiments	3.66	0.82
23. There is positive peer pressure amongst students to try local produce	3.21	1.01
Overall Mean Score	**3.89**	**0.54**

[a] The actual number of responses varied due to missing data

[b] Likert-type scale was used as follows: 1= Strongly Disagree, 2= Disagree, 3=Neutral, 4= Agree, 5= Strongly Agree

Oklahoma). Although differences in barriers have not been identified in previous research, research has identified availability of local produce, infrastructure, and perceptions towards FTS programs as barriers (Izumi, Wright, & Hamm, 2010; USDA FTS Team, 2011). It is also possible that differences amongst states from different regions may be related to other reasons not explored in this research such as local school infrastructure (e.g. staff, facilities, space, and equipment), policies related to FTS, and specific FTS activities (e.g. school garden, chef visits, and farm visits). Variation in the number and size of districts and schools participating from each state could also possibly explain differences. For example, all 25 participants (11.7% of all respondents) from Maryland came from one district whereas most other states (5 of the 8) were represented by at least three districts. Given that policies and procedures are likely the same or similar for different schools in the same district, this could explain some of the findings.

Number of Meals Served: Significant differences in mean scores for barriers were also found based on number of meals served; the same categorization scheme was used by Smith, Wleklinski, Roth, & Tragoudas (2013) to identify small, medium and large schools based on number of meals served (Table 8). Significantly different mean scores were found for the following success items: (1) "the amount of time required to wash local produce is longer than non-local produce" (p=0.009; medium [3.06] and large [3.59]), (2) "it is easier to get students to try local produce than non-local produce" (p=0.001; small [2.88] and large [3.41]; medium [2.93] and large [3.41]), and (3) "processing (e.g. peeling, cutting, packaging) local produce takes more time" (p=0.037; medium [2.87] and large [3.35]). It is interesting to note the three barriers with significant differences all dealt with hands on preparation or serving of local produce. Findings also exhibited differences between large and medium or large and small schools. This is likely a result of large schools preparing, and serving more local produce. Therefore, because employees who work at smaller schools typically prepare smaller amounts of local produce, they might be less likely to perceive these items as barriers. It is also likely that larger schools have greater segmentation by function area in the kitchen so that only those employees designated for salad prep would be handling FTS produce. Thus, the impact of the FTS program would be greater on those specific employees. No significant differences between mean scores related to keys to success and number of school meals were identified.

CONCLUSIONS AND APPLICATIONS

This study focused solely on the perceptions of hourly non-management foodservice employees in identifying barriers and keys to success when implementing and maintaining FTS programs. The study also assessed differences between barriers and keys to success based on geographic location and number of school lunches served daily in respondents' schools. Hourly non-management foodservice employees prepare, promote, and serve local produce to students as part of FTS programs on a regular basis. Therefore, understanding barriers and keys to success from the view of hourly non-management school foodservice employees is important to school nutrition directors and school nutrition managers. Mean scores of agreement to listed barrier items indicated that hourly foodservice employees did not generally agree with barriers to FTS programs identified in previous research; most previous research summarized perspectives of managers and foodservice directors rather than foodservice employees (Colosanti, Matts, & Hamm, 2012; Gregoire & Strohbehn, 2002; Izumi, Wright, & Hamm, 2010a; Izumi, Wright, & Hamm, 2010b). Thus, the findings from this study can help foodservice managers in devising implementation and sustainable steps for FTS programs. Generally, respondents in this study had a positive outlook towards FTS programs and were of the opinion that using local produce in school meals was not an insurmountable challenge. This research also found that hourly employees do believe that there are certain keys to success when implementing FTS programs, such as support from teachers and staff. Therefore, foodservice directors could ensure that teachers and staff are well informed concerning the FTS program and seek out their support during implementation and continuation of related activities. Findings suggest that hourly foodservice employees felt valued by their contribution to students' health with FTS activities; further research is needed in this area regarding the role of school meals program staff and the school health environment

Participants from this study demonstrated a lack of knowledge concerning management of the FTS programs. Therefore, foodservice directors should educate staff concerning managerial issues related to these programs. This might include inreased communication regarding availability and/or specifications of upcoming local menu items or staff in-service training on how to safely prepare unique varieties of fruits and vegetables and why it is important to students' health. Further, given that about a third of participants currently

Table 6: Differences in mean ratings of barriers by geographic location (n=165-211)[a]

	Mean[b] ± SD								
Geographic Location	**California**	**Colorado**	**Oklahoma**	**Minnesota**	**Texas**	**North Carolina**	**Maryland**	**Connecticut**	**P-Value[c]**
Local produce has a different appearance than non-local produce	3.71±0.77	3.79±0.92	3.44±0.98	4.08±0.86	3.65±0.78	3.39±0.94	3.57±0.94	3.82±1.00	0.167
The amount of time required to wash local produce is longer than non-local produce	3.72±0.67	3.00±1.19	3.21±1.08	3.63±1.25	3.24±1.18	3.05±0.90	3.00±1.16	2.86±1.36	0.145
It is easier to get students to try local produce than non-local produce	3.14±0.91	3.05±0.62	2.78±0.91	3.12±0.83	2.95±1.00	3.50±0.51	3.17±0.94	3.00±0.93	0.205
Students have never been exposed to some of the local produce items	3.07±1.00	2.61±1.09	3.34±0.94	3.67±1.17	3.06±1.06	3.40±0.88	3.40±1.05	3.74±1.10	0.028*
The quality of local produce is better than non-local produce	3.61±0.85	3.68±0.95	3.74±0.90	3.48±1.05	3.40±1.19	3.48±0.75	3.55±1.06	3.81±1.08	0.850
It is hard to know whether students prefer local produce raw or cooked	3.11±0.83	3.00±0.60	3.41±0.80	3.17±0.96	3.00±1.05	3.32±0.75	3.71±0.72	3.00±1.07	0.086
Staff are less knowledgeable about how to serve local produce compared to non-local produce	2.75±1.13	2.33±0.84	2.50±1.02	2.31±0.88	2.79±0.86	2.27±0.77	2.50±0.96	2.05±0.81	0.186
Local produce is less available than non-local produce	3.07±0.92	3.28±0.83	3.18±0.98	3.71±1.20	3.14±0.79	3.16±0.60	3.09±0.81	4.00±1.05	0.008*
The size of local produce is less consistent than non-local produce	3.63±0.96	3.44±0.98	3.00±0.86	3.68±0.85	3.00±0.78	2.95±0.62	2.95±0.62	3.10±1.12	0.009*
A substitute is needed because an insufficient amount of local produce is received	3.19±0.66	2.75±0.93	2.97±0.95	3.23±0.87	3.22±1.00	2.43±0.98	2.74±0.87	3.62±0.87	0.002*
It is difficult to know student's preferences for local produce	3.53±0.94	3.00±0.91	3.16±0.72	2.96±0.79	3.45±0.76	3.17±1.04	3.26±0.73	3.05±0.95	0.330
Local produce is not as clean as non-local produce	3.47±0.72	3.06±1.06	2.82±0.92	3.86±0.94	3.10±1.04	2.95±0.89	2.68±0.89	2.73±1.08	0.001*
It is difficult to serve local produce items to a diverse student body	2.38±0.72	2.58±0.77	2.58±0.85	2.24±0.78	2.70±0.98	2.47±0.70	2.40±0.75	2.26±0.65	0.491
Processing (e.g. peeling, cutting, packaging) local produce takes more time	3.25±1.21	2.79±0.98	3.09±1.21	3.33±1.28	2.86±1.04	3.10±0.97	3.10±1.14	2.74±1.29	0.615
It is difficult for staff to identify local produce items compared to non-local produce	3.00±1.00	2.79±0.79	2.75±1.08	2.58±1.14	3.09±1.04	2.42±0.77	2.89±0.94	2.70±1.03	0.428
Local produce has a shorter shelf life than non-local produce	3.31±1.20	3.16±0.77	2.67±1.08	2.95±1.02	2.82±1.01	3.06±0.80	2.79±0.86	2.36±0.90	0.071
There are no differences between local and non-local produce	2.94±1.00	2.78±1.00	2.91±1.00	2.15±1.05	2.55±0.74	3.05±0.92	2.95±0.90	2.00±0.62	0.000*
It is more difficult to receive sufficient amounts of local produce compared to non-local produce	3.13±0.92	3.28±0.83	3.00±0.84	3.48±0.93	3.45±0.83	2.89±0.90	3.00±0.87	4.10±0.85	0.000*
Overall mean score	**3.18±0.32**	**2.93±0.30**	**3.01±0.63**	**3.31±0.35**	**3.18±0.66**	**3.05±0.48**	**3.04±0.41**	**3.06±0.33**	**0.453**

[a] The actual number or responses varied due to missing data and "don't know" response allowed for barriers

[b] Likert-type scale was used as follows: 1= Strongly Disagree, 2= Disagree, 3=Neutral, 4= Agree, 5= Strongly Agree

[c] Results of the analysis of variance (ANOVA) were statistically significant

*(p<.05)

Table 7: Differences in mean ratings of keys to success by geographic location (n=165-211)[a]

