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LETTER FROM THE EDITORS

JOURNAL OF FOODSERVICE
MANAGEMENT & EDUCATION

Welcome to the final issue of the *Journal of Foodservice Management and Education* for 2012. Due to increasing submissions, this is first time that two issues are being published within the same calendar year. Thank you to the authors who have submitted journal articles, the reviewers who have helped review these articles, the Foodservice Systems Management Education Council and National Association of College and University Foodservice for their continued support. We would also like to welcome Kerri Cole from Kansas State University as a new assistant editor. In her role, Kerri will help facilitate reviews and correspond with authors. With the increase in manuscript submissions, her addition to the team is certainly welcomed.

The goal of the journal is to support researchers, educators, and industry by publishing quality research and educational resources that enhance operations and assist educators in developing an environment to support and nurture student development. The manuscripts included in this issue of the journal are certain to achieve this goal.

"Serving hot food hot and cold food cold" is a theme that resonates throughout the foodservice environment and is highlighted in several manuscripts in this issue. Troutner and colleagues share their assessment of actual patient meal temperatures on perceived satisfaction. Food temperatures affect not only perceived quality and satisfaction, but also food safety practices in retail foodservice operations. Kwon and researchers reveal their 1-year analysis of food code violations across 156 Asian restaurants. Priorities for food safety training are discussed.

College students were the population of interest for two studies. Lambert and colleagues share the findings of their investigation about measuring and integrating cultural diversity initiatives into the college classroom. Kitterlin, Tanner, and Agrusa used social learning theory to investigate university foodservice management students' level of alcohol consumption. Finally, research about food waste remains a sustainable topic in the Journal. Kwon and colleagues share the results of a national survey of college and university foodservice management administrators about barriers to food waste management and related variables.

The Editors are forecasting an eventful and busy 2013 for the *Journal of Foodservice Management and Education* - ALL of which will not be possible without the assistance of great reviewers and the authors who submit their quality manuscripts for consideration. Thank you to everyone for your attention to outstanding foodservice management education, research, and practice.

Warmest Regards,

Kevin R. Roberts, PhD
Co-Editor

Kevin L. Sauer, PhD, RD
Co-Editor

ABSTRACTS

Research Manuscripts

Analysis of temperature of patient meals

Perceptions of food temperature from post-discharge satisfaction questionnaires and actual temperatures changes during the assembly and delivery of patient meals were explored. Modifications in tray assembly were done in an attempt to improve service temperatures. Results indicated temperature ratings differed based on age and length of stay; younger patients were more satisfied then older individuals; those with a length of stay of more than ten days were least satisfied. Temperature monitoring revealed the greatest loss of temperature occurred during the tray assembly process. Modifications in the tray assembly process had minimal impact on serving temperatures.

Dietetics students' cultural food knowledge and experiences with various cultures

Academic institutes are investigating benefits of integrating cultural diversity learning objectives into classroom learning outcomes and creating an environment supportive of students' interactions and experiences with diverse cultures. The purpose of this study was to investigate dietetics students' cultural awareness by measuring food knowledge, perceptions, and learning experiences with various cultures and differences in cultural awareness based on their gender, age, career choice, graduation date and amount of nutrition education. Results indicate that students' believe it is more beneficial to learn about other cultures through direct cultural experiences than through classroom interactions with other cultures or classroom instruction on other cultures.

Food safety training needed for Asian restaurants: Review of multiple health inspection data in Kansas

The purpose of this study was to assess the frequency and types of food code violations in Asian restaurants in Kansas using health inspection data. A total of 326 restaurant inspection reports over a 12-month period from 156 Asian restaurants in 10 Kansas counties were reviewed. The results indicated that behavioral critical violations occur more often during routine health inspections than other inspections and suggested focus areas for food safety training in Asian restaurants. This study identified food handling practices that Asian restaurant managers and health inspectors should emphasize when training employees and providing performance feedback.

Alcohol use among university foodservice management students

Previous academic and trade analyses have eluded to the phenomenon that hospitality students and industry employees display more frequent alcohol consumption than do their non-hospitality-related counterparts. The aim of this study was to use social learning theory as a basis to investigate the university foodservice management students' alcohol consumption, specifically as they relate to work experience and demographic characteristics. Results indicated that no significant alcohol consumption behaviors were reported among those students with and without practical work experience in the foodservice industry. Age and gender emerged as indicators of significantly different alcohol consumption behaviors.

An investigation of college and university foodservice administrators' level of agreement on potential influencing factors on sustainable food waste management

A national survey to determine college and university foodservice administrators' level of agreement on statements regarding food waste management was developed based on focus group results. Sixty-three college/university foodservice administrators participated in either an online or mailed survey. Administrators mostly disagreed with statements describing barriers to food waste management. However, they agreed they had limited space to store food for donation. Respondents from contract-managed facilities and those serving a higher number of meals agreed more strongly on potential liability issues related to food donation. To increase facilities' donation of leftover food, storage space and liability issues must first be addressed.

Research Contribution

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ANALYSIS OF TEMPERATURE OF PATIENT MEALS

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ABSTRACT

Perceptions of food temperature from post-discharge satisfaction questionnaires and actual temperatures changes during the assembly and delivery of patient meals were explored. Modifications in tray assembly were done in an attempt to improve service temperatures. Results indicated temperature ratings differed based on age and length of stay; younger patients were more satisfied then older individuals; those with a length of stay of more than ten days were least satisfied. Temperature monitoring revealed the greatest loss of temperature occurred during the tray assembly process. Modifications in the tray assembly process had minimal impact on serving temperatures.

Keywords: Patient satisfaction, temperature of foods, tray assembly and delivery.

INTRODUCTION

The concept of patient satisfaction is an emerging one, and has developed over the years into an important variable in medical care. Patient satisfaction assessments are required by accrediting agencies and are used by hospitals for internal and external benchmarking. Overall patient satisfaction with an inpatient hospital experience is influenced by several domains (Hendriks, Oort, Vrielink, & Smets 2002; Jha, Orav, Zheng & Epstein 2008). The satisfaction with foodservice has been identified as a component of overall quality (Otani, Waterman, Faulkner, Boslaugh, Burroughs, & Dunagan 2009).

Several studies have suggested that the temperature of food is important for patient satisfaction with foodservice (Maller, Dubose & Cardello 1980; Stanga, Zurfluh, Roselli, Sterchi, Tanner, & Knecht 2003; Wright, Connelly, & Capra 2006). However, the temperature of food often is the lowest rated of the foodservice variable (DeLuco and Cremer 1990; Fallon, Gurr, Hannah-Jones, & Bauer 2008; Lengyel, Smith, Whiting, & Zello 2004; Sahin, Demir, Celik, & Teke 2006; Wright, Capra, & Alikbari 2003). Temperature of food has been identified as a component of food quality (Dubé, Trudeau, & Belanger 1994), food issues (Lau and Gregoire, 1998), and meal service quality (Fallon et al., 2008; Wright et al., 2003). The temperature of hot foods also has been analyzed as a variable separated from temperature of cold foods in some research (Wright et al., 2003; Wright et al., 2006). When patients' written comments regarding meal service were analyzed, it was found that the temperature of food received the most comments, and the majority of those comments were negative (Tranter, Gregoire, Lafferty & Fullam 2009).

The majority of these studies used questionnaires to examine aspects that influenced overall satisfaction with foodservice. Most studies have not examined the temperature of food alone, but as a variable in overall satisfaction with foodservice (Dube et al., 1994; O'Hara and Harper 1997; Stanga et al., 2003; Wright et al., 2003; Sahin et al., 2006;Wright et al., 2006; Fallon et al., 2008). Often this research has focused on "uncontrollable" factors that influence patient satisfaction with foodservice such as demographic characteristics, of age, gender, and length of stay (LOS). No study to date has looked at individual foods or types of foods that are of most concern to patients. One study measured the temperature of food at the point of assembly and then at point of delivery to determine the change in food temperature and compared two systems of meal service, the trolley method and the traditional plated method, but did not analyze where in the assembly and delivery process temperature was lost (Hartwell and Edwards, 2001).

To date no study has focused on the change in temperature of food during the entire tray assembly and delivery process and what influences patients' ratings of food temperature. Therefore, the objectives of this study were to (1) explore whether satisfaction with food temperatures differs based on patients' age, gender, education level, ethnicity, and length of stay, (2) identify specific foods or categories of foods whose temperatures were of most concern to patients, (3) document changes in food temperature during the tray assembly and delivery process, (4) identify possible areas for improvement in maintaining food temperatures during the tray assembly and delivery process

METHODOLOGY

This study had five phases to explore various aspects of the temperature of hospital patient meals. The university's institutional review board approved the study's protocol prior to data collection.

Food production and tray assembly, at the institution where this study was conducted, was done in a centralized unit using a conventional food production system. Tray assembly was completed by eight foodservice employees who work at stations along a conveyor belt and placed requested food items on the meal tray. A supervisor checked the accuracy of the trays before they were placed in non-insulated transportation carts.

The tray line setup contained three stations with hot foods. Hot entrees were placed on pre-warmed plates on induction heat, insulated bases. Once the entrée was placed on the tray, the remainder of hot and cold side dishes, hot and cold beverages, and desserts were added to the tray. An insulated dome was placed over the entree at the end of the tray line after the accuracy of the tray was checked. The coffee was dispensed from two machines and was served in an insulated mug with a plastic lid; the mugs were not pre-warmed prior to coffee being poured into them.

To help maintain food temperature, the institution utilized the Aladdin Temp-Rite® Heat On Demand® Ultra™ Heat Activator with foam insulated Allure® base and cover. The Heat Activator uses induction heat and takes 12 seconds to heat the base to 200 to 240

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degrees Fahrenheit. According to the manufacturer, the temperature of the base should be maintained for up to one hour after it is heated. Food was served on ceramic plates that were pre-warmed to 170 degrees Fahrenheit using the Aladdin Temp-Rite® Dish Heater. Food and Nutrition Services employees were on the unit and delivered trays to the patients when the cart arrived on the unit. The average length of time from the beginning of tray assembly for the first tray for a unit to service to the last patient on the unit is approximately 29 minutes and 42 seconds.

For the first phase of this study, data from Press Ganey® questionnaires completed by post discharged patients were compiled and analyzed from three medical and surgical units. The Press Ganey® questionnaire measures overall patient satisfaction, with three questions focused on foodservice. The results of this study only explored patient's ratings of one of the foodservice questions, the temperature of food served. Patients rated temperature of food on a five-point scale (very good, good, fair, poor, and very poor). Demographic data, including patient's age, gender, length of stay (LOS), ethnicity, and education level, were obtained as well.

In the second phase of this study, inpatients from the designated medical and surgical units who rated food temperature a three or below (fair, poor, or very poor) on the institution's Food and Nutrition Services (FNS) inpatient questionnaire were interviewed to determine facets contributing to the lower food temperature ratings. The FNS inpatient questionnaires were delivered at meal times to all inpatients on a daily rotation schedule. Interviews were conducted with inpatients until patterns were seen in types of foods prompting lower ratings were identified. Informed consent was obtained by the researcher prior to the interview, with all interviews being conducted by the same researcher to ensure consistency in questioning. A total of 22 semi-structured interviews were conducted.

For the third phase of this study, the tray assembly and delivery process was timed for three medical and surgical units. Each unit was analyzed three separate times, resulting in a total of nine measurements of the entire tray assembly and delivery process. The times were recorded at ten points in the tray assembly and delivery process as these points were considered to be potential areas in which changes could be made to help control temperature loss and included: in the steam table, first tray placed into the cart, middle tray placed into the cart, the last tray placed into the cart, when the cart door was closed, when the cart reached the unit, when the first, middle and last trays were passed, and one hour after the last tray was passed. The time point one-hour later was to replicate a tray being held for patients who were in procedures or could not start eating their meals right away. The purpose of the third phase of this study was to establish the times in which the temperature would be tracked. Because there were significant differences in the times monitored in this phase and the three units were assembled throughout the meal tray line timeframe, scenarios were developed to capture these potential differences. The best-case scenario was the best times (shortest times) recorded in the assembly and delivery process. The worst-case scenario was the worst times (longest times) recorded in the tray assembly and delivery process. These timeframes were used to develop the four scenarios that were used in the study. The beginning best and worst scenarios were the temperatures recorded from trays assembled at the start of the meal service tray line. The middle best and worst scenarios were temperatures recorded from trays assembled during the middle of the meal service tray line.

The purpose of phase IV was to analyze the change in temperature during the tray assembly and delivery process for the foods identified by patients in Phase II. This was completed in two parts. The first component of Phase IV was to assure the foam insulated Allure® bases used in tray assembly were heating properly. The second component of Phase IV was tracking the change in temperature for the specified food items during the assembly and delivery process. Temperatures of four food items were measured ten times during the tray assembly and delivery process. The initial temperatures of selected foods were recorded in the steam table and were monitored over nine key points in the tray assembly and delivery process for six test trays. All food temperatures were measured using the Cooper Atkins® AquaTuff ™ Model #: FW2000MK. This model is NSF (National Sanitation Foundation) and CE (European Commission) certified and is accurate within 1 degree Fahrenheit within the complete temperature range (-100 – 500°F). The temperature probe was placed in the food item as soon as the food item was portioned onto the plate. Once the lid was placed on the item, it was not removed as the temperature reading device was outside of the covered item allowing temperatures to be monitored and recorded without lifting the lid.

After phase IV was completed and analyzed for trends in temperature loss, two interventions were developed and tested in phase V that were designed to potentially minimize temperature loss during the tray assembly process: pre-warming hot beverage cups and placing the insulated dome lid on the entrée plate at the time of entrée portioning. Each intervention (pre-warming hot beverage cups and placing the lid on the plate at the time of portioning) was analyzed on separate days for a total of three measurements, to provide a adequate data. The same times and procedures were used in Phase IV and Phase V. To determine if pre-warming hot beverage cups would result in higher service temperatures, cups were warmed in the dish machine and immediately brought to the tray line and filled with coffee. To reduce temperature loss during the first minute food is placed onto the tray, the tray line was manipulated to change the order of lid placement. During phase IV of this study, hot food was placed onto the pre-warmed plates Heat On Demand® Ultra™ Heat Activator bases first and the rest of the food was placed onto the tray prior to placement of the foam insulated Allure® cover at the end of the tray line. For phase V, the lid was placed onto the base immediately after the food was put onto the plate.