	Mean[b] ± SD								
Geographic Location	**California**	**Colorado**	**Oklahoma**	**Minnesota**	**Texas**	**North Carolina**	**Maryland**	**Connecticut**	**P-Value[c]**
Knowledge of kitchen staff who are more experienced	3.55±0.83	3.89±.74	3.89±.67	3.96±0.68	3.78±0.75	3.67±.75	3.73±.83	3.86±.71	0.616
Students sampling local produce	4.19±0.68	4.00±0.58	4.08±0.91	4.12±0.97	3.67±0.78	3.48±0.92	4.32±0.65	4.09±0.52	0.004*
Slowly incorporating local produce into the menu	4.05±0.89	3.79±0.71	4.06±0.67	3.48±1.19	3.92±0.74	3.88±0.78	4.32±0.57	3.57±0.95	0.015*
Exposing students to local produce consistently	4.16±0.83	4.00±0.88	4.17±0.56	4.16±0.75	4.00±0.78	3.84±0.80	4.32±0.57	4.22±0.60	0.393
There is positive peer pressure amongst students to try local produce	3.30±1.17	3.11±0.94	3.33±0.96	2.84±1.07	3.30±0.99	3.08±1.02	3.45±0.91	3.48±0.99	0.370
Presenting local produce attractively to students	4.05±1.00	4.05±0.85	4.08±0.68	4.19±0.63	4.07±0.73	3.88±0.73	4.27±0.70	4.13±0.76	0.789
Employees desire to increase use of local produce	3.81±1.03	3.95±0.52	4.03±0.88	4.04±0.79	3.78±0.93	3.64±0.76	4.41±0.50	4.30±0.82	0.020*
Staff encouraging students to try local produce	4.19±0.68	3.89±0.94	4.05±0.91	4.38±0.57	4.04±0.81	3.96±0.74	4.39±0.58	4.52±0.67	0.038*
Serving local produce with condiments	3.62±1.12	3.79±0.71	3.64±0.90	3.68±0.85	3.78±0.70	3.58±0.78	3.86±0.79	3.48±0.79	0.839
Employees personal beliefs aligning with ideals of the FTS program	3.47±0.96	3.68±0.58	3.81±0.86	3.84±0.75	3.70±0.78	3.65±0.78	3.95±0.79	3.63±0.76	0.638
Offering local produce during “snack time”	3.72±0.75	3.68±0.75	3.97±0.83	4.00±0.76	3.96±0.76	3.24±1.05	4.04±0.71	3.44±0.86	0.006*
Using appropriate preparation methods to prepare local produce	4.10±0.94	4.00±0.47	4.14±0.68	4.24±0.66	3.96±0.71	3.71±0.86	4.39±0.58	3.87±0.97	0.062
Getting support from teachers and staff	3.86±1.15	3.84±0.96	3.89±1.02	4.28±0.84	3.96±0.85	3.61±0.99	4.26±0.69	4.17±0.78	0.162
Incorporating local produce into existing recipes	4.10±0.79	4.05±0.62	4.16±0.69	4.16±0.69	4.00±0.68	3.71±0.75	4.22±0.67	3.70±0.93	0.072
Consistency in serving size of local produce	3.57±1.08	3.79±0.86	3.97±0.73	4.00±0.91	3.85±0.66	3.78±0.74	4.09±0.81	3.83±0.83	0.532
Getting support from parents	3.38±1.12	3.74±0.81	4.03±0.81	4.00±1.00	3.81±0.92	3.54±0.98	3.96±0.88	3.61±0.72	0.119
Employee motivation to serve local produce	3.65±1.23	4.16±0.50	4.03±0.91	4.00±0.76	3.93±0.83	3.68±0.90	4.05±0.84	4.26±0.69	0.216
Explaining to students how local produce can be served	3.90±0.97	3.79±0.54	3.97±0.75	3.96±0.79	3.85±0.77	3.61±0.89	4.18±0.66	3.39±0.78	0.032*
Getting to know local farmers	3.85±1.04	3.79±0.71	3.75±1.00	3.84±0.85	3.89±0.75	3.43±0.90	3.86±0.64	3.30±1.15	0.212
Explaining to students how to prepare local produce	3.85±0.99	3.79±0.63	3.65±1.01	3.56±0.92	3.70±0.87	3.65±0.78	4.00±0.85	3.18±1.05	0.147
Getting support from students	3.60±1.27	3.79±0.71	3.70±0.85	3.92±0.91	3.74±0.81	3.57±0.90	4.00±0.74	3.82±0.59	0.684
Training for staff on how to prepare local produce	4.00±0.92	3.84±0.60	3.86±0.92	3.96±0.79	4.11±0.70	3.50±0.98	4.17±0.72	4.09±0.95	0.150
Offering a substitute when an insufficient amount of one item is available	3.55±1.05	3.84±0.50	3.89±0.77	4.00±0.71	3.96±0.76	3.79±0.72	3.96±0.88	4.35±0.71	0.082
Overall mean score	**3.83±0.77**	**3.84±0.47**	**3.98±0.43**	**3.94±0.52**	**3.88±0.61**	**3.73±0.78**	**4.20±.54**	**3.76±.37**	**0.187**

[a] The actual number or responses varied due to missing data and “don’t know” response allowed for barriers

[b] Likert-type scale was used as follows: 1= Strongly Disagree, 2= Disagree, 3=Neutral, 4= Agree, 5= Strongly Agree

[c] Results of the analysis of variance (ANOVA) were statistically significant

*(p<.05)

Table 8: Differences in mean ratings of barriers and keys to success based on meals served (n= 165-211)[a]

Number of meals served	Mean[b] ± SD			
Barriers	**Small (0-200)**	**Medium (201-400)**	**Large (more than 400)**	**P-Value[c]**
Local produce has a different appearance than non-local produce	3.70±0.72	3.56±0.92	3.84±0.96	0.166
The amount of time required to wash local produce is longer than non-local produce	3.00±0.96	3.06±1.15	3.59±1.07	0.009*
It is easier to get students to try local produce than non-local produce	2.88±0.52	2.93±0.90	3.41±0.81	0.001*
Students have never been exposed to some of the local produce items	3.13±0.87	3.32±1.09	3.41±1.08	0.572
The quality of local produce is better than non-local produce	3.88±0.82	3.55±1.03	3.58±0.94	0.289
It is hard to know whether students prefer local produce raw or cooked	2.91±0.61	3.19±0.92	3.43±0.89	0.053
Staff are less knowledgeable about how to serve local produce compared to non-local produce	2.13±0.80	2.47±0.93	2.43±0.94	0.244
Local produce is less available than non-local produce	3.48±1.20	3.39±0.92	3.18±0.93	0.324
The size of local produce is less consistent than non-local produce	3.46±0.66	3.12±0.93	3.28±0.88	0.209
A substitute is needed because an insufficient amount of local produce is received	3.04±0.94	3.11±0.93	2.85±0.98	0.278
It is difficult to know student's preferences for local produce	3.05±0.74	3.24±0.89	3.11±0.82	0.524
Local produce is not as clean as non-local produce	2.92±1.09	2.98±1.03	3.22±0.90	0.296
It is difficult to serve local produce items to a diverse student body	2.52±0.73	2.43±0.82	2.47±0.75	0.873
Processing (e.g. peeling, cutting, packaging) local produce takes more time	2.96±1.31	2.87±1.14	3.35±1.01	0.037*
It is difficult for staff to identify local produce items compared to non-local produce	2.63±0.97	2.89±1.03	2.63±0.92	0.212
Local produce has a shorter shelf life than non-local produce	2.85±1.05	2.81±1.02	3.02±0.93	0.488
There are no differences between local and non-local produce	2.48±0.87	2.74±1.01	2.58±0.93	0.383
It is more difficult to receive sufficient amounts of local produce compared to non-local produce	3.30±0.82	3.33±0.99	3.16±0.84	0.574
Overall Mean Score	**3.04±0.34**	**3.04±0.52**	**3.18±0.42**	**0.332**
Keys to Success				
Knowledge of kitchen staff who are more experienced	3.79±0.74	3.80±0.70	3.75±0.83	0.913
Students sampling local produce	4.11±0.83	3.96±0.82	3.94±0.78	0.629
Slowly incorporating local produce into the menu	3.81±0.92	3.88±0.78	3.88±0.92	0.926
Exposing students to local produce consistently	4.15±0.53	4.10±0.73	4.03±0.78	0.751
There is positive peer pressure amongst students to try local produce	3.11±0.99	3.26±0.96	3.16±1.11	0.683
Presenting local produce attractively to students	4.04±0.64	4.13±0.72	4.02±0.81	0.567
Employees desire to increase use of local produce	4.15±0.60	3.98±0.80	3.91±0.96	0.448
Staff encouraging students to try local produce	4.32±0.61	4.08±0.85	4.20±0.73	0.279
Serving local produce with condiments	3.63±0.84	3.66±0.81	3.67±0.85	0.975
Employees personal beliefs aligning with ideals of the FTS program	3.85±0.72	3.72±0.75	3.65±0.88	0.541
Offering local produce during "snack time"	3.42±0.76	3.87±0.86	3.77±0.88	0.058
Using appropriate preparation methods to prepare local produce	4.00±0.61	4.02±0.75	4.09±0.85	0.794
Getting support from teachers and staff	4.21±0.83	3.97±0.94	3.89±0.95	0.306
Incorporating local produce into existing recipes	4.14±0.65	3.98±0.76	4.02±0.76	0.598
Consistency in serving size of local produce	3.86±0.81	3.82±0.80	3.97±0.89	0.494
Getting support from parents	3.79±0.79	3.78±0.94	3.72±0.93	0.908
Employee motivation to serve local produce	4.08±0.74	3.92±0.87	3.92±0.92	0.700
Explaining to students how local produce can be served	4.04±0.76	3.81±0.76	3.83±0.85	0.409
Getting to know local farmers	3.63±0.84	3.69±0.94	3.81±0.87	0.589
Explaining to students how to prepare local produce	3.74±0.90	3.54±0.96	3.87±0.77	0.056
Getting support from students	3.96±0.81	3.74±0.79	3.72±1.00	0.425
Training for staff on how to prepare local produce	4.04±0.81	3.85±0.85	3.94±0.93	0.571
Offering a substitute when an insufficient amount of one item is available	3.85±0.66	3.90±0.73	3.95±0.94	0.837
Overall Mean Score	**3.94±0.45**	**3.88±0.51**	**3.88±0.63**	**0.871**

[a] The actual number of responses varied due to missing data and "don't know" response allowed for barriers

[b] Likert-type scale was used as follows: 1= Strongly Disagree, 2= Disagree, 3=Neutral, 4= Agree, 5= Strongly Agree

[c] Results of the analysis of variance (ANOVA) were statistically significant

*($p < 0.05$)

garden or process garden harvest for later use, hourly staff at schools with FTS programs might benefit from engagement in other activities (e.g. trips to local farms, chef demonstrations) of the program beyond serving local produce in school meals. These suggestions align with findings from Debliek, Strohbehn, Clapp, and Levandowski (2010) who found that informational posters and development workshops increased hourly foodservice employee's awareness of a university FTS program.

Differences between barriers and keys to success based on geographic location as well as by respondents in schools serving a small, medium or large number of school lunches were identified in this study. This information can be helpful to foodservice directors or FTS leaders by helping them understand that barriers may be specific to particular areas of the country. Although this study included participants from several different regions across the United States, the sample from each region was relatively small; thus caution should be taken in interpretation of findings. Future research could focus on surveying a larger sample of hourly school foodservice workers from each specific region and further exploration of region specific barriers. Future research could also investigate differences in employee perceptions of FTS based on kitchen work areas due to possible differences in work load segmentation depending on the amount of local produce prepared at each school. Differences in barriers were identified for washing, preparing, and serving local produce by respondents at schools with a large number of school lunches served with staff at these schools more strongly agreeing that noted tasks were a barrier (3.18 overall mean score compared to 3.04 overall mean score from small and medium schools). Because staff in larger schools serving more students often has designated responsibilities, such as produce preparation, and because FTS activities in school meals typically involve use of fresh produce, this higher mean agreement score could be due to fewer people in the school bearing a greater burden. Directors can use this information to help develop strategies for processing and serving large populations of students such as redesigning job duties within the kitchen, hiring extra staff, or recruiting volunteers to assist with produce preparation. Data were collected spring of 2014, which was during a time of recent changes to nutritional requirements implemented as part of Healthy Hunger Free Kids Act. Future research could investigate other possible reasons for differences in barriers and keys to success such as local school infrastructure (e.g. space, equipment, and staff), FTS policies, Wellness policies, management (self-operated versus contract-managed) and specific FTS activities (school garden, classroom education, and farm visits). Research to assess effectiveness of developed strategies designed to overcome identified barriers and assessing effectiveness of different training techniques for school staff involved with FTS should also be explored.

This study was limited by the number of school districts participating from each region. Because most regions only had two or three school districts that distributed questionnaires to participants from multiple school buildings in the district, it should be noted that respondents from the same district will likely have similar perceptions toward the FTS program. Using several different districts from each region would be beneficial. Another limitation to this study was that the majority of schools participating had been involved with FTS programs for two or more years. Schools that have had programs for one year or less may perceive barriers and keys to success differently. Efforts should be made in future research to include a larger number of new FTS programs.

This study is the first known that addresses the views of hourly non-management school foodservice employees with hands-on experience preparing local produce as part of a FTS program. . Given the expanding efforts to incorporate FTS programs into schools, a knowledge of the successes and barriers to these programs is important. Findings from this study indicate the importance of maximizing successes and addressing barriers in order to improve implementation and maintenance of FTS programs.

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Research Contribution

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FOODSERVICE DIRECTOR AND SCHOOL ADMINISTRATOR'S KNOWLEDGE, ATTITUDES AND INTEREST/MOTIVATION TOWARDS FAMILY-STYLE MEALS IN SCHOOL FOODSERVICE SETTINGS

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ABSTRACT

Many schools serve meals in a traditional cafeteria style but family-style service is limited. The aim of this study was to assess knowledge, attitudes, previous exposure, and interest/motivation of foodservice directors/managers towards a family-style meal service in school settings. The survey was pilot-tested with a random sample of 20 foodservice directors/managers and subsequently administered to a convenience sample of 718 foodservice directors/managers. Test-retest reliability coefficients were weak to substantial (r = 0.16 to 0.80). Principal components analysis confirmed a six-factor model. Internal consistencies were substantial (α = .73 to .91). Future research should focus on additional testing of the survey instrument on a broader scale.

Keywords: Family-style meals, foodservice directors, school-aged children, instrument development, and factor analysis

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INTRODUCTION

In 2012, the National School Lunch Program (NSLP) served school lunch to approximately 31 million children (United States Department of Agriculture, 2014). That same year, the United States Department of Agriculture (USDA) initiated a final rule to update NSLP and School Breakfast Program meal patterns and standards to better align them with the 2010 Dietary Guidelines for Americans (USDA, 2010) by requiring that the availability of fruits, vegetables, whole-grains, and fat-free or low-fat milk be increased in school meals (Federal Register, 2012). Since implementation of the final rule, over 90% of schools are meeting the new standards (First Focus, 2014). The objective of the Healthy Hunger-Free Kids Act is to improve the health and well being of children (Federal Register, 2012). This overarching philosophy has also been at the cornerstone of the NSLP since its inception in 1946 (Public Law 396, 1946). However, an important consideration should not only be what children are served, but the environment in which they are served.

Historically, family-style meals were observed in childcare centers, institutional settings (e.g. psychiatric facilities, nursing homes), and the home environment. A growing body of research has demonstrated the beneficial effects of family meals on the health and dietary behaviors of children including the self-regulation of intake of young children (Mogharreban & Nahikian-Nelms, 1996), opportunities for adult role modeling in childcare centers (Sigman Grant, Christiansen, Branen, Fletcher, & Johnson, 2008) and greater intake of fruits, vegetables, grains and key nutrients such as calcium, iron, folate, fiber, and vitamins C, E, and B_6 (Burgess-Champoux, Larson, Neumark-Sztainer, Hannan, & Story, 2009; Christian, Evans, Hancock, Nykjaer, & Cade, 2013; Gillman et al. 2000; Larson, Neumark-Sztainer, Hannan, & Story, 2007; Neumark-Sztainer, Hannan, Story, Croll, & Perry, 2003).

A paucity of research assessing the use of a family-style meal service in school settings exists in the literature. Cain (1984) investigated the effect of a family-style versus a cafeteria-style meal service on student's food preferences, intake, and food waste. Students in grades 4-6 were randomly assigned to either condition and were served two different menus. Significantly greater intakes of key nutrients (e.g. protein, thiamin, riboflavin, niacin, and iron) and energy were reported among students in the family-style condition on one of two days compared to the cafeteria-style condition ($p < 0.05$). Overall, the family-style meal service was deemed acceptable by students and resulted in reduced plate waste. A subsequent study by Donnelly, Jacobson, Legowski, Johnson, & McCoy (2000) extended this work by assessing the effect of family-style versus the traditional method of service on student's dietary intake and food waste. Similar to the study by Cain (1984), students in grades 3-6 were randomized to either a family-style or traditional style of service. Although not statistically significant, the study reported that there were slightly greater intakes of energy, protein, and fat and less food waste among students in the family-style meal condition.

Food service directors are key stakeholders and decision makers with regards to operations and fiscal management in school foodservice settings. The aim of the present study was to develop and test a survey instrument that assessed the knowledge, attitudes, level of previous exposure, and interest/motivation of foodservice directors/managers towards a family-style meal service in school settings.

METHODS

Sample Overview

Participants (n=20) for the pilot sample were identified from the Minnesota Department of Education database (Minnesota Department of Education, 2014) and were randomly selected if they had the title, "Foodservice Director or Manager." Compensation was given in the form of a $15 Target gift-card. Participants of the final sample (n=718) were identified from membership lists provided by State School Nutrition Associations (SNA) representing several geographic regions of the United States. State SNA's were contacted individually via telephone by the research team to obtain permission to release their state SNA membership list. Overall, six state SNA's provided their membership lists containing valid email addresses for 718 foodservice directors/managers. An email invitation containing a letter describing the study and survey objectives and a link to access

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the survey was sent to the 718 email addresses. Participants provided informed consent prior to completing the survey. To maximize the response rate, a follow-up email reminder was sent two weeks later to non-responders (Dillman, Smyth, & Christian, 2009). Participants who completed greater than 75% of the survey were entered into a drawing to win one of two Apple iPad Mini's. The University of Minnesota and St. Catherine University Institutional Review Boards approved the use of human subjects in this research prior to data collection.