SPSS version 17.0 (Chicago, IL) was used for all data analyses. Descriptive statistics (including means, standard deviations, and frequencies) were calculated for Phase I and II. Analysis of Variance (ANOVA) was used to explore differences in ratings based on demographic characteristics in Phase I. Independent samples t-test and Analysis of Variance (ANOVA) were used to compare food temperatures across the four scenarios in Phase III and between temperatures collected in Phase IV and V. Significance level was set at $p \leq 0.05$.

RESULTS AND DISCUSSION

Phase 1 Patient Satisfaction Ratings

A total of 4,095 completed Press Ganey® satisfaction questionnaires were returned to the medical center between January 1, 2008 and December 31, 2009. Of the total sample, 2,303 were excluded because they were not from the specified medical and surgical units used for the study; an additional 25 were excluded from the sample due to missing data points. The total number of returned satisfaction questionnaires analyzed was 1767 (43%). During this time period there were 19,319 patients admitted to the three units used in this study.

The average age of respondents was 60 years old and the majority of the respondents were non-Hispanic white (83.5%). The average length of stay (LOS) was four days. The sample was educated with 71% of individuals indicating they had at least some college education. The majority of respondents were female (57%). The actual patients admitted to the three units differed somewhat demographically from the patients who returned the Press Ganey® satisfaction questionnaires. Of note, fewer (66.3%) of the total patient population identified themselves as non-Hispanic white.

ANOVA of "Temperature of Food" based on five demographic variables was completed. Ratings differed significantly based on age and length of stay (LOS). Individuals in the younger age categories were more satisfied with the temperature of their food than patients in the older age categories (Table 1). Patient with a LOS of greater than ten days were the least satisfied (Table 1). There were no significant differences observed in temperature ratings based on the other demographic characteristics (gender, education level, and ethnicity).

The result of older individuals being less satisfied with the temperature of their food is similar to the results of Wright et al., (2006). However, these results are contradictory to the results of earlier studies by Maller et al., (1980), DeLuco and Cremer (1990), Dubé et al's., (1994) and Lau and Gregoire (1998), who all found older individuals were generally more satisfied with the temperature of their food. The result of individuals with a LOS of more than ten days having a lower level of satisfaction with food temperatures is consistent with the results of earlier studies by Maller et al., (1980) and Stanga et al., (2003), who found that a longer LOS resulted in lower satisfaction with food temperature.

Table 1: Comparison of ratings for temperature of food served by demographic characteristics of discharges patients

	n	Mean[1,2]	SD
Age			
<50	313	4.13^{x}	0.92
50-59	414	3.95^{y}	1.01
60-65	293	3.99^{y}	0.83
66-75	412	4.00^{y}	0.88
>75	239	3.91^{y}	0.93
Education			
High School or less	458	4.05	0.928
Some College	494	3.96	0.961
Four Year Degree	239	3.92	0.917
Beyond Four Year Degree	396	4.05	0.831
Length of Stay			
1 Day	349	4.04^{x}	0.906
2 Days	328	4.10^{xy}	0.867
3 Days	352	3.97^{wx}	0.933
4 Days	212	3.92^{xz}	0.973
5 Days	103	4.11^{x}	0.873
6-10 Days	221	3.92^{xz}	0.929
>10 Days	85	3.78^{wyz}	0.993
Race			
White non Hispanic	1289	3.98	0.917
Black	209	4.10	0.874
Other including non Hispanic	131	3.92	1.020
Gender			
Female	952	3.99	0.918
Male	719	4.00	0.922

[1]Scale 1= very poor, 2= poor, 3= fair, 4= good, 5= very good
[2]Different superscripts (x, y ,z) in rows indicate differences between means (p<.05) using analysis of variance

Phase II Patient Interviews

A total of 22 interviews were conducted between April 2010 and July 2010, with patients from the three units. Interviewees were selected based on results from the in-patient foodservice satisfaction questionnaires (i.e a rating of three or below for temperature), and then seen by the Patient Advocate to determine willingness to participate in the study.

Hot beverages were cited frequently during the interviews (ten comments for coffee and four comments for tea) as an item at an undesirable temperature. There were only three comments for cold beverages not being at an acceptable temperature. The most frequently cited food items with unsatisfying food temperatures were hot entrees (13 comments), with chicken tenders and baked chicken being the most often mentioned entrées (five comments for chicken tenders and two comments for the baked chicken). Scrambled eggs were cited as having an undesirable food temperature eight times. Breakfast breads including toast, pancakes, waffles, and French toast were cited as having undesirable food temperatures (11 comments), with pancakes (nine comments) being the most frequently mentioned. Other items such as side dishes, broth/soup, and vegetables all were mentioned fewer than four times. Based on the results of the interviews coffee, scrambled eggs, pancakes, and chicken tenders were used for the assessment of temperature change in Phase IV.

Phase III Timing of Tray Assembly

Analysis of the timing of the assembly and delivery process showed significant ($p<0.05$) differences in the amount of time spent assembling and delivering the trays at three points: the time from assembly of the first tray to service; the time required to reach the specific unit after the cart door was closed; and the total time for the assembly and delivery process. Therefore, to better replicate the assembly and delivery process, the best times and worst times for each time point were used for the temperature collection. For example the best time for the cart reaching the unit was ten minutes and the worst time for the cart reaching the unit was 21 minutes after the start of assembly of the meal trays on that cart. Because, the medical and surgical units were assembled at different points in the tray line process, test trays were either started at the beginning of the

Figure 1: Average "Best Case Scenarios" temperature changes for test food items

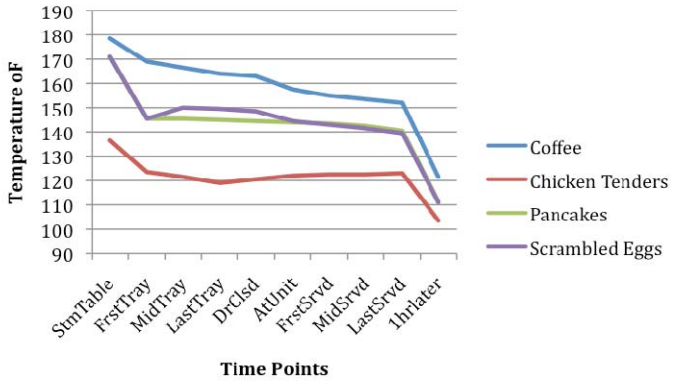


Table 2: Analysis of temperature change in food items between scenarios during the tray assembly and delivery process [a]

			Comparisons of Temperatures			
	Best Case Scenario[b]	Worst Case Scenario[c]	Beginning Best: Middle Best[d]	Beginning Best: Middle Worst[e]	Beginning Worst:: Middle Best[f]	Beginning Worst: Middle worst[g]
	Time (minutes:seconds)					
StmTable	0	0	Coffee** Chicken Tenders**	Coffee** Chicken Tenders**	Coffee** Chicken Tenders **	Coffee** Chicken Tenders**
FrstTray	0:04	0:30	ns	ns	ns	ns
MidTray	1:33	7:40	ns	ns	ns	ns
LastTray	3:47	10:25	ns	ns	ns	ns
DrClsd	4:41	11:30	ns	ns	ns	ns
AtUnit	10:06	21:00	ns	ns	ns	ns
FrstSrvd	12:25	24:10	ns	ns	Coffee *	ns
MidSrvd	15:25	32:50	ns	ns	Pancakes*	ns
LastSrvd	17:55	47:30	ns	Coffee**	Coffee* Pancakes**	ns
1hrlater	1:17:55	1:47:30	ns	ns	Coffee * Pancakes**	ns

[a]Analysis of variance with Bonferroni Correction, food items with differences in temperatures are listed
[b]Best Case Scenario: The best times recorded in the tray assembly and delivery process
[c]Worst Case Scenario: The worst times recorded in tray assembly and delivery process
[d]Beginning Best: The temperatures recorded from trays at the start of the meal service trayline using the "best" times
[e]Beginning Worst: The temperatures recorded from trays at the start of the meal service trayline using the "worst" times
[f]Middle Best: The temperatures recorded from trays during the middle of a meal service trayline using the "best" times
[g]Middle Worst: The temperatures recorded from trays during the middle of a meal service trayline using the "worst" times
*p≤0.05
**p≤0.01

tray line process for the meal period or during the middle of the tray line. This was done to see if units at the beginning of the tray line would have different temperatures than units at later in the tray line.

Phase IV Monitoring Temperatures of Food Items

Temperatures for each food item were collected on six separate days, on three occasions the food items temperatures were taken at the beginning of the tray line and three occasions during the middle of the tray line. Figure 1 displays a visual of the change in temperature that occurred in all food items during the best-case scenario. The pattern of temperature change was similar for all items in each scenario with an initial drop in temperature of 10 to 25 degrees when the hot food item/beverage was placed on/in the service ware, items maintained their temperature for about 25 to 30 minutes, and then had a gradual drop in temperature thereafter. All food items were below optimal serving temperatures recommended by Molt (2006) at the point of service to the patient.

Analysis of variance was used to explore differences between temperatures taken at various points in the tray assembly and service process. As shown in Table 2, few differences existed between the scenarios.

Phase V Change in Practices

Results of Phase V indicated that neither pre-warming the coffee cup nor placing the lid on the hot entrée plate earlier resulted in a significant improvement in service temperatures. Results of the pre-warmed coffee cup compared to the non-pre-warmed coffee cup can be seen on Figure 2. Figure 3 displays the temperature of the scrambled egg temperatures in phase IV and phase V.

CONCLUSIONS AND APPLICATIONS

Comparisons of patients food temperature ratings based on demographics in this study are similar to results of other researchers who examined patient satisfaction with food temperatures. Differences in ratings were found based on patient's age and length of stay with younger patients being more satisfied then older patients and those with the longest lengths of stay being least satisfied.

Figure 2: Comparison of coffee temperatures in warmed and not warmed cup

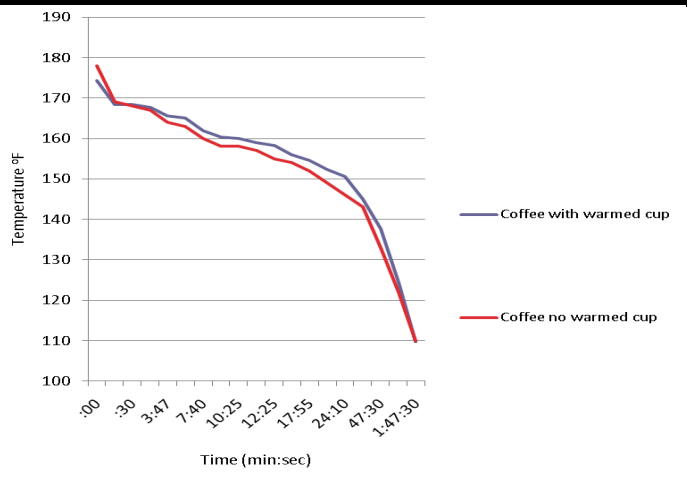
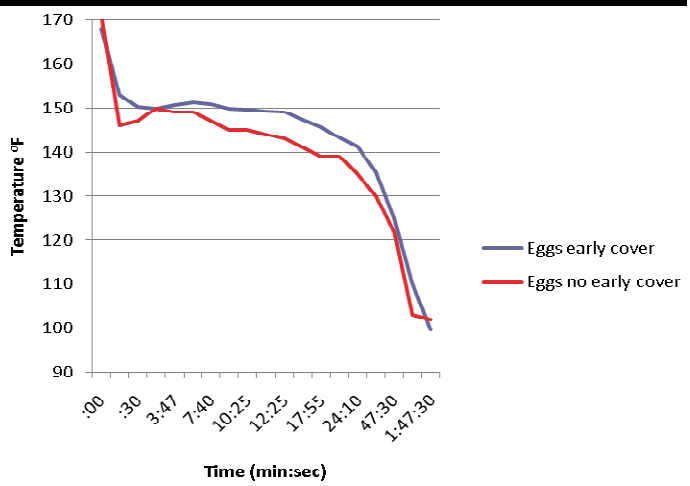


Figure 3. Comparison of temperature of scrambled eggs with and without being covered early in tray assembly process



During phase II of this study, inpatients interviewed cited multiple food items as having unsatisfactory food temperatures with the most common items being coffee scrambled eggs, chicken tenders, and pancakes. Although, results of this study are limited to findings from one medical center, they do provide inpatient information for managers at other hospitals who are concerned about the temperature of foods served to patients.

Tracking the temperature of food items from the steam table to the end of service and identifying points where temperature changes occur can assist administrators to improve operations. Based on the results of this study, large drops in temperature occurred during the tray assembly process. For eggs and pancakes this drop in temperature was often more than 20 degrees. For food items that were placed on the Heat On Demand® Ultra™ Heat Activator bases and then covered with the foam insulated Allure® cover, the items maintained their temperature once the lid was placed onto base often for 25 to 30 minutes. Placing the insulated lid onto the plate earlier in the tray assembly process did not result in a significant improvement in temperature for the scrambled eggs. Likewise, pre-warming the coffee cups prior to service did not provide any improvement in temperature.

Based on these results, foodservice managers at hospitals utilizing a centralized tray assembly process need to be aware of the initial loss of temperature that occurs in the tray assembly process and the somewhat limited holding time provided by insulated bases, both of which reinforce the need to ensure that hot food items are held at as high a temperature as possible on the tray line and that meal trays are assembles and delivered as quickly as possible. Additional research is needed to help identify ways to reduce food temperature loss in the tray assembly and delivery process. A comparison of the impact of alternative delivery systems i.e. decentralized preparation, galley kitchens, or heated carts on patient satisfaction with food temperature is also warranted to help identify best practices. Further research on types of foods, which do or do not hold temperature well in the assembly and delivery process is also recommend, as the sample size for this study was small.

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Research Contribution

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DIETETICS STUDENTS' CULTURAL FOOD KNOWLEDGE AND EXPERIENCES WITH VARIOUS CULTURES

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ABSTRACT

Academic institutes are investigating benefits of integrating cultural diversity learning objectives into classroom learning outcomes and creating an environment supportive of students' interactions and experiences with diverse cultures. The purpose of this study was to investigate dietetics students' cultural awareness by measuring food knowledge, perceptions, and learning experiences with various cultures and differences in cultural awareness based on their gender, age, career choice, graduation date and amount of nutrition education. Results indicate that students' believe it is more beneficial to learn about other cultures through direct cultural experiences than through classroom interactions with other cultures or classroom instruction on other cultures

Keywords: culture, food customs, dietetics students

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INTRODUCTION

Institutions of higher learning have acknowledged the need to educate and prepare students to be future leaders in diverse workforces. To increase cultural competences in students, academic institutions are trying to find ways to bring diversity into the classroom. The incorporation of learning objectives and classroom environments that support student interactions and experiences with diverse cultures are being encouraged by academic institutions. Gurin, Hurtado, and Gurin (2002) reported increased intellectual interest and student engagement when a curriculum included incorporating outside classroom activities that increased interactions with students from diverse cultures. It was also noted that students perceived having a higher awareness and knowledge of multicultural issues when these types of activities were incorporated across their curriculum (Dickerson & Jepsen, 2007). Similar results were supported by Chang, Denson, Sàenz, and Misa (2006) who reported college students with higher levels of interaction with diverse groups had significantly greater increases in their knowledge, intellectual, and social self-confidence than students with lower levels of interaction. Additionally, Gottfredson et al., (2008) found a positive correlation between repeated student interactions with and exposure to multicultural students and favorable attitudes towards those groups.

Recently, McArthur, Greathouse, Smith, and Holbert (2011) assessed the cultural competence of dietetics majors at seven universities and reported knowledge scores were highest for food habit questions and lowest for questions concerning cultural health beliefs. They concluded that students would benefit from more interactive intercultural learning opportunities. However, Knoblock-Hahn, Darcell, and Elliot (2010) reported fewer than 20% of the dietetics programs included in their survey (N = 153 program directors) incorporated a required course for cultural competency into the curriculum.

Within the area of dietetics and nutrition education, the focus on increasing dietetics students' understanding of and exposure to multicultural society has been intensified with the publication of the '2006 Environmental Scan of the Dietetics Profession' commissioned by the American Dietetic Association [(ADA) as of January 2012, referred to as the Academy of Nutrition and Dietetics)] (Jarrat & Mahaffie, 2007). Because of the growing multicultural population in the U.S, it was reported that dietitians need greater cultural awareness, language skills, counseling sensitivity, and knowledge of the nutritional values of ethnic foods. Curry (2000, p1142) stated that "the strong influence of culture on an individual's food intake, attitudes, and behaviors is especially imperative." Recent commentaries by Stein (2009a, 2009b) presented a strong argument for the need to better prepare dietetics students to meet the challenges of working in a more culturally diverse work environment.

The issue of cultural awareness is addressed through the accreditation requirements of the Commission on Accreditation for Dietetics Education [(CADE) as of January 2012, referred to as the Accreditation Council for Education in Nutrition and Dietetics] who is responsible for establishing and enforcing eligibility requirements and accreditation standards that ensure quality and continued improvement in dietetics education. To be successfully accredited by CADE, dietetics programs must meet the Eligibility and Requirement Accreditation Standards (ERAS) which are updated accordingly as the dietetics profession evolves. In 2008, dietetics programs were required to implement the updated ERAS that included revised Foundation Knowledge Requirements (FKR) and learning outcomes. One of the updated FKRs in 2008 is the learning outcome "Students are able to apply knowledge of the role of environment, food, and lifestyle choices to develop interventions to affect change and enhance wellness in diverse individuals and groups" (CADE, 2008, p15).

At present, the literature is limited in research investigating dietetics students' cultural awareness and the perceived importance and benefits of multicultural exposure in dietetics education. Therefore, the purpose of this study was to investigate dietetics students' cultural awareness by (1) identifying dietetics students' food knowledge, perceptions, and learning experiences with various cultures, and (2) identifying differences among dietetics students on cultural knowledge about food and perceptions across various cultures based on their gender, age, career choice, graduation date, and if they had taken a college nutrition course.

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METHODOLOGY

Instrument

This survey was designed for students matriculated in a university didactic program in Dietetics (DPDs) to determine their food knowledge, perceptions, and experiences with various cultures. Permission was granted to use the cross-cultural survey developed by Taylor and McArthur (2009) for measuring students' cultural knowledge, attitudes, and experiences. The original survey used 56 items in section one of the survey to address cultural social practices and food knowledge. The number of items addressing cultural social practices was reduced to more closely reflect the study's purpose of measuring cultural food knowledge and potentially increasing student participation by reducing survey length (Dillman, 2000). Thirty five items were included in this section. Content validity was established through subjective agreement among experts and professionals and through extensive literature review and pretest (Zikmund,1997).

Prior to the study, the cross-cultural survey was pilot tested using a convenience sample of May 2010 graduating students enrolled in a DPD from one university. Students were asked to evaluate the survey instrument for clarity of instructions, and readability and content of items. Students' input resulted in some rewording of items. Students also completed the survey online to mimic the primary study and evaluated the ease of responding and the length of time to complete the survey.

The final survey included four sections. Section I, as described earlier, used 35 items measuring students' cultural food knowledge. Section II included 7 items assessing students' perceptions toward the importance of learning about other cultures and 2 items regarding their awareness about other cultures using a 5-point Likert-type scale with 1 being "strongly disagree" to 5 being "strongly agree." Two additional items identified students' exposure to another country and likelihood of visiting another country. Section III consisted of 16 items ascertaining students' exposures and experiences with other cultures and how beneficial these experiences have been in increasing their understanding of the various cultures. A 4-point Likert-type scale was used with 1 being "not useful at all" to 4 being "an extremely useful experience." Section IV captured demographic data and provided an open ended question for students to write additional comments regarding their curriculum and cultural experiences.

Table 1: Demographic Profile

Variables	Frequency	Percentage (%)
Gender (N = 118)		
Female	111	94.1
Male	7	5.9
Age (N = 118)		
18	5	4.2
19	9	7.6
20	28	23.7
21	29	24.6
22	16	13.6
Older than 22	31	26.3
Pursuing Career (N = 18)		
Clinical/Healthcare	57	48.3
Community/ Nutrition	34	28.8
Other	20	16.9
Administrative/ foodservice	7	5.9
Expected Graduation (N = 116)		
2011	37	31.9
2012	49	42.2
2013	21	18.1
2014	9	7.8
Experience of Nutrition Course (N = 118)		
Yes	113	95.8
No	5	4.2
University (N = 118)		
A	33	28.0
B	47	39.8
C	38	32.2

Sample and Data Collection

Between October and November 2010 students (n = 294) in CADE accredited DPDs at three universities were recruited to participate in a survey using Survey Monkey on-line software program (SurveyMonkey, 2010). All students had the same opportunity to participate by receiving the survey link and instructions through their university email addresses. Dillman's Tailored Design Method (2000) was used for survey distribution. Faculty teaching courses with dietetics majors notified students that a survey was coming to their email address and encouraged students to participate. The study was approved by each university's institutional review board (IRB) prior to data collection. As an incentive, students were eligible for one of ten $25.00 monetary rewards at each university.

Data Analysis

Data were analyzed using SPSS (version 16.0.1 SPSS, Inc, Chicago, IL, 2007). Descriptive statistics were employed identifying factors that statistically explained differences among variables. After encoding the data in SPSS, the data were screened for usage. Missing values, outliers, normality, and linearity were analyzed. An independent t-test: gender and dichotomous data (e.g., nutrition course taken) and Analysis of Variance (ANOVA): age, graduation date, and career choice were performed to investigate whether there were any significant differences among groups in cultural food knowledge, perceptions, and learning experiences. Statistical significance was determined using $p < .05$.

RESULTS AND DISCUSSION

A total of 118 (40%) useable surveys were completed, with 39.8% of the respondents being from one university, followed by 32.2% and 28.0%. The majority (94.1%) of students were female (n = 111) and 95.8% had taken a college-level nutrition course. Almost half (48.3%) of students identified clinical/healthcare nutrition as their career choice with 28.8% selecting community nutrition, 16.9% other career, and 5.9% administrative/foodservice. The demographic profile of participants is presented in Table 1.

There were no significant differences in cultural knowledge for food and custom among gender, graduation date, career choice, and completion of college-level nutrition course with the exception of age groups ($p = 0.02$). Students 23 years and older (M = 2.97) had more knowledge than younger students. The 19 year old group had the

Table 2: Difference Among Age Groups in Food and Cultural Knowledge

Age	n	M	SD
18	5	2.80	0.84
19	9	2.11*	1.05
20	28	2.54	0.69
21	29	2.54	0.87
22	16	2.13	0.81
>22	31	2.97**	0.95
Total	118	2.58+	0.89

p <.02
*Lowest and **Highest Score
+5 is the maximum score and 2.58 is approximately 52 out of 100 point scale

lowest score in the knowledge test (M = 2.11). However, there was no consistent relationship between knowledge and age. On average, students' answered 18 of 35 (52%) items correctly on cultural food knowledge, as measured in Section I.

For Section II, descriptive statistics were used to evaluate students' perceptions towards and awareness of other cultures. Students strongly agreed (M = 4.14) to the 7 items measuring importance of learning values, customs, and/or foods of other cultures. Students believed that incorporating information on other cultures into their curriculum is important in contributing to their future professional success. For Section III, factor extraction for the 16 items was conducted through Principle Component Analysis. Factor rotation was performed through the Varimax with Kaiser Normalization. The factor loading scores of the rotated solution were 0.51 and higher. In addition, the Cronbach's standardized alpha was used to test reliability. The reliability test was satisfied as reliabilities varied from 0.74 to 0.83. This resulted in three categories representing; interactions with other cultures (5 items), direct experiences with other cultures (4 items), and instruction and education on other cultures (7 items). As reflected in Table 3, students perceived a direct experience (M = 3.48) with other cultures in learning about other cultures a more useful experience than interactions with other cultures (M = 3.22) and instruction and education (M = 3.15) on other cultures. The open-ended question in Part IV "Please identify any factors that make it difficult for you to participate in activities where you could learn more about other cultures" generated responses regarding factors such as lack of financial support, time, and language as barriers for not participating in different cultural activities.

Discussion

The U. S. demographics are becoming more culturally and ethnically diverse. In preparing dietetics graduates, DPDs are expected to incorporate foundation knowledge into cultural competencies in their students. All three university's DPDs addressed cultural competencies in varying degrees across multiple courses during students' sophomore, junior, and senior years. However, no DPDs required an entire course designated to instruction on foods, values, and customs of different cultures. According to Knoblock-Hahn et al. (2010), the vast majority of dietetics programs do not teach a course in cultural competence. These factors may have contributed to the low knowledge scores reflected in Section I. It may be interesting to survey dietetics programs on which courses in their curriculum include cultural learning objectives and how these objectives are met. It was clear that the majority of students (89.8%) strongly agreed or agreed to the importance of DPDs providing opportunities to learn about and have exposure to different cultures. The majority of students (92.4%) reported they had the opportunity to interact with individuals from other cultures with 91.5% reporting they enjoyed meeting and interacting with people from other cultures. These results are similar to the results of Taylor and McArthur (2009). While students reported varying degrees of exposure to individuals from other cultures, only 33% believed they were very aware of the values, customs, and foods of other cultures.

Students did perceive a direct experience, such as living abroad, as the most useful experience for learning about other cultures over local interactions with other cultures and instruction and education on other cultures. This is similar to what Taylor and McArthur (2009) found with students reporting that the most useful experience in learning about other cultures is direct experience by spending time in another country. This supports ADA's encouragement for dietetics education to offer more than just classroom instruction in meeting cultural competencies (Stein, 2009a, Stein 2009b). However, McArthur et al. (2011) reported that their sample of 238 junior and senior dietetics majors experienced least often intercultural activities such as study abroad and internship abroad programs. Now may be the time for Dietetics faculty to explore different avenues to facilitate international travel among their students. Efforts towards working more closely with study abroad and other exchange programs, in addition to what is available through the university, may be of real benefit in enhancing dietetics education. It is curious that "Interacting with individuals from other cultures on Facebook/Twitter" was perceived to be the least useful experience for increasing knowledge about other cultures (Table 3). A survey of a national representation of undergraduate college students found that while 90% of students use facebook, only 15% wished their professors would use this technology in the classroom (Educause: Center for Applied Research, 2011).

Table 3: Perceived Importance of Cultural Experiences

Direct Experience (M=3.48, SD=0.43)	M	SD
Traveling to another country as part of a study abroad program	3.83	0.38
Traveling to another country as a tourist	3.69	0.46
Working or participating in an internship in another country	3.69	0.50
Eating in a restaurant that featured the traditional foods of another culture	3.16	0.66
Interaction (M=3.22, SD=0.47)	**M**	**SD**
Working or volunteering with individuals from other cultures	3.43	0.66
Talking with classmates whose cultural background is different	3.43	0.63
Talking with friends who have spent time in another country	3.19	0.64
Talking with family members who have spent time in another country	3.18	0.69
Interacting with individuals from other cultures on Facebook/Twitter	2.76	0.86
Instruction and Education (M=3.15, SD=0.41)	**M**	**SD**
Watching television programs/movies/documentaries about another culture	3.33	0.56
Studying a language other than your own native language	3.29	0.79
Attending lectures or conferences that provide information about other cultures	3.18	0.55
Attending conferences about some aspect of another culture	3.11	0.69
Reading information about other cultures on the internet, YouTube, or other electronic reference sources	3.06	0.66
Reading newspaper/magazine articles about another culture	3.06	0.58
Reading literary works by authors from another culture	2.93	0.67

*Scale: 1 = Not useful at all, 2 = Not a very useful experience, 3 = A useful experience, 4 = An extremely useful experience, No experience = Not Applicable (No Value).