Survey Development and Description

The survey was developed to assess participants' knowledge, level of exposure, attitudes, and interest/motivation concerning a family-style meal service in a school foodservice setting. Themes from individual interviews (n=8) and focus groups conducted with foodservice directors or school administration (principals) (n = 8), children (kindergarten, 3rd and 4th grade; n = 20), parents (n = 8), and teachers (n = 12) were used to inform development of the survey instrument. Study design and findings have been described previously (Street-Coborn, 2014).

Survey questions addressed demographic characteristics and participant's knowledge, attitudes, and interest/motivation towards a family-style meal service. Demographic characteristics included participant's current or most recent position, geographic location, registered dietitian status, percentage of students on free or reduced priced meals, and NSLP participation by grade level. Level of exposure to a family-style meal service was assessed by one question that asked participants if they had past exposure and/or experience with a family-style meal service. The USDA definition of a family-style meal service in a school lunch environment provided a framework for participants to answer questions that addressed knowledge, attitudes, and interest/motivation related to a family-style meal service in school settings (Food and Nutrition Services USDA, 2013-2014). The definition described common characteristics of a family-style meal service in a school foodservice setting, which included the following: (1) allowing students to serve themselves from common dishes of food and make choices in food selection, (2) supervising adults providing assistance during mealtimes, (3) encouraging of additional portions and selections by supervising adults, and (4) complying with daily and weekly NSLP food component/food item requirements (Food and Nutrition Services USDA, 2013-2014).

Following the definition, three items measured knowledge using a 5-point scale. The questions asked how similar the USDA definition was to their knowledge prior to completing the survey (1= not very similar to 5= very similar), how well participants understood the USDA definition (1= not at all well to 5= very well), and level of confidence in their ability to implement a family-style meal service based on the USDA definition provided (1= not very confident to 5= very confident). Attitudes related to the benefits (3 questions) and barriers (1 question) of a family-style meal service in a school foodservice setting were assessed using a 5-point scale (1= strongly disagree to 5= strongly agree). The four questions addressed the following: attitudes towards benefits of a family-style meal service, benefits of adult presence and supervision during a family-style meal service, benefits towards educational opportunities during a family-style meal service, and potential barriers to the application of a family-style meal service in a school foodservice setting. A total of four questions assessed participant's interest/motivation towards a family-style meal service in a school foodservice setting. Two questions asked participants to rate their level of agreement using a 5-point scale (1= strongly disagree to 5= strongly agree): interest in learning more about a family-style meal service in a school foodservice setting, and motivation to learn more about a family-style meal service in a school foodservice setting. The preceding two questions also asked participants to rate their level of agreement using a 5-point scale (1= not at all interested to 5= very interested) to the following: 1) regardless of the barriers, how interested are you in learning more about the application of a family-style meal service; and 2) regardless of the potential barriers, how interested are you in learning more about the concept of a family-style meal service in a school foodservice setting?

The pilot sample of 20 foodservice directors/managers (female=90%, male=10%) were utilized to test the stability and reliability of the survey by administering the same survey, with the same participants, on two different occasions approximately 10-14 days apart. The research team revised all questions with correlations below 0.45 to enhance clarity and understanding.

Statistical Analysis

Data were analyzed using Statistical Analysis System (SAS, version 9.3, copyright 2002-2003, SAS Institute Inc, Cary, NC). The level of statistical significance was set at $p < 0.05$. Descriptive statistics including frequency distributions were generated for demographic characteristics and level of exposure. Spearman correlation coefficients were calculated to determine test-retest correlations for knowledge, attitudes, and interest/motivation between the two time intervals. Exploratory factor analysis using Principal components analysis with Varimax rotation was conducted to identify factors related to knowledge, attitudes, and interest/motivation towards a family-style meal service in a school foodservice setting. Factors with an eigenvalue of one or more were retained based on Kaiser criterion (Kaiser, 1960) and the scree plot test (Cattell, 1966). Factor loadings were considered "high" if the absolute value exceeded 0.40 (Costello & Osborne, 2011). To assess internal consistencies of the factor patterns, Cronbach alpha coefficients were calculated (Nunnally & Bernstein, 1994). Cronbach alpha > 0.7 were indicative of good to excellent internal consistency (Nunnally & Bernstein, 1994).

RESULTS AND DISCUSSION

Results

Response Rate and Participant Characteristics: A total of 233 surveys were completed out of the 718 sent to foodservice directors/managers resulting in an overall response rate of 32%. Data from survey respondents who did not complete more than 75% of the survey were discarded (n= 48). The final analytical sample included 187 usable surveys. The majority of participants indicated most recent position of Foodservice Director (78%), Foodservice Manager (13%), Foodservice Employee (2%), and other (7%). Eighty-one percent of participants stated they were not Registered Dietitians. Approximately one-fourth (26%) of participants indicated that they had a previous opportunity to serve family-style meals in a school foodservice setting. Slightly less than three fourths (71%) of participants indicated no previous opportunity, while the remaining participants (3%) responded "unsure".

Participants identified their geographic location as Midwest (54%), South (39%), and North East (7%) with nearly half (47%) indicating student enrollment less than 2,500. Percentage of students that received free or reduced price lunches ranged from 10-80% and the majority of participants (> 95%) indicated that all grades in their district including elementary, middle, and high school participated in the National School Lunch Program (Table 1).

Table 1: Demographic Characteristics of Survey Participants (n = 187)	
Characteristics	**n (%)**
Title	
Foodservice Director	145 (78)
Foodservice Manager	24 (13)
Foodservice Employee	4 (2)
Other[1]	14 (7)
Registered Dietitian[2]	
Yes	35 (19)
No	150 (81)
Geographic Location	
Midwest	102 (54)
South	73 (39)
Northeast	12 (6)
Student Enrollment[3]	
< 2500	86 (47)
2501-5000	35 (19)
5001-7500	7 (4)
7501-10000	12 (7)
10001-15000	15 (8)
15001-25000	11 (6)
25001-50000	6 (3)
> 50000	1 (.55)
NSLP[7] **Participation by Grade**	
Elementary school[4]	173 (99)
Middle school[5]	175 (100)
High school[6]	171 (99)

[1] Titles listed as "other" included Foodservice Supervisor (district level), Nutrition Fund Coordinator, Head Cook, Consultant, Record Keeper, Foodservice Director Assistant, Registered Dietitian, Operations Manager, Camp Director, Food Service Director, Nutrition Coordinator (district level), and District Level Coordinator.
[2] Data missing from 2 participants who declined to answer the question.
[3] Data missing from 6 participants who declined to answer the question.
[4] Data missing from 14 participants who declined to answer the question.
[5] Data missing from 12 participants who declined to answer the question.
[6] Data missing from 16 participants who declined to answer the question.
[7] NSLP= National School Lunch Program

KNOWLEDGE, ATTITUDES AND INTEREST/MOTIVATION TOWARDS FAMILY-STYLE MEALS

Knowledge

Approximately 40% of participants indicated that the USDA definition of a family-style meal service was "somewhat similar" to their knowledge prior to completing the survey. Slightly less than one-fourth (20%) of participants indicated that the definition was "very similar" to their prior knowledge. Thirty-seven percent stated that they understood the USDA definition "very well." Of the total participants, approximately 7% responded that they understood the USDA definition "not very well" or "not well".

Responses related to confidence were not evenly distributed. Thirty-eight percent of participants indicated that they were not confident in their ability to apply a family-style meal service based on the USDA definition; whereas 20% felt neither confident nor un-confident. Alternatively, 32% felt confident and 9% felt very confident in their ability to apply a family-style meal service based on the USDA definition provided.

Attitudes

Approximately half of participants agreed that the application of a family-style meal service could provide students an opportunity to socialize with adults during lunch (52%) and meet government regulations by offering all food components (50%). Only 3% of survey participants strongly disagreed with these items. Somewhat less than half (45%) agreed that the application of a family-style meal service could enhance a student's willingness to try new foods, while 19% disagreed and/or strongly disagreed.

When asked about the benefits of having adult supervision during the use of a family-style meal service, over half (52%) of the survey participants agreed that the presence of a supervising adult would provide students with an opportunity to build social skills by conversing with adults and promote a holistic school environment (e.g. meeting the physical, mental and social factors for student development) (48%). Slightly more than half (58%) of the participants also agreed that the presence of a supervising adult could provide students with a role model to encourage positive selection of food components.

Approximately half of participants agreed that the family-style meal service should encompass "learning" where students learn about how food is acquired, produced, and served at school (48%) and learn about the health benefits of foods served (52%). A little over half (60%) also agreed that students should learn how to apply nutrition knowledge learned in the classroom to make healthy choices during lunch.