Qualitative responses from students identified that not knowing a second language was a barrier to learning more about another culture. It is interesting that the DPDs in this study did not require a language course, other than English, in their curriculum. Lack of financial support was also identified by students as a factor in preventing exposure to other cultures. Efforts could be made by DPDs to secure resources or provide guidance for students in finding resources that support participation in programs such as study abroad.

CONCLUSION AND MANAGERIAL IMPLICATION

In this study, students believed that knowing about different cultural values, customs, and foods, is important to their education and success in their future profession. While DPDs are including cultural diversity information in their courses, students believe that direct experience such as study abroad courses are more useful experiences in learning about other cultures. The benefit of incorporating cultural diversity competencies into secondary educational programs has been identified by Chang, Denson, Saenz, and Misa, (2006). However, no previous studies could be found on how best to impart cultural awareness in dietetics programs at the university level. In addressing cultural competencies in their programs, DPDs should explore ways to provide students direct exposure to and experiences with diverse populations. DPD programs could increase student exposure through their foods and foodservice courses. Having students investigate the different foods and social food norms and then prepare the various ethnic foods will assist in increasing their awareness. Field trips to ethnic grocery stores will also help increase exposure to new and exotic foods.

Limitations in this study may have affected the processes and results. The research did not address other potential variables that could increase or decrease students' cultural knowledge level on foods and customs, such as level of exposure to other cultures (e. g., hours per day or days per week, month, or year). Another limitation is that data were not gathered from individual DPD faculty on the extent or manner in which cultural competencies were being incorporated into the curriculum. Additionally, this study only included universities from one state in the U. S. with a limited number of students therefore limiting its application to other parts of the country. Finally, limitations may be associated with the limited objective of this study. Instead of comparing different groups and their knowledge level, it may suggest more implications by using regression analysis or structural equation modeling and knowing which activities are more helpful to better understand cultural knowledge of foods and customs.

This study provided an initial investigation of dietetics students' cultural knowledge on food and custom and learning experiences. The results suggest that future studies on "Best Practices" for imparting culture awareness into DPDs curricula would be of value. It is believed that the current study added to the literature on the assessment of cultural knowledge and awareness of college students in DPDs. It may be suggested that future research should investigate how success is measured in achieving adequate cultural knowledge and understanding at the university level, and more specifically with dietetics students. It also may be of value to compare the associations between exposures and experiences of students and the importance they place on learning about other cultures.

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FOOD SAFETY TRAINING NEEDED FOR ASIAN RESTAURANTS: REVIEW OF MULTIPLE HEALTH INSPECTION DATA IN KANSAS

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ABSTRACT

The purpose of this study was to assess the frequency and types of food code violations in Asian restaurants in Kansas using health inspection data. A total of 326 restaurant inspection reports over a 12 -month period from 156 Asian restaurants in 10 Kansas counties were reviewed. The results indicated that behavioral critical violations occur more often during routine health inspections than other inspections and suggested focus areas for food safety training in Asian restaurants. This study identified food handling practices that Asian restaurant managers and health inspectors should emphasize when training employees and providing performance feedback.

Keywords: Foodborne illness, Asian restaurants, food safety training, health inspection, food code violation

INTRODUCTION

According to a report from the Centers for Disease Control and Prevention (CDC), the frequency of foodborne illnesses associated with ethnic food increased from 3% of total outbreaks in 1990 to 11% in 2000 (CDC, 2009). A recent CDC study estimates that, in the U.S., 9.4 million foodborne illness cases, 55,961 hospitalizations, and 1,351 deaths are caused by the 31 most prevalent foodborne pathogens each year (Scallan et al., 2011). Restaurants have been responsible for most foodborne illness outbreaks (CDC, 2011; Lynch, Painter, Woodruff, & Braden, 2006). In addition, the scale of outbreaks caused by restaurant food is much greater than those caused by home-cooked meals because the former is served to many customers (Jones & Angulo, 2006). The majority of outbreaks caused by ethnic foods were associated with Mexican, Italian, and Asian foods (Simonne, Nille, Evans, & Marshall, 2004).

A few studies have explored food handling practices in ethnic restaurants. Mauer et al. (2006) found that many food safety professionals thought ethnic restaurants had inadequate food safety training; experts identified the top three food safety violations in such restaurants as improper food temperature, cross contamination, and poor worker hygiene. Kwon, Roberts, Shanklin, Liu, and Yen (2009) found that ethnic restaurants violated more food codes per facility, both critical and non-critical, than non-ethnic restaurants. These studies address the need for food safety training programs focusing on critical behaviors that can lead to foodborne outbreaks in ethnic restaurants.

Ram, Sanghera, Abbas, and Barlow (2000) reported that only 26% of the independent restaurants operated by ethnic minorities provided food safety and personal hygiene training for their employees. These researchers reported that employers doubted the necessity of training, unless it was required by law. Rudder (2006) found that restaurant owners felt that the lack of food safety resources and support were barriers to adopting food safety guidelines. Additional impediments to foodservice establishments providing food safety training for their employees were time constraints, employee attitudes, and language barriers (Mauer et al., 2006; Roberts et al., 2008).

Inspections are one way to ensure that foodservice establishments follow food hygiene and safety practices (Binkley, Nelson, & Almanza, 2008). Seiver and Hatfield (2002) contended that a restaurant inspection disclosure system, in which inspection scores are made public, could benefit the society by raising public awareness about food safety risks and motivating foodservice managers and employees to be more compliant with regulations. However, occasional inspection records may not fully portray the persistent challenges in individual establishments.

Therefore, this study examined health inspection data from independently owned Asian restaurants in Kansas over a 12-month period (January 1 to December 31, 2009) in order to identify persistent food handling challenges and to investigate the food safety training needs of Asian restaurant employees. Specific objectives were to identify the frequency and types of food code violations in these restaurants. The Kansas Department of Agriculture (KDA) inspects foodservice establishments at least once annually and publishes the inspection reports online. Specific food code violations are indicated in each online report.

The present study may provide Asian restaurant owners and managers with an understanding of what food handling practices related to code violations they should emphasize when training employees. At the same time, this information may help food safety professionals, including health inspectors address challenges they observe during Asian restaurant inspections.

Asian Restaurants in America

Since the mid-19th-century, Asian cuisines such as Chinese, Vietnamese, Japanese, and Thai have gradually become an integral part of American daily life (The Food Timeline, 2010). In addition, the American population is becoming more diverse; according to the latest census report, minorities increased by 25 million in 10 years, from 86.9 million in 2000 to 111.9 million in 2010 (U.S. Census Bureau, 2012). This minority population represents approximately 37% of the U.S. population (U.S. Census Bureau, 2012). The same figure is expected to increase to 62% by 2050 (Ortman & Guarneri, 2009). With the growing ethnic population, awareness of and demand for ethnic food is increasing. Asians and Hispanics operate more ethnic restaurants in the U.S. than all other ethnic minority groups (U.S. Census Bureau, 2006a, 2006b). More specifically, Chinese food is one of America's favorite ethnic cuisines, and Chinese restaurants account for a large percentage of the ethnic restaurants in America.

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Chinese Restaurant News (2010) reported that there are twice as many Chinese restaurants as McDonald's establishments in the U.S.

Food Handling Practices in Asian Restaurants

Liu and Jang (2008) identified the top five attributes affecting customers' intention to revisit Chinese restaurants: taste, food safety, food freshness, environmental cleanliness, and appropriate food temperature. Among these attributes, food safety was rated most important, followed by environmental cleanliness. A MORI survey for Kimberley-Clark Professional (2004) found that even among customers satisfied with food quality and price, 84% would not revisit a restaurant if they thought it was not clean. This result is consistent with Liu and Jang's study, which identified a positive association between environmental cleanliness and customers' intention to revisit Chinese restaurants. Unlike home-cooked meals, where consumers are responsible for their own food handling and preparation, consumers eating in restaurants must trust the food preparation and handling practices of chefs and other foodservice employees (Knight, Worosz, & Todd, 2007). The criterion of environmental cleanliness, although it may or may not be directly associated with foodborne illness risks, may provide a convenient way for consumers to assess the safety of Chinese restaurants.

Other studies found that, among ethnic foods, Asian, Mexican, and Italian cuisines had the highest association with foodborne outbreaks (Simonne et al., 2004). In addition, Kwon et al. (2009) found that independently operated Asian, Mexican, and Latin American ethnic restaurants had significantly more critical violations and frequent inspections than non-ethnic restaurants. The increased number of foodborne outbreaks related to ethnic foods (CDC, 2009) and poor food safety inspection results (Kwon et al., 2009) raise concerns for food handling practices, and therefore, food safety in these restaurants.

Food Safety Inspection and Food Safety Training Needs

Most U.S. states mandate certain types of health inspection for all foodservice establishments as one way to ensure safe food handling (Binkley et al., 2008). Depending on state or local regulations, results of restaurant inspections across the U.S. are reported using letter grades, numerical scores, colored cards, or facial expressions (Filion, 2009). Publicizing inspection results encourages foodservice managers and employees to exercise compliance with food codes.

Another purpose of restaurant inspection scores is to predict the occurrence of foodborne illnesses, as in the study conducted by Irwin, Ballard, Grendon, and Kobayashi (1989). These researchers concluded that the inspection scores of restaurants with more reported outbreak cases were significantly lower than those with no reported outbreak cases.

Although inspection reports may provide insights into food safety training needs, Mauer et al. (2006) contended that food safety professionals' unfamiliarity with ethnic foods and a lack of guidelines for ethnic food safety may prevent food safety inspectors from providing constructive feedback for operators. In addition, Chinese-restaurant owners expressed concerns that health inspectors "*do not understand*" their cooking methods (Liu & Kwon, 2012). Cultural differences were identified as a contributing factor to this perceived misunderstanding, as ethnic restaurateurs were unaware of food safety risks associated with certain food handling behaviors and conditions (Liu & Kwon).

Previous research has identified some of the food safety risks associated with ethnic foods. Rudder (2006) found that there was an increased risk of *E. coli O157* and *Clostridium botulinum* in ethnic restaurants because business owners did not understand how they should store food and other materials. Failure to control hot food temperature (70% of violations) and lack of proper cooling (18% of violations) were rampant among retail food businesses run by ethnic minorities (Rudder).

Reviews of restaurant inspection scores have also been used to identify foodborne illness risks in restaurants. Even though there may be merits to evaluating food handling practices with such scores, isolated inspection scores may not always accurately reflect food handling practices. Restaurant inspection records capture only a snapshot of restaurant operation and do not reflect persistent challenges (Phillips, Elledge, Basara, Lynch, & Boatright, 2006). Frequent inspections have shown mixed results in terms of their relationship with sanitation compliance (Bader, Blonder, Henriksen, & Strong, 1978; Corber, Barton, Nair, & Dulberg, 1984; Kaplan, 1978; Kwon et al., 2009; Mathias, Sizto, Hazlewood, & Cocksedge, 1995; Newbold, McKeary, Hart, & Hall, 2008; Roberts et al., 2011). Kwon et al. (2009) contended that the frequency of inspections alone indicates an increased need for food safety training, as an increased number of inspections is often due to complaints and follow-up visits. Reviewing inspection records over a long period of time may reveal individual restaurants' persistent challenges in food handling practices.

METHODOLOGY

Study Sample and Instrument

As of 2009, there were 4,671 food and beverage service establishments in Kansas (National Restaurant Association [NRA], 2009). Approximately 3,600 of those establishments were located in the 10 counties where the population density of ethnic minorities is the greatest. Of these 3,600, over 500 establishments were identified as ethnic restaurants, and 219 of those were independently owned Asian restaurants. All 219 Asian restaurants were selected as the study sample, but inspection reports were available online for only 156 restaurants in 10 counties. The inspection data for some of the restaurants listed online were not available. The instrument developed by Kwon et al. (2009) was used to collect data from multiple inspection reports. Since the data were considered public record and no human subjects were involved in the research protocol, no approval from the institutional review board was necessary.

Variables and Data Collection

Once the sample was identified, health inspection reports for each establishment were reviewed on the KDA website (http://www.ksda.gov/winwam). Each Kansas Food Code violation was recorded from every inspection report available (KDA, 2010). All 326 health inspection reports for the 156 Asian restaurants in the sample were reviewed and recorded during March and April of 2010. The individual code violations for each restaurant were recorded on the data collection form along with the number and types (e.g., routine inspection, complaint-driven inspection, follow-up inspection after poor performance on previous inspection) of health inspection reports in the previous 12-month period (January 1–December 31, 2009). A follow-up inspection was warranted when routine or other types of inspections, such as complaint-driven inspections, were not satisfactory. According to the information retrieved from KDA, a follow up inspection is carried out to "verify the correction of critical food safety issues" (KDA, 2010). After the initial data collection, the data were cross-checked to ensure the accuracy of data entry. The number of critical and non-critical food code violations and the frequency of individual code violations in each report were also recorded on the data collection form. Data were then entered into a Microsoft Access database, cross-checked again to verify correct data entry, and converted to SPSS for Windows, Version 15.0, for data analyses.

Statistical Data Analyses

Prior to statistical analyses, individual food code violations were grouped based on categories identified by KDA. KDA categorized over 275 individual code violations into 36 groups, each of which includes a variety of food codes. KDA categories were further consolidated into 15 categories to reduce the number of variables (Kwon et al., 2009). The compute function of SPSS was used to add all violations within each category. To evaluate persistent violations and food handling challenges, multiple inspection records for the same establishments were combined using Microsoft Excel before statistical analysis. Furthermore, to make meaningful comparisons, the total number of violations per category from all restaurant inspection reports was divided by the number of inspections per establishment to calculate the average number of violations per restaurant inspection.

Descriptive statistics were calculated to summarize the data including frequencies, cross-tabulations, means and standard deviations, of continuous variables (i.e., number of inspections, critical and non-critical violations, and violations in each category). Paired-sample t-tests were conducted to determine whether differences existed in the number of critical, non-critical, and within-category violations between initial and follow-up inspections, showing whether Asian restaurants improved their food handling practices. Analyses of Variance (ANOVA) with Tukey's post hoc analyses were conducted to evaluate the differences in numbers of individual and categorical code violations between and among inspection types (i.e., routine inspection, complaint-driven inspection, and follow-up inspection). Repeated measures of Multivariate Analyses of Variance (MANOVA) were calculated to identify the differences in frequency of violations within categories. Statistical significance was determined at $p<0.05$.