Overall, participants responded that the two greatest barriers to a family-style meal service would be money (56%) and adequate staffing (42%). Additional barriers included resources and lack of facility space.

Interest/Motivation

Two questions assessed participant's interest/motivation towards a family-style meal service in a school foodservice setting. The first question assessed participant motivation to learn more about a family -style meal service. Approximately half responded that their interest in learning more would be motivated by increased student consumption of fruits and vegetables (50%), student willingness to try new foods (51%), and community engagement within the school environment (49%). Furthermore, approximately 40% of participants also responded that their interest in learning more would be motivated by increased student socialization with peers (40%) and adults (42%). The second question addressed participant interest in learning more about the use of family-style meals in a school environment. Participant interest in learning more about the family-style meal service was motivated by a reduction in plate waste (58%), followed by reduced production costs (48%), reduced overall costs (43%), the ability to meet food safety requirements (43%), and the ability to increase the number of reimbursable meals (40%).

Finally, participants were asked whether completion of the survey enhanced their interest and receptivity to the application of a family-style meal service. Roughly one-fourth (26%) indicated that completion of the survey had made them more interested and receptive to the concept and application of a family-style meal service in school settings. Lastly, regardless of the barriers, one fourth of participants were not at all interested in learning more about the application of a family-style meal service compared to 34% that were interested.

Exploratory Factor Analysis and Reliability Analysis

Principal components analysis identified six factors: one factor regarding knowledge, three factors regarding attitudes, and two factors regarding interest/motivation (Table 2). The one factor for knowledge, "Knowledge of A Family-Style Meal Service," included two

items (three originally): similar, understand, and confidence. Factor loadings for the three items ranged from 0.83 to 0.66. The item "confidence related to a participant's knowledge of a family-style meal service" was removed to increase the internal consistency from moderate (α=0.68) to substantial (α= 0.73).

Three factors regarding attitudes included the following: factor one, "Attitudes Towards Family-Style Meal Service Benefits", factor 2, "Attitudes Towards Family-Style Meal Service Benefits Aside From Nutrition", and factor three, "Attitudes Towards Family-Style Meal Service Barriers". Factor one contained four items (five originally): opportunity to socialize with adults, enhance a student's willingness to try new foods, opportunity to build social skills by conversing with adults, and provide an adult role model. One item, "promotes a holistic school environment", was removed because it cross-loaded onto multiple factors. Factor two contained four items and all of the items loaded at least 0.40; therefore, none were discarded. Lastly, factor three contained six items with the highest loadings observed among the following items: money (0.70), facility space (0.71), and resources (0.71). Factor loadings for the three factors ranged from 0.52-0.86 and internal consistency for factor one (α= 0.91), factor two (α= 0.82), and factor three (α= 0.79) was substantial.

Two factors regarding interest/motivation included factor one, "Interest/Motivation Towards a Family-Style Meal Service Based on Ability to Reduce Potential Barriers," and factor two, "Interest Towards a Family-Style Meal Service Based on Ability to Enhance Children's Physical and Social Health." Factor one contained five items, none of which were removed. Factor two contained two items (seven originally). Five items (student consumption of fruits and vegetables, student willingness to try new foods, community engagement in school environment, serving of healthier, less processed food to students, and connection between home and

Table 2. Factor Loadings and Internal Consistency Reliabilities for Family-Style Meal Scales (n = 187)

Factor and Items	Factor Loadings[1]	Cronbach α[2]	% Variance Explained	Item Mean (SD[3])
Knowledge				
F1: Knowledge of a Family-Style Meal Service		.73	61%	
Similar[4]	.83			3.62 (1.07)
Understand[5]	.84			3.99 (0.94)
Attitudes[6]				
F1: Attitudes Towards Family-Style Meal Service Benefits		.91	33%	
Enhance a student's willingness to try new foods	.67			3.40 (0.96)
Provide student's an adult role-model	.76			3.70 (0.85)
Opportunity to socialize with adults	.77			3.49 (0.87)
Opportunity to build social skills by conversing with adults	.86			3.55 (0.88)
F2: Attitudes Towards Family-Style Meal Service Aside From Nutrition		.82	17%	
Meet government regulations by offering all food components	.56			3.58 (0.99)
Learn about how food is acquired, produced, and served at school	.75			3.42 (0.90)
Learn about the health benefits of food served	.80			3.68 (0.86)
Apply the nutritional knowledge they learned in the classroom to make healthy choices during lunch	.81			3.78 (0.80)
F3: Attitudes Towards Family-Style Meal Service Barriers		.79	8%	
An easy method to assess that federal regulations are met for reimbursable meals	.52			3.54 (1.42)
Adequate staffing	.59			4.52 (0.75)
Preparation time	.65			3.96 (1.07)
Money	.70			4.07 (1.03)
Facility space	.71			3.91 (1.09)
Resources	.71			4.11 (0.97)
Interest/Motivation[7]				
F1: Interest/Motivation Towards A Family-Style Meal Service Based On Ability To Reduce Potential Barriers		.89	52%	
Reduced plate waste	.70			3.89 (0.93)
Meeting food safety requirements	.78			3.67 (1.09)
Increase the number of meals reimbursed	.82			3.82 (0.99)
Reduced overall cost	.82			3.79 (1.03)
Reduced production cost	.87			3.47 (0.98)
F2: Interest/Motivation Towards A Family-Style Meal Service Based On Ability To Enhance Children's Physical And Social Health		.89	15%	
Student socialization with adults	.81			3.47 (0.93)
Student socialization with peers	.82			3.41 (0.93)

[1] Factor loadings refer to correlations between factors and variables that emerged from the principal components analysis.
[2] Measures the reliability of internal consistency between multiple item scales.
[3] SD, standard deviation
[4] Total n= 187 with all items scored on a scale of 1-5 (1= not at all similar and 5= very similar).
[5] Total n= 187 with all items scored on a scale of 1-5 (1= not very well and 5= very well).
[6] Total n= 181 with all items scored on a scale of 1-5 (1= strongly disagree 5= strongly agree).
[7] Total n= 130 with all items scored on a scale of 1-5 (1= not at all interested and 5= very interested).

school environment) were removed because they cross-loaded onto multiple factors. Factor loadings ranged from 0.70 to 0.82 and internal consistency for factor one (α= 0.89) and factor two (α= 0.89) was substantial

DISCUSSION

To our knowledge, this is the first study to assess knowledge, attitudes, level of previous exposure, and interest/motivation of foodservice directors/managers towards a family-style meal service in school settings. Exploratory factor analysis established a six-factor model to explain these scales.

The majority of participants held the title, foodservice director and were not Registered Dietitians. Additionally, almost 100% of participants indicated that all grade levels participated in the National School Lunch Program. These findings are similar to previous survey results conducted with foodservice directors or other food and nutrition personnel (Rosen, Arndt, & Marquart, 2013).

Survey results indicated that forty percent of participants felt that the USDA definition of a family-style meal service was similar to their knowledge prior to completing the survey. Additionally, 37% responded that they understood the USDA definition. However, only 9% of participants felt confident in their ability to apply a family-style meal service in a school setting based on the definition provided. Inadequate knowledge may best be explained by lack of exposure to family-style meals in school settings. Only 26% of participants had previous exposure to a family-style meal service, whereas the majority (71%) did not. Overall, this lack of knowledge suggests a need to train foodservice directors and school personnel on the standard operating procedures related to the incorporation of a family-style meal service in a school foodservice setting.

Attitudes of foodservice directors and school personnel were also assessed. Identified barriers to a family-style meal service were lack of money, facility space, resources, and adequate staffing. An additional barrier identified in the present study was plate waste. Over half (53%) of participants indicated that they would be interested/motivated to move towards a family-style meal service based on the ability to decrease plate waste. These potential barriers are consistent with published survey results from school food authorities related to the challenges they face when implementing new meal standards (PEW Charitable Trusts & Robert Wood Foundation, 2013). Based on this evidence, it seems plausible that changes to the foodservice delivery method, such as implementing a family-style meal service, might present similar challenges to those resulting from the incorporation of new meal standards. Future research should examine the effect of a family-style meal service in minimizing these barriers.

Previous research has shown that the use of a family-style meal service in childcare and nursing home settings can result in increased socialization and communication for participants during mealtimes (National Food Service Management Institute, 2003). Although minimal research has explored the relationship between a family-style meal service and its effect on a child's socialization and communication during school mealtimes, our survey results support the concept. Over half (52%) of participants agreed that children could build social skills by conversing with adults during a family-style meal service. Furthermore, participants indicated that interest in learning more about a family-style meal service would be motivated by increased student socialization with peers (40%) and adults during mealtimes (42%). Interestingly, only 11% of participants disagreed with these statements. These results suggest that foodservice directors/managers are not solely focused on meeting children's physical needs through nutrition and compliance with school meal standards. Rather, our findings suggest that foodservice directors/managers are concerned with other dimensions of a child's health such as their social development.

Exploratory factor analysis using principal components analysis with varimax rotation revealed a one-factor solution for knowledge, a three-factor solution for attitudes, and a two-factor solution for interest/motivation. Attitude factor two may need further development because three of the four items (learn about how food is acquired, produced, and served at school; learn about the health benefits of food served; and apply the nutritional knowledge they learned in the classroom to make healthy choices during lunch) cross-loaded onto factor one.