RESULTS AND DISCUSSION

A total of 326 restaurant inspection reports were reviewed from 156 Asian restaurants in 10 Kansas counties. Some food handling practices were categorized as behavior-related and included hand washing occasions and methods; glove use; cooking, holding, cooling, and reheating procedures; and eating, drinking, and smoking in the kitchen. Examples of non-behavior-related practices included demonstration of knowledge; temperature of cold storage; and adequacy of hand washing facilities and supplies. The mean± standard deviation (SD) of critical and non-critical violations for these restaurants were 2.92±2.59 and 2.05±2.55, respectively. Among these, 2.66±2.41 violations were behavior-related and 2.30±2.77 were non-behavior-related. Of behavior-related violations, 1.89±1.75 violations were considered critical. The average number of inspections during the 12-month study period (January 1–December 31, 2009) was 2.09±1.30 (range: 1 to 9, median 2.0).

Prevalence of Individual Food Code Violations and Descriptive Statistics for Compiled Inspections

The number of food code violations was computed and analyzed for each restaurant. The top violation categories were *Control of Hands as a Vehicle of Contamination* (2.09±1.71); *Time & Temperature Control of Potentially Hazardous Food* (PHF or Time and Temperature Control for Safety [TCS] food) (1.56±1.41); *Protection from Contamination* (1.55±1.82); *Physical Facility Maintenance* (1.39±2.28); and *Food & Non-Food Contact Surface Maintenance & Ware Washing Facilities* (1.04±1.56).

To identify persistent violations, each restaurant's number of food code violations in each category per inspection was computed. This figure was calculated by dividing all violations within each category by the total number of inspections for that restaurant. *Time & Temperature Control of PHF* (TCS food) (0.73±0.68); *Protection from Contamination* (0.73±0.69); and *Control of Hands as a Vehicle of Contamination* (0.65±0.78) were violated the most. These were followed by *Physical Facility Maintenance* (e.g., hot and cold water availability; toilet, sewage, waste water, garbage, and refuse disposal) (0.57±0.68); *Food & Non-Food Contact Surface Maintenance & Ware Washing Facilities* (0.46±0.55); *Contamination Prevention through Pest Control, Storage & Personal Cleanliness* (0.36±0.60); and *Safe Cooling, Thawing, Hot Holding Methods & Working Thermometer* (0.27±0.44).

Table 1. Mean Number of Violations per Inspection (N=326)

Variables[a]	Mean number ± SD
Critical Violations	2.92 ± 2.59
Non-critical Violations	2.05 ± 2.55
Behavior-related Violations	2.66 ± 2.41
Non-behavior-related Violations	2.30 ± 2.77
Critical Behavior-related Violations	1.89 ± 1.75

[a]Number of violations found in one health inspection report between January 1, 2009 to December 31, 2009

To identify food safety training priorities, the five most common categories were compared by repeated measures of MANOVA. Results showed that the numbers of violation per inspection for the top four categories were not significantly different (Table 2). However, our results indicated that *Time & Temperature Control of PHF* (TCS) was one of the most common food code categories per inspection record, despite this category's inclusion of only 7 food codes. Compared to *Physical Facility Maintenance*, which included 78 codes, the probability of getting as many violations in a category of 7 (i.e., *Time & Temperature Control of PHF* [TCS]) seems less likely. Therefore, this finding suggests that *Time & Temperature Control of PHF* (TCS) may be the category that needs the most attention to improve food handling behaviors in Asian restaurants.

ANOVA with Tukey's post hoc analyses were used to compare numbers of violations and types of inspections. The results showed significant differences among different types of inspections in the total number of violations ($F=3.85$, $p<0.001$), the total number of critical violations ($F=5.78$, $p<0.001$), the number of behavior-related violations ($F=5.22$, $p<0.001$), and the number of critical behavior-

Table 2. Mean Number of the Top Five Violation Categories Observed in Asian Restaurants in Kansas: Descriptive Statistics by Types of Violations per Inspection

Violation Categories	# Of Food Codes Per Category	Mean[b]±SD[c]
Time & Temperature Control of Potentially Hazardous Food	7	.73 ± .68[x]
Protection from Contamination	14	.73 ± .69[x]
Control of Hands as a Vehicle of Contamination	14	.65 ± .78
Physical Facility Maintenance (e.g., hot & cold water availability, toilet, sewage & waste water, garbage & refuse disposal)	78	.57 ± .68
Food & Non-Food Contact Surface Maintenance & Ware Washing Facilities	48	.46 ± .55[y]

[a]Statistical significance was analyzed by a repeated measures MANOVA (Degrees of Freedom=4, F=5.13, $p<0.001$).

[b]Mean scores were calculated by dividing the number of violations in each category by number of inspection for each restaurant.

[c]SD: Standard Deviation Values with different superscripts (x or y) are significantly different ($p<0.05$) from each other analyzed by pairwise comparisons.

related violations (F=5.90, p<0.001). In most cases, complaint-driven inspections and routine inspections had the most number of violations and were significantly different from other regulatory inspections (Table 3). There were no significant differences (p>0.05) in numbers of non-critical violations and non-behavior-related violations among different inspection types.

The results from this study, which utilized publicly available health inspection reports, revealed evidence of food safety training needs in Asian restaurants. In Kansas, each foodservice establishment receives at least one unannounced inspection per year. If the results of the routine inspection show poor performance, follow-up inspections occur. Our data confirmed that routine inspections were performed at least once per year and that the total number of annual inspections varied (range: 1 to 9) depending on the frequency of additional inspections. In addition, our results showed that the average number of inspections per restaurant was 2.09±1.30, which indicated that many Asian restaurants did not pass their routine inspections and required re-inspections. This finding is consistent with Kwon et al. (2009) where ethnic restaurants had a significantly higher frequency of inspections than non-ethnic restaurants.

Researchers of this study found that increasing the frequency of routine inspections does not motivate restaurateurs to perform better. Paired-sample t-tests showed no significant differences (p>0.05) in the number of critical, non-critical, behavior-related, and non-behavior-related violations between routine or complaint-driven inspections and their subsequent follow-up inspections. That is, assigning poor inspection scores and following up later did not necessarily improve food safety practices in Asian restaurants. This finding is consistent with Jones, Pavlin, LaFleur, Ingram, and Schaffner (2004) who found no association between inspection scores and the frequency of restaurant inspection. Corber et al. (1984) also found that increasing the number of inspections from 6 to 12 in a year did not enhance the sanitation levels of restaurants.

However, different results were reported after an intervention which identified high food safety risk establishments and increased the inspection frequency (Briley and Klaus, 1985). These researchers used types of food served, previous inspection scores, and the number of customers to identify the total food safety risks, and then, increased the frequency of inspections for identified high-risk establishments. The results showed the score improved enough after frequent inspections that some of the high-risk establishments were reclassified as low-risk (Briley & Klaus).

In the case of Asian restaurants in Kansas, an increase in the number of inspections was not due to efforts to improve food handling practices as in previous studies. Rather, the increased number of inspections was caused by poor performance on the previous inspection or customer complaints. Future studies should address why Asian restaurants fail to perform better despite being inspected multiple times for violations.

Kwon et al. (2009) found that the most prevalent food code violations in ethnic restaurants were considered critical, which were associated with leading causes of foodborne illnesses. Failure to control time and temperature, poor personal hygiene, and cross-contamina-tion have been identified as the most significant factors to foodborne illnesses (U.S. Food and Drug Administration [FDA], 2004). Phillips et al. (2006) analyzed recurrent food code violations in Oklahoma from 1996 to 2000. Their research showed that most repeated violations reported by the Oklahoma State Department of Health (OSDH) (Oklahoma Food Service Establishment Inspection, n.d.) and the Oklahoma City-County Health Department (OCCHD) (Oklahoma FoodService Establishment Inspection, n.d.) were related to maintaining correct food holding temperature, pest control, and personal hygiene. Findings of this study also showed that time and temperature control of PHF was the most frequently violated food code in Asian restaurants. Therefore, this violation represents a persistent problem in restaurant establishments regardless ethnic or non-ethnic restaurants.

Rudder (2006) performed a risk assessment to investigate the reasons behind failure to comply with food safety standards in retail food businesses owned by ethnic minority groups in Greater Manchester, U.K. One reason for these failures was general lack of maintenance of the restaurants' physical structures. Cultural traditions of food

Table 3. Differences in Frequency of Violations Among Different Inspection Categories

Inspection Categories (n)	Mean±SD	F	P
No. of Total Food Code Violations		**3.85**	**<0.001**
Complaint-driven (n=46)	6.24±4.52^{x}		
Routine (n=165)	5.54±4.40^{x}		
Follow-up (n=60)	4.77±5.41		
Other regulatory (n=20)	1.60±2.07^{y}		
No. of Critical Violations		**5.78**	**<0.001**
Complaint-driven (n=46)	3.43±2.61^{x}		
Routine (n=165)	3.44±2.31^{x}		
Follow-up (n=60)	2.68±3.11		
Other regulatory (n=20)	0.80±1.36^{y}		
No. of Behavior-related Violations		**5.22**	**<0.001**
Complaint-driven (n=46)	3.15±2.13^{x}		
Routine (n=165)	3.13±2.32^{x}		
Follow-up (n=60)	2.38±2.87		
Other regulatory (n=20)	0.75±1.16^{y}		
No. of Critical Behavior-related Violations		**5.90**	**<0.001**
Complaint-driven (n=46)	2.28±1.79^{x}		
Routine (n=165)	2.28±1.65^{x}		
Follow-up (n=60)	1.55±1.96		
Other regulatory (n=20)	0.45±0.76^{y}		

[a] Based on ANOVA with Tukey's post hoc analyses.
Values with different superscripts (x or y) are significantly different (p<0.05) from each other based on Tukey's post hoc analyses.

preparation handed down through generations may also contribute to unsafe food handling in specific ethnic groups according to a nationwide survey of consumers (Kwon, Wilson, Bednar, & Kennon, 2008). The other food safety challenges found in ethnic restaurants were proper stock rotation, storage methods, hot and cold holding temperatures, and cooling methods (Rudder). Results of this study are consistent with the challenge areas identified in these studies.

Rudder (2006) also reported that there were communication barriers between inspection officers and foodservice workers, including difficulty in understanding the language used in food safety reports. Another indication that language barriers may be an issue in ethnic restaurants was high levels of violations in demonstrated knowledge on inspection reports (Kwon et al., 2009). Liu and Kwon (2012) found that owners and operators of Chinese restaurants considered health inspections and food safety training helpful for ensuring food safety at their restaurants. However, some Chinese restaurant owners and operators did not completely understand or were not able to follow the instructions after food safety inspections. Further, they identified several barriers existed including physical exhaustion in providing food safety training (Liu & Kwon).

Employees in this segment of the foodservice industry often lacked adequate knowledge about safe food handling, despite having received training. Even when employees were knowledgeable about safe food handling procedures, they often failed to apply this knowledge. Based on current and previous research findings, establishing safe food handling procedures in Asian restaurants may be challenging without continuous food safety training and motivation.

CONCLUSION AND MANAGERIAL IMPLICATION

The results of this study identified the five food code categories with the most violations: *Time & Temperature Control of PHF (TCS)*; *Prevention from Contamination*; *Control Hands as a Vehicle of Contamination*; *Physical Facility Maintenance*; and *Food & Non-Food Contact Surface Maintenance & Ware Washing Facilities*. Asian restaurants may need to emphasize these five areas when training employees.

Detailed inspection reports available online enabled us to identify specific violations and training needs for independent Asian restaurants located in 10 Kansas counties. Our results show that behavior-related violations, especially critical violations, occurred more often in routine health inspections than in other types of inspection such as complaint driven or follow up. Because poor food handling behaviors could be a major cause of the foodborne outbreaks that occur in ethnic foods (Simonne et al., 2004), findings from this study suggested that strategies need to be developed to nurture behavior change among the food handlers in the Asian restaurants.

Future research may be needed to identify effective ways to overcome barriers to food safety training in Asian restaurants, especially with respect to behavior-related critical violations. In order to increase Asian restaurant owners' awareness of the need for food safety training, risks associated with foodborne illness outbreaks in Asian restaurant establishments must be clearly addressed in food safety training using the languages or words that the restaurant owners could understand (Kwon et al., 2009). Because limited language skills have been identified as a barrier to providing food safety training, such training might need to be conducted by trained individuals who are bilingual. In addition, training materials should be developed in the preferred language specific to ethnic restaurants to enhance the acceptance and effectiveness (Liu & Kwon, 2012).

Moreover, it will be critical to examine the relationship between frequency of health code violations and the food safety training status. It may be also beneficial to investigate Asian restaurant owners' attitudes toward food safety. As Asian restaurant operators recognize that employee training reduces the frequency of inspection and improves health inspection results, they may be more motivated to train their employees appropriately.

Future research should also investigate employees' attitudes toward food safety training and barriers to such training in Asian and other ethnic restaurants. The ways in which employees can apply food safety knowledge to their behavior should also be explored. This study is limited in generalizability because only independent Asian restaurants located in 10 counties in Kansas were investigated. Therefore, it may not be possible to generalize the results to other geographic locations or other types of restaurants (i.e., chain, non-ethnic, or non-Asian ethnic restaurants).

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Research Contribution

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ALCOHOL USE AMONG UNIVERSITY FOODSERVICE MANAGEMENT STUDENTS

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ABSTRACT

Previous academic and trade analyses have eluded to the phenomenon that hospitality students and industry employees display more frequent alcohol consumption than do their non-hospitality-related counterparts. The aim of this study was to use social learning theory as a basis to investigate the university foodservice management students' alcohol consumption, specifically as they relate to work experience and demographic characteristics. Results indicated that no significant alcohol consumption behaviors were reported among those students with and without practical work experience in the foodservice industry. Age and gender emerged as indicators of significantly different alcohol consumption behaviors.