Two factors were identified for interest/motivation. Five items from factor two were removed because they cross-loaded onto more than one factor. Additional development and testing of this factor is needed. Because this factor is related to social health, participants may not have understood the context of the items in relation to a school foodservice setting because social health is not a dimension of health that is often considered when serving school meals to children. Currently, the emphasis has been solely on promoting the physical health of children by improving the nutritional quality and quantity of foods served (Cohen, Richardson, Parker, Catalano, & Rimm, 2014; Hanks, Just, & Wansink, 2014; Sallis et al. 2003).

CONCLUSIONS AND APPLICATIONS

This survey is a reliable and valid instrument to measure the knowledge, attitudes, and interest/motivation of foodservice directors/managers towards a family-style meal service in a school foodservice setting. Overall, the study found that foodservice directors/managers understood the definition of a family-style meal service despite having limited exposure prior to the survey. The majority of foodservice directors/managers were also receptive and interested in learning more about this style of service and its application in a school foodservice setting. Attitudes towards family-style meal service benefits were relatively positive. Survey responses indicated that foodservice directors/managers care about the potential positive impact of a family-style meal service on the development of a child's physical, social, and mental health. However, concern was expressed towards logistical barriers such as money, facility space, resources, and, adequate staffing.

Overall, future work in this area should use the present study findings to further examine potential barriers, promoters, and feasible strategies for implementing a family-style meal service in a school foodservice setting. Moreover, study findings can be utilized to develop additional surveys targeted towards other stakeholders involved in school foodservice such as, parents, teachers, school district personnel and government or state officials. Adoption of a family-style meal service may impact the implementation and oversight of the current school meals program nutrition standards. Therefore, surveying federal and state government officials to identify strategies to further meet the NSLP guidelines / regulations with a family-style meal service may help clarify the logistical challenges and opportunities within the food delivery system, kitchen preparation, and service area (e.g. portion sizes, food component requirements) in the cafeteria. Additional work in this area that addresses the potential positive impact of a family-style meal service in school settings on the social and emotional health of children is also warranted. This might include the influence of a family-style meal service on adult-role modeling, adult-child interactions and peer relationships.

The present study has limitations that should be considered when interpreting the results. First, the recruitment of participants was an inherent limitation because a convenience sample of foodservice directors/managers was generated from select states rather than a random national sample. The primary reason for this limitation was that consent was not provided by each state's SNA to obtain their membership lists which resulted in a relatively low overall response rate (32%). Administration of this survey with a larger, geographically diverse sample is warranted to confirm the factor structure. Lee, Kwon, and Sauer (2013) reported that low response rates among foodservice directors could be attributed to limited access to the Internet. Past research suggests that the range of response rates for an online survey can be wide, between 6-75% (Sheehan & McMillan, 1999). Although the response rate was relatively low, it was within the range (24-50%) of response rates of foodservice directors or other food and nutrition personal previously reported in the literature (Gilmore, O'Sullivan Maillet, & Mitchell, 1997; Rogers, 2003; Rosen, Arndt, & Marquart, 2013; Lee, Kwon, & Sauer, 2013).

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Pedagogy

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THE WORLD READINESS PROGRAM IN THE CULINARY ARTS, A CASE STUDY: CAN MOTIVATION AND ACADEMIC COMPETENCY BE IMPROVED BY TEACHING KIDS FOOD STUDIES ON A SHOESTRING BUDGET?

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ABSTRACT

A novel pedagogical approach using food as the vehicle was designed and implemented to gauge the effectiveness of the culinary arts to increase preparedness for college for 15 under-resourced high-school students. The curriculum was developed to improve competencies and increase students' self-confidence and academic proficiency. A mixed-method approach was used for analysis. Phenomenological and observational data revealed students' perceived high self-assessment of academic confidence, though these feelings were not supported by the pre and post quantitative 6th grade level math and science test results. We believe improved results could be obtained through this program with earlier intervention in the education process.

Keywords: culinary arts education, college prep, pedagogical innovation

INTRODUCTION

There are many obstacles that may hinder the future aspirations of under-resourced, minority students. Such challenges may include discrimination, poverty, less opportunity to partake in career exploration, and less opportunity to understand how an educational ethic helps to obtain future career goals (Turner & Conkel-Zielbell, 2011). The National Center of Educational Statistics reported that students from low-income and minority families were more likely to drop out of high school as compared to students from white middle or upper class families (Kaufman, Alt, & Chapman, 2004). As they are under-resourced, these students are faced with many barriers, both in and out of their control, that hinder their prospects for success in school and later on (Chaves et. al., 2004). In many circumstances, under-resourced minority students do not engage in career exploration during school, have a lower sense of self-efficacy and are challenged with discrimination and poverty (Chin & Kameoka, 2002;Turner & Conkel-Ziebell, 2011). Subsequently, under-resourced minority students are not adequately prepared to transition to higher tiers of education. Many of these adolescents have been tracked into vocational programs without the necessary fundamental components for career success (Turner, 2007). Others choose to directly enter the working environment without postsecondary or vocational education. As such, they have limited prospects and fewer choices to develop successful careers. This could have a consequent effect on motivation to pursue specific career options as well as self-efficacy to perform well in the working environment (Aldeman, 2010; Chin & Kameoka, 2002; Jackson & Nutini, 2002; Jackson, Kacinski, Rust, & Beck, 2006; Teranishi & Parker, 2010).

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The literature has shown that early-on academic guidance has a significant impact on students' subsequent academic and career success (Turner, 2007). This support has been found to have a positive effect on the readiness and confidence scores of inner-city youth transitioning to high school (Turner, 2007). Developing caring and supportive relationships between teachers, students, and peers has been found to increase student motivation and positive perceptions of intent to attend college (Radcliffe & Bos, 2011). Unfortunately, under-resourced minority students are often not given ample opportunities to receive proper encouragement; either in-school or from positive familial inputs (Kirschner, Sweller, & Clark, 2006; Turner, 2007). To increase the success for high school and beyond, there has been a scholarly call to identify at-risk students to properly prepare them to transition into higher tiers of education. The need for this has been shown to be even more critical in inner-city environments where children often face greater challenges, barriers, and an increased rate of academic failure in schools (Williams & Sanchez, 2013). Efforts to enable students from these settings to seek advice on higher levels of education have been confounded by schools that redirect advisement funding to behavioral control or social services, therefore limiting the potential for advice and academic encouragement for the students who need it most (Roscigno, Tomaskovi, & Crowley, 2006).

Research has demonstrated that under-resourced minority students have a more positive attitude toward school and thus are more likely to succeed when they receive support from their family (Anderson, Sabatelli, & Kosutic, 2007; Roscigno, Tomaskovi, & Crowley, 2006). This engagement potentially increases confidence, which in turn influences a variety of factors including the amount of effort placed on performing academic tasks, as well getting better test scores and grades (Chin & Kameoka, 2002). However, many under-resourced minority students are not receiving the necessary supportive attributes that are inherent to educational success from their families due to variables impacted by a low socioeconomic status such as: lack of financial resources and the adults lack of educational experience both leading to low confidence in navigating the education system (Jeynes, 2007).

In consideration of the related issues and potential solutions presented in the literature, the World Readiness Program in the Culinary Arts (WRPCA), conducted at a university in New Jersey, was designed to better enable under-resourced students to succeed in upper level learning environments. The program was offered during the summer in the Food System culinary laboratory at the university. The objective was to expose under-resourced minority students to the college experience through a Food Studies education portal, to increase self-efficacy, academic skills, and thus transition students more effectively into a university milieu. Program administrators

proposed the following research questions: a) If involving under-resourced minority high school students in a university sponsored Food Studies Program would enhance their confidence of attaining post-secondary education; b) If involving under-resourced minority high school youths in a university sponsored Food Studies Program would increase the academic competence of these students; and c) If involving under-resourced minority youths in a university sponsored Food Studies Program will increase their appreciation of the diversity of food and culture. The team also hoped to identify any specific academic barriers or self-limitations that the students may have perceived.

The academic genre of Food Studies has been described as not necessarily the study of only food. Rather, it has been explained to be the examination of food and its contexts within a broad range of topics and methodologies (Miller & Deutsch, 2009). Teaching academics through the venue of food or Food Studies in particular, has been used as a method to engage students in the learning process (Bonnekessen, 2010). Food has been shown to be a safe, common ground for learning among students (Cargill, 2005; Duffrin, et al., 2010). Further, it has been suggested that hands-on activities (such as cooking) provides students with an enjoyable opportunity to learn and improve their academic skills by encompassing a variety of activities (Bonnekessen, 2010; Calder, Brawley, & Bagley, 2003; Cargill, 2005).

Program History

In 2005, paying "gifted and talented" high school students took part in a culinary arts course housed in the Food Management (now called Food Systems) Program at the university. The course ran in two successive summers. After assessing the impact of the course, the course administrators recommended a similar but extended "program" during the academic year for under-resourced minority, inner-city students – a constituency ostensibly more in need of academic support. A partnership was subsequently formed between the Food Systems Program and a local church. The goal was to academically empower under-resourced, inner-city minority youths at no charge, by providing them with a path to post-secondary education through a culinary venue. A grant application was submitted to a local benefactor with ties to the church.