Keywords: Alcohol, Work Experience, Foodservice Management, Social Learning Theory

INTRODUCTION

Numerous studies have found alcohol consumption to be significantly high among foodservice industry employees. A 2010 study by Borchgrevink, Sciarini and Borchgrevink confirmed the claim that hospitality students and employees display higher alcohol consumption rates than their counterparts in other studies or industries. This finding agreed with earlier studies by Larsen (1994) and Larsen & Jorgensen (2003) which both found hospitality students and employees to display significantly higher scores on the Alcohol Use Disorders Identification Test (AUDIT) than their non-affiliated counterparts. This phenomenon of higher consumption levels among foodservice affiliated individuals has been attributed to a number of factors, including a young labor pool, late-night work hours, work-related stress, required internship in the foodservice/hospitality industry and workplace environmental norms (Larsen, 1994; Larsen & Jorgensen, 2003).

The purpose of this study was to use social learning theory as a basis to investigate the relationship between foodservice management students' demographic characteristics, work experience history, and alcohol-use behavior. The evidence that foodservice industry workers display higher levels of alcohol consumption begs the question, "Will students have higher drinking levels after having actually worked in the industry? Or is it simply a matter of demographics?" Jayson (2011) suggests that college students' continued alcohol abuse despite knowledge of the negative effects indicates a need for continued exploration of student alcohol consumption in general. Because alcohol abuse can cause substantial negative impacts at both the individual and the organizational level, it stands to reason that employee drinking behavior can impact service quality, thus affecting revenue and profit (Larsen, 1994). Finally, the variety of health issues and overall well-being associated with excessive alcohol consumption warrants further investigation on behalf of foodservice industry employees (Borchgrevink, et al., 2010).

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The aforementioned literature highlights a need for change within the culture of the restaurant industry, specifically with regards to work environment, culture and supervision, and suggests the necessary provision of increased counseling on alcohol abuse for foodservice management students, so as to prepare them for the behavioral and health threats prior to entering the industry (Borchgrevink, et al., 2010; Jayson, 2011; Larsen, 1994). Once equipped with a more detailed understanding of this area, academia and industry professionals may better approach the issue and lower potential risks for both employees and hospitality organizations.

Alcohol Use in the Workplace

According to the U.S. Department of Health and Human Services (1999), alcohol consumption is associated with workplace culture and acceptance, workplace alienation, availability of alcohol, and existence and enforcement of alcohol polices in the workplace. Thus, drinking rates vary among different occupations, and if the culture of the workplace accepts or encourages alcohol consumption, then employee drinking levels will be higher (U.S. Department of Health and Human Services, 1999).Studies have found that a work environment fraught with boredom, stress, isolation, low job autonomy, lack of job complexity, lack of control over work conditions, sexual harassment, and/or disrespectful behavior is associated with higher levels of employee drinking (Borchgrevink, et al., 2010; Larsen, 1994). Workers who find it easy to bring in alcohol to the workplace, consume alcohol at the workplace, or obtain alcohol at the workplace will display higher levels of employee drinking behavior. Workers who have limited supervision are associated with a greater number of alcohol problems and levels of alcohol consumption. Finally, establishments with less employee drinking often have an alcohol policy in place, as well as awareness of such a policy among supervisors and employees.

Alcohol Use, Gender and Age

Previous studies have indicated that gender differences may influence drinking culture within the workplace (Hoffman, Larison& Sanderson, 1997; Kraft, Blum, Martin & Roman; Mandell, et al., 1992; Sonnenstuhl, 1996; Trice, 1992).For example, predominately male workplaces and occupations have been found to exhibit a heavier drinking culture and more alcohol-related problems, while female-dominated workplaces and predominately female occupations display a lesser drinking culture (Hoffman, Larison & Sanderson, 1997; Kraft, Blum, Martin & Roman; Mandell, et al., 1992; Sonnenstuhl, 1996; Trice, 1992).In addition, Borchgrevink, Sciarini and Borchgrevink (2010) found that male alcohol consumption was higher than that of females across both student and employee groups.

Other studies have found age to be a substantial indicator in alcohol consumption; Larsen and Jorgensen (2003) found that when age was introduced to their model, all other effects on consumption disappeared. These findings could imply that all groups in a certain age bracket will display heavier alcohol consumption, not just those working in or studying in the hospitality fields. In addition, college

students, a group traditionally comprised of individuals within the 18-22 years of age bracket, have been found to display excessive alcohol consumption, even when armed with the knowledge of negative physical and emotional impacts of such abuse (Jayson, 2011).

Alcohol Use in the Hospitality Industry

Empirical support for the claim that hospitality students as well as hospitality industry workers display higher levels of alcohol consumption than in other fields of education or employment is provided by a number of academic studies (Borchgrevink, Sciarini and Borchgrevink, 2010; Kjærheim, et al., 1995; Kjærheim, et al., 1996; Kouvonen & Lintonen, 2002; Larsen, 1994; Larsen &Jørgensen, 2003; Pizam, A., 2010). High levels of employee alcohol consumption in the hospitality industry have been attributed to several factors, including a relatively young labor pool, a work schedule including late-night shifts, low management surveillance, and a work culture with norms of 'having an end-of-shift drink' or 'going out after work' (Kjaerheim, Mykletun, Aasland, Haldorsen& Anderson, 1995; Kjaerheim, Mykletun & Haldorsen, 1996; Spector, 2001). Levels of employee alcohol consumption are influenced by work schedule (night work influences more drinking), type of workplace (bars, pubs and clubs influencing heavier drinking), and modeling factors, such as co-worker alcohol consumption behavior or perceived pressures by co-workers to engage in heavy drinking (Kjaerheim et al., 1995).

Students in hospitality management programs will typically be working in the hospitality industry during their studies as a large number of hospitality programs have an industry work internship requirement to complete in order to gain work experience and/or future employment upon graduation (Larsen & Jorgensen, 2003). It has been suggested that the introduction to a work environment with co-workers who display high levels of alcohol consumption will increase an individual's likelihood to display high consumption levels of alcohol (Kjaerheim et al., 1995; Kjaerheim et al., 1996); it stands to reason that a student's introduction to the food service industry may play a role in the higher levels of alcohol consumption among foodservice management students. Larsen (1994) hypothesized that lenient attitudes and high levels of alcohol consumption are observed by the individual during their socialization to working in the hospitality industry; thus, heavy drinking is a learned behavior.

Social Learning Theory

Bandura (1977) proposes that displayed behaviors are learned either deliberately or inadvertently through the influence of example, implying that individuals in a social context are influenced by the behavior of others. "In the social learning view, people are neither driven by inner forces nor buffeted by environmental stimuli. Rather psychological functioning is explained in terms of a continuous reciprocal interaction of personal and environmental determinants" (Bandura, 1977, 11-12). Individual actions impact environmental surroundings, which in turn influences individual behavior; thus, behavior is a byproduct of the individual and the environment, not just one or the other. In context, a work environment hosting a large number of heavy drinkers will 'create' more heavy drinkers when new employees are introduced to the work environment. This notion is supported through social learning theory (SLT).

The notion of vicarious learning is a major tenant of social learning theory (Bandura, 1977), suggesting that through observation of others an individual can learn what behaviors are generally accepted or unaccepted. The individual will then imitate the observed behavior. Applicably, if an individual witnesses a peer participating in heavy alcohol consumption, it is likely that the observer will also engage in such behavior. SLT further proposes that this relationship can be strengthened or even reversed depending on perceived outcome expectancies. If the observer perceives that the behavior is not punished, a positive relationship is predicted. If the observer perceives that this behavior will be punished or negatively perceived by others, a negative relationship is predicted. This theory that employees will model their behavior based upon what they consider to be acceptable and rewarded is similar to that seen in the work of Corsun and Young (1998), Kjaerheim, Mykletun, Aasland, Haldor`sen, and Andersen (1995), Whitehead and Simpkins (1983).

The literature review has provided empirical support for the claim that hospitality students and industry workers display higher levels of alcohol consumption. There is also indication that age and gender will influence drinking behavior. The tenants of social learning theory suggest that individuals will imitate observed behavior when that behavior is perceived as rewarded or resulting in positive outcomes. In context, lenient attitudes and high levels of alcohol consumption observed by individuals during their socialization to working in the hospitality industry result in heavy drinking as a learned behavior. The goal of this study was to investigate the impact of work experience, age, and gender on foodservice management students' alcohol consumption behavior. Specific questions to be addressed are as follows:

1: What are the alcohol use behaviors (as measured by AUDIT score) of foodservice management students in the United States?
2: Is there a significant difference in foodservice management students'alcohol consumption based on demographic factors, such as age and gender?
3: Is there a significant difference in foodservice management students'alcohol consumption based on what work experience group they belong to: those with work experience within the foodservice industry, those with work experience in an industry other than foodservice, and those with no work experience?

METHODOLOGY

Population and Sampling Frame

Study participants included undergraduate college students enrolled in foodservice management classes at three universities in the United States.Convenience sampling was used to target students in foodservice and hospitality management classes at all levels of the undergraduate degree programs. Participation was elicited at the end of scheduled class periods, and participation was voluntary. All students present on the day the survey was administered were eligible to participate in the study. Student participants were guaranteed anonymity; i.e., no attempt whatsoever was made to identify respondents by their answers. There were a total of five hundred and fifty (550) respondents representing 31 different countries from around the world, with the majority (more than 65 percent) were from the United States.

Instrument

Participant responses were collected using a self-administered survey containing demographic questions, work experience questions, and items from the Alcohol Use Disorders Identification Test (AUDIT). Developed by the World Health Organization to screen for excessive drinking and establish the relative population risk of harmful and hazardous drinking, AUDIT is recognized as a reliable and valid measure for identifying people who would benefit from a reduction or abstention from alcohol consumption (Babor, Higgins-Biddle, Saunders, Monteiro, 2001).

RESULTS AND DISCUSSION

Demographics

Table 1 presents a demographic description of the respondents as well as a general description of the respondents' work experience. As the table shows, more than 58 percent of the respondents were females, with ages ranging from 17 to 52; the average respondent being 21.88 years of age. Participants were somewhat evenly distributed into three age ranges: 36.9 percent were 20 years of age or younger, 30.5 percent were 21-22 years of age, and 32.5 percent were 23 years of age or older. This grouping represents (1) respondents under the legal drinking age in the United States, (2) those within both the legal drinking age and the age range typical of heavier alcohol consumption (Larsen and Jorgensen, 2003), and (3) those above both the legal and heavy drinking age. With respect to ethnicity, more than 50 percent were Caucasian, and more than 27 percent were Asian-American. Almost 94 percent indicated that their marital status was single. Almost 50 percent of the respondents were classified as either freshmen or sophomores, with more than 76 percent stating that the semester in which they responded to this survey was not their first semester at the university they were currently attending. With regards to work experience, 41.3 percent of participants reported having worked in the foodservice industry, while 31.6 percent had work experience in other types of jobs, and 27.1 percent had no work experience at all.

Table 1. Demographic Characteristics and Work Experience of Respondents

Demographic Characteristic	Percent of Respondents
Gender:	
Female	58.5
Male	41.5
Age:	
20 years of age and younger	36.9
21-22 years of age	30.5
23 years of age and older	32.7
Ethnicity:	
African American	3.5
Asian American	5.4
Asian	27.7
Caucasian	51.0
Hispanic	4.4
Native American	4.0
Pacific Islander	0.9
Other	3.1
Marital Status:	
Single	93.6
Married	5.3
Divorced	0.7
Married, but Separated	0.4
Widow/Widower	0.0
Other	0.0
Classification:	
Freshman	32.2
Sophomore	17.3
Junior	21.7
Senior	22.2
Masters Student	4.4
Ph.D. Student	0.2
Other	18.9
First Semester at this University:	
Yes	23.9
No	76.1
Work Experience:	
Foodservice industry work experience	41.3
Other work experience	31.6
No work experience	27.1

Participants Mean Responses to Drinking Questions

Table 2 shows the means and standard deviations for the ten AUDIT-derived drinking behavior questions as well as the mean respondent AUDIT score. Lower AUDIT scores indicate lower levels of drinking behavior, as do lower ranked responses for drinking behavior questions. A scale is provided for each of the questions below Table 2. As seen in the table, respondents stated that they drank alcohol an average of almost twice per month, with an average of about two or three drinks on those occasions. Respondents also reported that on these drinking occasions they consumed six drinks or more, less than once monthly.

When asked how often in the past year participants were unable to stop drinking once they started, the average response to this question was "almost never" or "less than monthly". Similar responses were reported when asked how often in the last year the participant had failed to do things they were supposed to do because of drinking; the

Table 2. Means and Standard Deviations for Drinking Behavior Questions

Drinking Behavior Question	Means	Standard Deviations
1. How often do you drink alcohol?	1.93[a]	1.07[a]
2. How many drinks do you have on a "typical" day that you drink?	1.27[b]	1.21[b]
3. How often do you drink six or more drinks on one occasion?	1.26[c]	1.08[c]
4. How often, during the last year, have you **not** been able to stop drinking, once you started?	0.47[c]	0.84[c]
5. How often, during the last year, did you not do things you were supposed to do because of drinking (i.e., hangover, drank too much the day before, etc.)?	0.79[c]	0.93[c]
6. How often, during the last year, have you needed a "first drink" in the morning to get yourself going after a heavy drinking session the night before?	0.25[c]	0.68[c]
7. How often, in the last year, have you felt guilty, or had a bad conscience, because of your drinking?	0.64[c]	0.87[c]
8. How often, in the last year, have you not been able to remember what happened the night before, due to drinking?	0.71[c]	0.86[c]
9. Have you, or anyone you know, been hurt because of your drinking?	0.33[d]	0.66[d]
10. Has a friend, relative, or doctor shown any concerns about your alcohol consumption, or told you that you should cut back on your drinking?	0.23[d]	0.58[d]
AUDITScore	7.88	5.86

[a]: 0 = Never; 1 = Monthly or less; 2 = Two to four times a month; 3 = Two to three times a month; 4 = Four times a week or more
[b]: 0 = 1 - 2; 1 = 3 – 4; 2 = 5 – 6; 3 = 7 – 9; 4 = 10 or more
[c]: 0 = Never; 1 = Less than monthly; 2 = Monthly; 3 = Weekly; 4 = Daily or almost daily
[d]; 0 – No; 2 = Yes, but not in the last year; 4 = Yes, during the last year

average response being "almost never", or "less than monthly". When asked how often during the last year participants needed a "first drink" in the morning to get going after a heavy drinking session the previous night, the majority of the respondents answered"almost never". The average response rate was again "almost never" or "less than monthly" when the respondents were asked how often in the last year had they felt guilty or had a bad conscience due to their drinking. When asked how often in the last year their drinking had caused them difficulty remembering what happened the night before, the average response rate was "almost never" or "less than monthly".