The original idea was to provide a 15-week (67.5 hours), after school, comprehensive academic program framed in a culinary setting. Visiting faculty from the university Mathematical Science, Nutrition, Biology, and History departments, academic and admissions advisors, and paid graduate students would round out a team led by the Food System faculty. The students would be bussed to campus and provided with uniforms. However, with only three months left until the program start date in the fall of 2012, the administrators were informed that the funding would be substantially cut to $5,000. The decision was then made to continue with a scaled down version of the project, which would be implemented over 12 consecutive 3½ hour morning sessions (42 hours) during the summer. Due to the limitation of funds the revised program would be taught by just one faculty-member with periodic help from the program administrators. Students would have to find their own transportation to campus, which was a challenging task considering the limitations of bus service.

METHODOLOGY

A general request for applicants notice was sent to inner-city high schools and after school programs one month before the program start date. Guidance counselors, community leaders, and program directors were apprised of the inclusion criteria: The students must be under-resourced, from a minority group, of high school age, and willing to find transportation to the school. Due to a lack of transportation resources, the pool of potential applicants was sparse. The students who did apply went through an interview process to assess their motivation level and were required to have various release and information forms signed by their parents or guardians. No students were rejected from the applicant pool. As such, the final tally was comprised of 15 eligible students coming from six underserved municipal areas in the state of New Jersey: Paterson, Orange, East Orange, West Orange and Montclair (both mixed socio-economic and ethnic communities) and Newark. The New Jersey Department of Education reported composite district high school graduation rates from these areas in 2012 were respectively: 66.8%, 66.6%, 70.8%, 85.6%, 92.5% and 68.7% (New Jersey State Department of Education, 2013). Five students were recruited from a local church program, 4 students were recruited from the local high school, 1 student was recruited from the local neighborhood center, 3 students were recruited from a shelter and 2 students were recruited from different, local inner city high schools. Nine female and six male students were enrolled. The mean age was 15.66 years old (± 1.24), the mean grade level was 10.5 (±1.51). Eleven Black American students (74%), 3 Hispanic students (20%), and 1 white student (7%) started and completed the program. Two students (only) previously been part of a culinary program.

Program Curriculum

The curriculum was designed by the program administrators to include topics such as recipe and purchasing calculations, food safety and microbiology, nutrition and food and culture. The program consisted of an introductory class, and then 9, 3 ½ hour classes that included lecture, demonstrations as well as hands-on culinary learning opportunities (individually and in teams). An additional class was dedicated to an international fusion event with visiting Korean students designed to enhance the students' exposure to diversity and cultural inputs. A final session was slated for the presentation of student culinary projects to family and friends. Students were loaned the necessary equipment, and supplies including uniforms and thermometers and they were given access to ingredients, equipment and materials. The classes took place in a culinary laboratory, which is regularly used by the Food Systems Program. On two separate occasions, the participating students were able to communicate face-to-face with volunteer college student mentors, who circulated with the students during prep time and breaks. The interaction with current students was designed to provide relatable models to help the participants envision themselves in the role of college student. The instructor provided further guidance and interaction during food preparation and cooking. The program featured components where teamwork was essential for completion of culinary projects.

Prior to each food production session, the students were given various recipes and food purchasing equations to encourage their math proficiency. Microbiology was addressed through two food safety lectures and ongoing instruction. Nutrition was taught at two sessions. For the latter, the students were instructed to go to the USDA My Pyramid (recently changed to My Plate) website (2005) to learn about age-specific nutrition information. The students were additionally instructed to complete a food dairy and compare their inputs to USDA recommended dietary amounts, and use the FoodWorks© nutrition analysis computer program to assess the nutrition properties of the foods they cooked (USDA, 2005; The Nutrition Company, 2000).

The food and culture component was addressed through the cultural fusion event. In preparation for this, culinary teams of WRPCA

students drew on their cultural heritage to find recipes. The final selected recipes included food renditions from the Dominican Republic, Jamaica, Trinidad and Tobago, and Mexico. On the day of the event, twenty-one Korean college students who were on an international visit to the campus were integrated into the culinary teams. Each team was presented with the ingredients needed for a pre-determined heritage recipe, plus surprise Asian additions that included oyster sauce, fish sauce, tofu, sesame sauce, and fermented soy. The teams then went about creating "fusion" meals.

Parents, family and friends were invited to the final "Friend and Family" class to take part in a culinary presentation given by the students of the skills learned throughout the program. All students were given a completion certificate at the end of the last session.

Assessment

The researchers planned a mixed method approach to analyze the effectiveness of the program, including phenomenology and triangulated baseline and post statistical test results, instructor observational analysis and qualitative interviews (Jick, 1979; Mathison, 1988; Creswell, 2005; Mertens, 2010). This between-method methodology reportedly appeals to the strengths of qualitative and quantitative research while lessening the impact of the weaknesses (Johnson & Onwuegbuzie, 2004). Triangulation has been used as an analytical method for a number of studies that skirt the topics covered in the present intervention, including research in education (Johnson & Onwuegbuzie, 2004), counseling (Hanson et al., 2005; Mertens, 2010) and health (Morgan, 1998; Casebeer & Verhoef, 1997). The Institutional Research Board at MSU approved the assessment protocols.

To evaluate the baseline math skills at the start of the program, the students were given a quantitative math pretest adapted from AIMSweb M-Cap (math concepts and applications) and M-Comp (math computation) standard test for sixth-grade students (2012a&b). A quantitative pretest adapted from a sixth-grade reading level ServSafe® Food Handler test preparation questions, was administered as well to assess the students' baseline food safety and microbiology skills (National Restaurant Association, 2011). The math assessment included questions such as, "How many ounces are in one pound?" as well as elementary math problems subsequently covered in the course. The food safety and microbiology assessment included questions such as: "What is the definition of a disease carried or transmitted to people by food?" and, "A single-cell organism that can cause foodborne illness is called?" The pretest math and science topics were also addressed within the course curriculum. During the final session, the same pre-tests, with rearranged question order, were re-administered to the students to evaluate statistical levels of change.

Four graded in-class quizzes connected to in-class projects were given over the course of the program, which tested the students' knowledge on nutrition, food safety and microbiology, recipes and knife skills. The food safety and microbiology quiz questions were adapted from the ServSafe® course book (National Restaurant Association, 2011). The recipe quiz, covered food math topics that are related to recipe development such as yield percent and factoring as well as how to list ingredients and procedures. The knife skills quiz was based on the instructor's lecture and handouts on the types and uses of knives and proper cutting procedures.

Eight qualitative interviews were also conducted with consenting students in an attempt to better understand the participants' experience of the program and likelihood to continue their education. The 9 semi-structured interview questions were based on a phenomenological approach, focusing on the student's experiences and their perceptions of these experiences (Eagleton, 2008; Smith, 2003). Phenomenology was chosen, as it is the lived experiences that inform these perceptions and subsequent actions. Phenomenology involves studying a small group of individuals deeply to develop patterns and reveal meaning (Creswell, J., 2009). The interviews lasted approximately 30 minutes and were recorded, with the participant's permission. The data were analyzed by thematic immersion followed by open coding, where transcripts were indexed according to topics. Codes were then collapsed into larger research categories, which formed the main themes of the qualitative research and reviewed and coded by the participating researchers to attain consensus regarding the emergent themes (Table 1) and ensure the reliability of the findings. To ensure the validity of the responses, subject checks were conducted at the conclusion of each interview with the participants. The emergent major themes were validated through agreement among four inter-raters: The two interviewing researchers and two administrating researchers. The program instructor also reviewed the thematic findings.

Semi-structured (open-ended) interview questions were used in an effort to elicit responses that would lead to more specific questions. A lead interviewer conducted the interview sessions and notes were kept and observations recorded by another team member. Example interview questions include: "How likely is it that you will continue your education beyond high school?" "How confident are you in your ability to succeed in school now and in the future?" and "What do you think you learned from the course". Follow-up questions were also utilized to elicit more revealing responses. The interviewing facilitator took notes on body language and other contextual data surrounding the participants' responses. The interview data was recorded for accuracy, transcribed then sorted into thematic components. The program administrators periodically observed the students by looking at their actions, demeanor and attitude. The instructor also observed

Table 1: Emergent Themes (n=8)

Theme	n=8	Student Voice (selected quotes)
Confidence of Academic Success and Beyond	6	"Confident" "Very confident" "I guess it's good", "there are some setbacks…they make me want to achieve it more" "Like math-wise…not the greatest"
Enthusiasm with Tactile Projects for Learning	6	"It was hands-on…I loved the hands-on thing" "To be in here…it helps…it is easier now for me" (In explaining learning efficacy in the normal class experience) "NO! Because I don't get no [hands-on] in [regular] classes"
Families and Barriers	5	(High level of discomfort in answering) "I cannot think" "My whole family is a barrier" "Certain people say I can't do things" I'm going to prove them wrong"

the students peer interactions, ability to follow instructions correctly, and kitchen safety and knife skills. The Korean fusion event was video-recorded with consent of the students and also analyzed for actions, demeanor and attitude. Observational protocols developed by the researchers required the instructor and facilitators to take notations on participants' facial expressions, body language and informal physical and verbal interactions between the instructor and the students and among the students.

RESULTS AND DISCUSSION

Statistical pre and post-test results were analyzed using SPSS, Version 19 (IBM Corporation, 2010). Out of a potential of a 100% score for correct answers, pre-test math grades ranged from 0-50% with a mean of 23.3% (±20.32), while post-test math scores ranged from 0-85% with a mean of 24.6% (±22.23). The pre-test science scores ranged from 20-55% (±8.63), with a mean score of 35.6%, while the post-test science scores ranged from 20-60% (±11.96) with a mean of 38.2%. Though there was a slight increase in the second set numbers, a t-test between pre and post-test scores showed no statistically significant improvement for either math or science scores over the span of the program. The average grades for the four graded in-class quizzes on nutrition, food safety and microbiology, standardizing recipes and knife skills are as follows in respective order: 85.28 (±12.79), 77.84 (±8.62), 82.9 (±18.74), 90.66 (±15.36).

Three themes were culled from the interview data:

Theme 1: Confidence of Academic Success and Beyond. Most of the students expressed a low level of confidence in their academic skills, particularly math (75%). This lack of confidence was exemplified by one student who indicated that he had "discalcula [sic];" and another, who in reference to the recipe exercises noted that, "like math wise, some of the stuff that we did, like multiplying and different measurements…is not my greatest." However, lack of mathematic proficiency did not seem to diminish the students' overall confidence to succeed in school and beyond. Many of the students elicited high levels of surety of academic and future success, as they described their prospects by using terms such as "very confident "(n=3), "confident, really confident"(n=1), "pretty confident"(n=1) and "I guess it's good" (n=1). One student noted, "there are some setbacks but that doesn't mean it's going to stop me achieving my goals. They make me want to achieve it more."

Theme 2: Enthusiasm with Tactile Projects for Learning: The students clearly preferred tactile learning to other academic venues. Said one in reflection about the course, "It was hands-on. I loved the hands-on thing. I'm the type of person, like if you give me something to do with hands-on stuff, I'll be very entertained." Another student, in agreement with the unsolicited statements of most (75%) of the students, mentioned that applied "hands-on" learning appeared to be the best way to deliver the understanding of complex problems. Learning in a kitchen setting seems to help, as noted by another, because, "to be in here [a culinary kitchen] and for me to be like literally seeing it every day, it helps and increases the way I see it, the way that I like, it is easier now for me to like look at a measurement and multiply it, and instead of having to go through all of that trouble that I used to in the past." The lack of hands-on learning opportunities was an agreed deficit of the participants' present high school academic agendas, as exemplified by the following students' response to the researcher's query, "Do you think you have received the skills you need from school?" "Noooo!," the student replied, "Because I don't get no [hands-on learning] classes."

Theme 3: Families and Barriers: Six students were reluctant to answer questions about family support. For example in answer to the researcher's query on this subject, one female said, "I cannot think," and then shut down for the rest of the interview. On the surface, the other students expressed that they had familial support for their academic endeavors. Digging deeper however, the facilitator uncovered some participant concerns about the level of this encouragement. One student noted, "My whole family is a barrier… sort of a road block." Another stated, "Like…certain people in my family say I can't do things" while another emphatically said, "I think my whole family [is a barrier], yeah!" However, while one student noted discouragement from his family, he found the negativity to be motivating. Said he, "Like certain people in my family, they say I can't do things, but it's like, I am going to prove them wrong." Six students had difficulty conveying responses to the question "Do you see any barriers in the future for continuing your education?" While, two participants were able to articulate concern for their future prospects. Said one: "Um, kind of scared [about the future]... cause I'm not really ready to be out there and go on my own." Two other students noted that they were already tracked into technical colleges: One student will be focusing on electronics, the other on culinary skills. For the latter student, career tracking started early on. Said, he: "Um, my guidance counselor, my 8th grade year, told me about it [the high school culinary program]… I just got excited. I was like, 'I just want to do it.'" Working hands-on with new classmates provided a positive setting for the development of social skills for at least one student. Said she, "Being in this class you don't know anyone, so like your people skills are like amped up."

Observations

The program administrators and the instructor provided the observational data. Controlling for one student who at enrollment pre-arranged to miss four classes, attendance was remarkably 100%. Generally, the students were observed to be respectful, punctual, and have a high interest level in the subject as seen through their enthusiasm throughout the programs entirety. The interviewing facilitator noted that while two students were highly enthusiastic in their discussion of culinary skills, three students (as noted), "took a long pause," "became quiet," "looked at the door," and "at the floor," when discussing their academic abilities. The instructor noted that many students did not enjoy the math component of the program as they were seen to be very uncomfortable and overly cautious when calculating measures. On the other hand, many students excitedly told the instructor on numerous occasions throughout the program, that while they normally do not cook for their families, they successfully prepared class recipes at home. One parent affirmed to the instructor that her son cooked for the very first time for their family, duplicating one of the recipe procedures created in class. Peer support and collaboration was evident during the program as these attributes were necessary for completion of the team assignments.

The students appeared to the program administrators to be very excited and engaged with their Korean counterparts during the cultural fusion event. The event enabled the WRPCA students to mentor their Korean counterparts, as the visiting students were not familiar with the laboratory setting or the assignment at hand. The integrated WRPCA and Korean students were observed exchanging emails and Facebook contacts. In response to a voting query, the participating students (WRPCA and Korean) unanimously endorsed the addition of the Asian ingredients as important flavor enhancements to the WRPCA recipes.

Most of the students had parent representatives (or guardians, as was the case for the students in the foster home) at the final "Friend and Family" class. The program administrators noted the enthusiasm, pride and emotional response of these supporting representatives. A few parents personally thanked the instructor and explained that their son or daughter looked forward to coming to class each day.

Some parents became emotional with pride (more than one was observed to have tears in their eyes) during the final certificate presentation. "I never thought that he could do so well," said one parent who was particularly impressed by the culinary display created by the class. It was noted that none of the visiting parents sought out educational information about their child's academic competencies or prospects from the instructor or program administrators.

CONCLUSIONS AND APPLICATIONS

This study examined the possibility of increasing under-resourced students self-efficacy and academic skills by exposing them to the college experience through a venue of applied food studies. In regards to the first research question, many of the students brought to the program perceived high levels of confidence for future academic success. Though, this confidence was muted by the students' lack of confidence in academic skills (particularly math) and issues with family support. Contrary to the second research question, involving under-resourced high school youths in the WRPCA was not found to increase academic competence. Pre and post-test math and science scores revealed many students were significantly lacking in mathematics and science competency, with little improvement over the course of the program. This held true for the two students who had previous culinary class exposure. The students' low confidence in mathematic abilities corroborates with their low mathematical pre and post-test scores in this subject. Involvement with the Korean students during the cultural-fusion may have partially validated the third research question, which postulates increased student appreciation of diversity of food and culture.

Academic shortfalls for under-resourced and minority students have been noted in the literature as partly attributable to lapses in the educational framework, undemocratic tracking, advisement, low access to proficiency courses and course-tracking patterns among middle and secondary schools. Under-resourced and minority students have been particularly affected by diminished standards and practices for teaching; whether these students are taught as a group, or if they receive differential individual treatment within the classroom (Buckley, 2010). As the learning disparities start early on (Greene & Anyona, 2010), it may not be possible to erase academic deficits within the parameters of a short-term proficiency program. The fact that WRPCA students performed at the lower-end of sixth-grade level math and science tests (across the program) underlines the need for more supportive educational strategies at earlier learning stages. Certainly, a shortened 12-session program was not enough to make up deficits that were years in the making. In sum, the WRPCA may have provided too little, too late.

On the positive side, the researchers were encouraged by the students' performance on the in-class "applied" quizzes, which were tied to hands-on activities. The students were enthusiastic, as exhibited by their comments, attendance and administrator observations. The students appeared to be developing a cultural savvy, as demonstrated by the sharing of food, recipes and exchange of contacts with the Korean students. The WRPCA students reported contributions to family cooking tasks and recipes. They also received the support of their relatives during the Family and Friends day. This engagement with parents and families may have been the most important corollary outcome of the program, as family support has been found to be fundamental to academic achievement (Greene & Anyona, 2010).

The researchers make no attempt to generalize the findings from this exploratory study to diverse populations in various locations. The culinary fusion event with visiting Korean students is not likely replicable for other programs. However, culinary fusion events could take place with visiting students from other schools with diverse or homogenous ethnic populations. The present study was limited by budget and time. It is possible more could be done with better outcomes. What was clear was the enthusiasm exhibited by the students to the tactile culinary learning experience. The researchers ask if the introduction of an extensive culinary-based teaching approach, perhaps in the middle-school years, might provide these students with an accessible means to develop basic math skills and scientific understanding in a non-threatening and enjoyable way. Basic math and science educational improvement at an early age may provide students with a platform from which higher order academic achievement may occur. Additional research is needed to determine whether an applied, hands-on food studies program could be an effective venue for promoting academic success for under-resourced high school students or, if such a program would be more successful if administered at earlier stages of learning.

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