Concerning injuries to others caused by the respondents' drinking, the average response was that this had never occurred. When asked if their families, friends, or physicians had ever expressed concerns about their alcohol consumption, or had told the respondents to cut back on their drinking, the average response was "no". Finally, the average AUDIT score for all respondents was 7.88 out of 15, which is near but below a score of 8 (the recognized level to indicate harmful or hazardous drinking) and well below a score of 13/15 (the recognized level in women/men to indicate alcohol dependence) (Babor et al, 2001).

Tests for Significance: Age Category, Gender and Work Experience

An analysis of variance (ANOVA) was performed to determine whether significant differences existed in the alcohol consumption behavior of respondents based on age category. As seen in Table 3, significant differences were found at the $p < .05$ level for AUDIT scores among the three age categories. Post-hoc tests indicated that those respondents who were 21-22 years of age had a significantly higher average AUDIT score than those aged 20 years old or younger. No significant differences were found between respondents who were 23 years of age and older and respondents in either of the two younger age categories.

A t-test was performed to determine the existence of significant differences in drinking behavior based on gender. Results showed significant differences at the $p < .05$ level, with male respondents displaying significantly higher AUDIT scores on average than female respondents. The results of this t-test, as well as means and standard deviations, are provided in Table 4.

Table 3. Analysis of Variance for AUDIT Scores Based on Age Category and Work Experience

Demographic Variable	Means	Standard Deviations	F	p-value*
Age Category:				
20 Years old or younger	9.91	5.21	6.885	.001*
21 or 22 Years old	9.17	6.72		
23 years old or older	7.81	5.47		
Work Experience:				
No foodservice industry Experience	7.69	5.37	0.171	.843
Some foodservice industry Experience	8.00	5.01		
No Work experience	8.00	7.45		

*significant at α = .05

Table 4. T-test for AUDIT Score Based on Gender

Gender	Means	Standard Deviations	t	p-value*
Female	6.75	5.00	-5.568	.000*
Male	9.53	6.59		

*significant at α = .05

With regards to work experience, an ANOVA was performed to determine if significant drinking behavior differences existed among the three groups: those respondents having had some foodservice industry work experience, those having had work experience but in industries other than foodservice, and those having had no work experience at all. Interestingly, no significant differences were found among the three groups; AUDIT scores were not significantly different for student participants regardless of whether they had worked in the foodservice industry, had worked in any other industry, or had not obtained any workplace experience.

CONCLUSIONS AND APPLICATIONS

The purpose of this study was to use social learning theory as a basis to investigate the relationship between foodservice management students' demographic characteristics, work experience history, and alcohol use behavior. The first research question proposed by this study was, "What are the alcohol use behaviors (as measured by AUDIT score) of foodservice management students studying in the United States?" The findings of this study do not provoke concern, as average responses to individual drinking questions indicated a low level of consumption, and AUDIT score average was not indicative of harmful or hazardous drinking levels. Average AUDIT scores for the participants studied was actually similar to that of the hospitality and tourism management students studied by Larsen & Jorgensen (2003).This is a particularly interesting finding, given the commonly held belief and previous reports that hospitality students display higher levels of alcohol consumption than their non-hospitality counterparts (Borchgrevink, Sciarini and Borchgrevink, 2010; Larsen, 1994).

The second question posed by this study was, "Is there a significant difference in foodservice management students' alcohol consumption behavior based on demographic factors, such as age and gender?" Results indicated that participants aged 21-22 reported higher alcohol consumption than those aged 20 and younger. These findings echo the idea of age as a primary factor in drinking behavior; Larsen and Jorgensen (2003) found that when age was introduced to their model, all other effects on consumption disappeared. In the current study, findings could also reinforce previous propositions that all groups in a young age bracket will display heavier alcohol consumption, not just those working in or studying foodservice management fields. It must be noted that the group of participants 20 years of age and younger may actually display significantly high levels of alcohol consumption, but may have reported lower behaviors due to the implications of under-age drinking (the legal drinking in the U.S. is 21 years of age) and decreased access to alcohol in the United States for individuals under the age of 21.

With regards to gender, it was found that males reported significantly higher levels of consumption than female respondents, a finding similar to that of Borchgrevink, Sciarini and Borchgrevink (2010). While alcohol education and excessive drinking warnings should not be relegated strictly to the male population, perhaps this young age group could benefit to increased education and address on the effects of harmful and hazardous levels of alcohol consumption.

The third and final question that this study addressed was, "Is there a significant difference in foodservice management student alcohol consumption based on what work experience group they belong to: those with work experience within the foodservice industry, those with work experience in an industry other than foodservice, and those with no work experience? The foundation for this question came from the proponents of social learning theory, which suggests that individuals who enter into a work environment that cultivates high levels of alcohol consumption will in turn learn to participate in high levels of consumption themselves (Bandura, 1977; Corsun & Young, 1998; Kjærheim et al., 1995; Whitehead & Simpkins, 1983).

An individual's personal standards may be modified through the level of impact in a social environment, possibly creating new, more easily accepted standards. Similar to personal characteristics (such as age, experience, or education), beliefs in personal capabilities may be influenced by these self-generated standards, resulting in a distancing of discrepancies that may have previously existed between personal capabilities and personal belief in the acceptable standards. This reciprocal process of change with higher levels of self-efficacy, as proposed by Bandura (1977), reflects an enhanced learning skill through the social environment and the individual self-directedness in the individual to learn this accepted behavior by the positive outcome or reaffirmation created in this unique social context (Bandura, 1994; Kitson, Lekan, & Guglielmino, 1995).

This is argued similarly in the social cognitive approach that includes a causation model that represents a theory of reciprocal triangular approach (Bandura, 1986). The dynamic relationship between behavior, personal characteristics, and the environment (social setting) continuously interacts with one component influencing the other two components (Bandura, 1977). Within the behavior performed, for instance, the behavior is not simply the result of the personal standards alone, but the result of both components including the social environment (Bandura, 1977, 1986). Therefore, changes in one component influence the nature of the relationship of the other components, and new standards are learned (facilitated by the group) and created simultaneously (Bandura, 1986).

Interestingly, no significant differences were found among the three groups; AUDIT scores demonstrated no significant difference for student participants regardless of whether they had worked in the foodservice industry, had worked in any other industry, or had not obtained experience in the workplace whatsoever.This finding that hospitality work experience has no impact on consumption behavior rejects the social learning theory-based proposition that students learn increased alcohol consumption behaviors after entering the foodservice industry workplace and observing high levels of alcohol consumption of their co-workers. Thus, this finding echoes the question posed by Larsen & Jorgensen (2003); 'Maybe restaurant students are better than their reputation when it comes to drinking?'

Limitations and Recommendation for Future Study

This study is not without limitations, particularly the sensitive nature of the topic and the element of self-reported data. Given that study participants were foodservice management students studying in the U.S., it would be of interest to perform further investigation of students majoring in different educational fields of study. Future research efforts may be helpful in identifying variations according to national, ethnic, or regional boundaries.

As hospitality management is one of the fastest growing fields of study worldwide, it would be interesting to examine foodservice management students studying in other countries such as in Europe, where a large majority of the countries' legal drinking age is lower (18 years old) as well as some Asian countries such as Taiwan where the legal drinking age is 18 years old as well.

Exploration of foodservice workers in the same age groups who are not enrolled in an academic institution may also yield interesting comparisons; perhaps the sample that was surveyed reported lower levels of alcohol consumption because they are university students with increased constraints on their time, leaving less opportunity for drinking than individuals of the same age without academic responsibilities.

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Research Contribution

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AN INVESTIGATION OF COLLEGE AND UNIVERSITY FOODSERVICE ADMINISTRATORS' LEVEL OF AGREEMENT ON POTENTIAL INFLUENCING FACTORS ON SUSTAINABLE FOOD WASTE MANAGEMENT

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ABSTRACT

A national survey to determine college and university foodservice administrators' level of agreement on statements regarding food waste management was developed based on focus group results. Sixty-three college/university foodservice administrators participated in either an online or mailed survey. Administrators mostly disagreed with statements describing barriers to food waste management. However, they agreed they had limited space to store food for donation. Respondents from contract-managed facilities and those serving a higher number of meals agreed more strongly on potential liability issues related to food donation. To increase facilities' donation of leftover food, storage space and liability issues must first be addressed.

Keywords: food waste management, college and university foodservice operations, liability, type of management, number of meals served

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INTRODUCTION

Although the Environmental Protection Agency (EPA) has made significant improvements in municipal solid waste management, food waste management remains a challenge. The total amount of solid waste peaked in 2007 (255 million tons [MT]) and decreased by 4.6 % (244 MT) in 2009. In 2010, a total of 250 MT of municipal solid waste was generated in the United States (EPA, 2011). The EPA (2006) reported that the total amount of food waste had increased by 6.5% in 2010 (34,760 kilotons [KT]) since 2007 (32,630 KT). More than one third of this solid waste (85 MT) was recycled, whereas 2.8% of food waste (970 KT) was recycled and/or composted in 2010.

Discarding edible food is considered a significant waste of money and energy. Anthropologist Timothy W. Jones (2005) reported that 14% of food was within expiration dates. This equates to wasting $590 worth of food annually for a family of four and a total of $90 billion per year nationally: $30 billion from retail business, $20 billion from the farming industry, and $40 billion from households (Jones, 2005). Considering the fact that 28,510 KT of food was wasted in 2005 (EPA, 2006), and the Consumer Price Index for all food has increased by 22.5% since 2005 (United States [U.S.] Bureau of Labor, 2011), it has been estimated that 33,790 KT food waste in 2010 would be worth more than $130 billion nationally. Recently, Hall, Guo, Dore, and Chow (2009) also reported that 40% of food available in the U.S. food supply was wasted in 2003 based on the researchers' formula, which was not adjusted for spoilage and wastage. When adjusted for spoilage and wastage, the U.S. Department of Agriculture estimated about 25% of edible food was wasted (Hall et al., 2009). In addition, Cuéllar and Webber (2010) concluded that approximately 2% of energy consumption in the United States during 2007 was wasted in the form of food. This was based on calculations of total embedded energy in food from agriculture, transportation, processing, preparation, sales, and storage.

The EPA has developed a food waste recovery hierarchy, which suggests source reduction as the most preferred method to avoid food waste, followed by food donation to hungry people and/or hog farmers, composting, and landfill/incineration (EPA, 2010). A 2007 report for the city of Seattle showed that reducing the amount of food waste from foodservice operations would contribute significantly to food waste reduction because the amount of food waste generated from grocery stores and restaurants was estimated at 16% of the overall waste stream (URS Corporation, 2007). However, the current status for foodservice operations' implementation of food waste management programs or the amount of food donated or composted is unclear.

Food donation to the needy is the second recommended method for food waste management. The Bill Emerson Good Samaritan Food Donation Act was established in 1996 to protect food donors/ providers from lawsuits (U.S. Government Printing Offices, 1996). Further, the Katrina Emergency Tax Relief Act (H.R. Rep. #3768, 2005) was passed by former President George W. Bush in 2005 to encourage organizations to donate food to evacuees from natural disasters and receive a tax deduction for donated food. This act has been extended several times under different names, such as the Pension Protection Act of 2006 and the Emergency Economic Stabilization Act of 2008. The Good Samaritan Hunger Relief Tax Incentive Extension Act was also introduced in 2009. A few national chain restaurants such as Yum! Brands Inc., Cheesecake Factory, and Darden Restaurants participate in a food donation program (Food Donation Connection, 2011a), but concerns about possible liability over foodborne illness outbreaks still remain when donated food is not properly handled. Several governmental agencies, including the EPA, provide requirements and guidelines for donors to safely prepare, store, and reheat donated food to reduce risk of foodborne illness (EPA, 2010). However, despite these efforts to ensure the safety of donated food, foodborne illness outbreaks could happen and damage the public image of restaurants or other foodservice operations that had served the donated food. Recently, a total of 60 people were hospitalized after eating turkey dinner at a homeless shelter in Denver, CO (Goetz, 2012, July 23). Although, it was not confirmed, it is speculated that this outbreak may have occurred due to the donated food which was received by Denver Rescue Mission, the homeless shelter, the day before serving the turkey dinner.

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Composting food waste has been well documented. A recent EPA report described three successful stories of foodservice facilities that composted food waste: Larry's Market grocery chain in Seattle, Washington; Middlebury College in Middlebury, Vermont; and the Frost Valley facility in Clarywill, New York (EPA, 2010). Five Larry's Market grocery stores collected and composted a total of 90% compostable materials such as wilted produce, flowers, and cardboard boxes in addition to donating non-perishable food items. Middlebury College collected and composted about 75% of total food waste. As a result, the college saved $137 per ton in landfill hauling and tipping fees, which equals a total net saving of $27,000 per year. The Frost Valley facility was able to reduce its solid waste by 53%, saving $5,200 per year by implementing a composting program.

The efforts to reduce or utilize food waste evolved in various ways. Deluxe Town Diner in Watertown, Massachusetts, invested $20,000 for a boiler that used recycled vegetable oil and saved $5,800 annually on heating and waste disposal expenses (Buchthal, 2006). Manufacturing companies such as Frito Lay and Kraft Foods Inc. also joined efforts to reduce food waste and became the 2010 award winners in the Waste Reduction Awards Program administered by the California Department of Resources Recycling and Recovery (CalRecycle, 2011). Aramark, a contract foodservice management company, has researched and implemented strategies to reduce food waste from their facilities. Aramark found that eliminating use of trays in cafeteria foodservice operations (trayless dining) reduced food waste by 20–30% (Aramark Higher Education, 2008). Aramark is also in the process of conducting a pilot study for a food donation program at Pacific University in Oregon (Lang, 2011).

Researchers and food waste management professionals have suggested factors and possible barriers to consider when implementing food waste management programs. Wie, Shanklin, and Lee (2003) recommended that foodservice facilities consider total amount of waste, availability of farms, compost sites, space, labor, cost for the labor, waste hauling and utility, and regulations for tax deductions when developing food waste management strategies. The Center for Ecological Technology (CET, 1999) in collaboration with Massachusetts Department of Environmental Protection suggested possible barriers to implementing food waste programs. These barriers include the lack of physical availability of the processing sites such as composting units; high demands for labor, space, and care; and inconsistent governmental and financial support or incentives. According to the Evans McDonough Co. (2002, 2004), the main barriers to implementing a food waste management program in residential areas were inconvenience, odor/smell, pests such as rodents and insects, and hygiene issues. Wie et al. focused on the cost effectiveness of implementing food waste management programs in four different types of non-commercial foodservice operations, and other studies have investigated residents' attitudes and barriers to food waste management programs in residential areas. No study has been published about the attitudes and perceived barriers that college and university foodservice operations may face in implementing food waste management programs. Therefore, this study was designed to investigate foodservice administrators' level of agreement on statements that could possibly represent attitudes and perceived barriers to sustainable food waste management in college and university foodservice operations.

METHODOLOGY

The Research procedures of this study were reviewed and approved by the Institutional Review Board of a University prior to contacting study participants.

Focus Group Discussion

A focus group was used to gather information from foodservice managers to identify variables for quantitative survey questionnaires. Contact information for colleges and university foodservice administrators and RecycleMania program participants in the Dallas, Fort Worth, and Houston areas in Texas were collected from public web sites. Individual participants were recruited by e-mail and telephone calls using the contact information. Foodservice administrators were asked questions about past and current practices and opinions regarding food waste management during a 60-minute focus group session. As a token of appreciation, a gift certificate ($50.00) from a national retailer of their choice was given to each participant in the focus group. Seven college/university foodservice administrators participated in the focus group, which was recorded, transcribed verbatim, and then analyzed to identify variables and common terms used by the administrators for the following national survey. A few quotes that support the results of the survey are included in the discussion section.

Survey

Based on results from the literature and the focus group, a questionnaire was developed. The questionnaire consisted of three main parts: (a) demographic information about foodservice administrators, (b) information about the facilities where the administrators work, and (c) statements reflecting attitudes and perceived barriers regarding food waste management. A Likert-type 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree) was used to measure level of agreement on statements reflecting attitudes and perceived barriers regarding food waste management. The questionnaire was validated by three foodservice educators and two university foodservice administrators for expert judgment of content validity (Jha, 2008), including vocabularies commonly used among foodservice administrators. The questionnaire was revised according to their suggestions. The questionnaire was converted to an online survey form using PsychData (PsychData™, LLC, 2008, State College, PA).

A convenience sample of 33 voting delegates of the National Association of College and University Food Services (NACUFS) was invited to participate in a pilot study using the online survey. Six administrators completed the pilot-study survey to assess the clarity of direction and internal consistency of the questions. Based on results of the inter-item reliability test using Cronbach's alpha, eight out of 23 statements on attitudes and perceived barriers were eliminated. The remaining statements were categorized into three sections: (a) operational management ($a = 0.641$, $n = 8$), (b) financial resources and administrative support ($a = 0.679$, $n = 4$), and (c) motivation ($a = 0.600$, $n = 3$). Because of the small sample size of the pilot test due to a low response rate, no further revisions to improve α value were made.

Data Collection

A mailing list of 624 voting delegates of NACUFS was purchased from the organization as the study sample. A cover letter that included a web page link to the survey was e-mailed to 591 voting delegates of NACUFS who had provided e-mail addresses. The 33 voting delegates from Texas and Oklahoma who had participated in the pilot study were not resurveyed. Two weeks later, follow-up e-mails were sent. At the same time, a cover letter and printed questionnaire were also sent to voting delegates of NACUFS who had not yet responded. Three weeks after the postal mailing, a follow-up reminder postcard was sent to each non-respondent to encourage participation. Upon completion of the questionnaire, participants were offered a gift certificate of their choice ($5.00) as a token of appreciation.

Data Analyses

The Statistical Package for the Social Sciences for Windows (SPSS, v. 15.0, Chicago, IL) was used for data analyses. Descriptive statistics were used to summarize the data. Student's t-test was used to test differences between self-operated and contract-managed foodservice operations. The number of meals served per week was grouped into four sections to determine the effect of size of foodservice operation on college and university foodservice administrators' attitudes and perceived barriers regarding food waste management. One-way analyses of variance (ANOVA) were performed to test for differences in variables among facilities with different sizes. A repeated measures ANOVA item analysis was applied to test differences in mean values of level of agreement on statements among the three sections: operational management (n = 8), financial resources and administrative support (n = 4), and motivation (n = 3).

RESULTS AND DISCUSSION

Seven college and university foodservice administrators participated in a focus group discussion. The focus group participants represented facilities serving between 4,000 and 35,000 meals per week. Three were working in contract-managed operations, and the rest were working in self-operated foodservice operations. Most foodservice administrators reported that they had already implemented recycling programs for cardboard and paper goods, but had not extensively executed waste management programs for food. The participants shared information about several food waste management methods: composting, donating food scraps to farmers for animal feeding, collecting food scraps in trash bins, implementing trayless dining, and recycling vegetable oil to generate energy. Their attitudes toward food waste management programs were very positive. They agreed that there is no best method for all foodservice operations because each food waste disposal method has its advantages and disadvantages. They also agreed that food waste management programs should continue because the advantages outweigh the disadvantages.

Attitudes and Perceived Barriers in Food Waste Management

In the survey, respondents were asked to rate 15 statements related to attitudes and perceived barriers in food waste management on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). Average ratings for each statement and the three sections are shown in Table 1. Survey participants showed a significantly higher level of agreement on statements related to the operational management section than other sections ($p < .001$).

Operational management: There was a significantly higher level of agreement on limited space in facilities to store food items for donation and dislikes to separate food waste from soiled dishes than

Table 1. College and University Foodservice Administrators' Mean Ratings of Statements Reflecting Attitudes and Perceived Barriers Regarding Food Waste Management (N=63)

Statements	*M*	±	SD
Operational management			
We have very limited space to store food items for donation.	3.68		1.16 [af]
Employees/customers do not like to separate food waste from soiled dishes and packaging.	3.29		1.07 [b]
Our operation does not donate foods to nonprofit organizations because of potential liability issues.	2.95		1.28 [bc]
We were overwhelmed with the complicated government requirements for food waste programs.	2.75		.88 [cd]
Lack of resources about food waste management discouraged us.	2.71		1.01 [cd]
We are satisfied with our current food waste program.	2.57		1.00 [cde]
Food waste management is not a current priority issue in our operation.	2.25		1.05 [e]
The amount of food waste from our operation is not enough to implement a specific food waste management plan.	2.13		.89 [e]
Average operational management [I]	2.80	±	.55 [ay]
Financial resources and administrative support			
We do not have the financial resources to initiate a food waste program in our operation.	2.94		1.08 [a]
We do not have enough staff to initiate a food waste management program.	2.51		1.01 [b]
My administrators (or headquarters) are not willing to support a food waste management program.	2.44		.93 [b]
We do not see the cost benefits of a food waste program.	2.37		.96 [b]
Average financial resources and administrative support [II]	2.56	±	.83 [b]
Motivation			
Government regulations do not require us to have a specific food waste management program.	3.49		.86 [a]
We tried several methods to reduce food waste in the past, but none of them were successful.	2.32		.69 [b]
The impact of food waste disposal on the environment is not our concern	1.60		.64 [c]
Average motivation [III]	2.45	±	.52 [b]

Note. M = Mean; SD = Standard Deviation. Likert scales: 1, strongly disagree; 2, disagree; 3, neutral; 4, agree; 5, strongly agree. [y] Statistical significance was analyzed by a repeated-measures ANOVA (F [2, 58]= 9.78, $p < .001$) among 3 sections of attitudes and perceived barriers. Values with different superscripts (bolded alphabets) are significantly different ($p < .05$) from each other analyzed by pairwise comparisons among three sections. [I-IV] Statistical significance was analyzed by a repeated-measure ANOVA: [I] $F(7, 53)= 16.3$, $p < .001$ among 8 statements under operational management; [II] $F(3, 60) = 9.72$, $p < .001$ among 4 statements under financial resources and administrative support; [III] $F(2, 61) = 109.3$, $p < .001$ among 3 statements under motivation. [f]Values with different superscripts are significantly different ($p < .05$) from each other analyzed by pairwise comparisons under each section.

the rest of operational statements (Table 1). A national survey showed that inadequate refrigerator space (17%), and inadequate freezer space (15.2%) were perceived as challenges for cooling leftover food properly (Krishnamurthy & Sneed, 2011). The nature of foodservice industry is also very labor-intensive and service-oriented (Ottenbacher, 2009) and has a high turnover rate (Hinkin & Tracey, 2000). The lack of space was mentioned during the focus group discussion of this study, "If you happen to get just one delivery over a week, you will have some waste or spoilage." Limited refrigerator and/or freezer space can make it difficult for foodservice facilities to follow proper food-cooling procedures and thus to donate prepared food. Therefore, frequent, possibly daily pick-up schedules for leftover prepared food should be implemented if foodservice facilities plan to set up programs to donate prepared food to the needy population. Foodservice administrators will also need to put additional effort, time, and money into educating employees and customers about food waste management and implementing any food waste programs.

Foodservice administrators working in contract-managed foodservice operations agreed more strongly on the statement regarding potential liability issues when implementing food donation program as a method of food waste management than those working in self-operated foodservice operations ($p < .05$; Table 2). Contract-managed foodservice operations tend to monitor productivity and liabilities more tightly due to their large volume of business (Choi, Park, Shin, & Kwak, 2007) and their success in contract agreements with colleges and universities. Even with the Federal Bill Emerson Good Samaritan Food Donation Act (U.S. Government Printing Offices, 1996), the concerns of lawsuits or negative media attention for foodborne illness outbreaks still exist. One of the focus group participants from a contract company was extremely concerned about negative public opinions of the company's reputation if a foodborne illnesses outbreak were to happen after donating prepared food to the needy population.

Donating prepared food to the needy population is also closely related to the marketing strategy trend of hospitality and food industry [National Restaurant Association (NRA), 2011]. Companies can promote their public images of pursuing sustainability and social responsibility, and receive tax deduction for donated food to the needy population (Food Donation Connection, 2011b). Recently, a contract management company implemented a food donation pilot program at Pacific University in Oregon and was able to donate 600 pounds of prepared food to the local needy people (Lang, 2011). Many restaurants such as Pizza Hut, Olive Garden, and Chipotle have participated in a food donation program and received a tax reduction for years (Food Donation Connection, 2011a).

Financial resources and administrative support: Respondents tended to disagree with the four statements related to financial resources and administrative support (Table 1). Their responses indicate that a food waste management program was considered cost-effective and that higher level administrators would be supportive of such a program. However, lack of financial resources to initiate a food waste management program was agreed upon more among items in this section.

Foodservice administrators serving a relatively small number of meals agreed more strongly on the lack of financial resources to initiate a food waste management program than those serving a large number of meals ($p < .05$; Table 3). They also agreed more strongly with the statement regarding potential liability issues when implementing a food donation program as a method of food waste management than those serving a large number of meals per week ($p < .05$; Table 3). Small-scale foodservice operations commonly encounter difficulties in human resource management (Alonso, 2009). They may not be able to hire employees who can be in charge of new food donation programs or who support financial and/or legal matters related to the programs. Smaller foodservice operations will hardly receive full support from human resources, financial, and legal departments to deal with liability issues possibly related to food donation programs.

Motivation: Three statements were asked regarding attitudes and perceived barriers related to motivation (Table 1). The foodservice administrators concerned about the impact of food waste disposal on the environment ($p < .05$). Conserving the environment and natural resources has become an important aspect in foodservice operations,

Table 2. Difference in College and University Foodservice Administrators' Level of Agreement on a Statement Regarding Potential Liability Issues for Donated Foods between Contract-Managed and Self-Operated Foodservice Operations (N=63)

	Type of Management					
	Contract-Managed (n=20)		Self-Operated (n=41)			
Statements	***M***	***SD***	***M***	***SD***	***t***	***p***
Operational Management						
We have very limited space to store food items for donation.	3.84	1.02	3.56	1.23	.852	.367
Employees/customers do not like to separate food waste from soiled dishes and packaging.	3.50	1.15	3.17	1.00	1.152	.254
Our operation does not donate foods to nonprofit organizations because of potential liability issues.	3.47	1.31	2.67	1.22	2.309	.025*
We were overwhelmed with the complicated government requirements for food waste programs.	2.95	0.78	2.56	.82	1.696	.095
Lack of resources about food waste management discouraged us.	2.60	1.00	2.76	1.02	-.566	.574
We are satisfied with our current food waste program.	2.65	0.99	2.46	.98	.698	.488
Food waste management is not a current priority issue in our operation.	2.25	1.07	2.29	1.06	-.148	.883
The amount of food waste from our operation is not enough to implement a specific food waste management plan.	2.25	1.07	2.29	1.06	-.594	.555

Note. M = Mean; SD = Standard Deviation. Likert scales: 1, strongly disagree; 2, disagree; 3, neutral; 4, agree; 5, strongly agree.
* $p < .05$, statistical significance was analyzed by student's t-test between contract-managed and self-operated foodservice operations.

and many professional groups suggested how to practice sustainability in the operations. The Academy of Nutrition and Dietetics recommended various techniques to reduce, recycle, and compost food waste from the operations (Harmon & Gerald, 2007). The NRA also created the NRA Conserve Initiative that encouraged restaurants to participate in waste management programs and provided them tips to take social responsibility (NRA, 2008). The more attention is paid to sustainability and corporate social responsibility in community, the more businesses will implement many creative ways to conserve energy and resources and use them as a marketing tool.

Participants had the highest level of agreement with the statement, "Government regulations do not require us to have a specific food waste management program" ($p < .05$; Table 1). Although government does not require any specific food waste management program, foodservice operations have voluntarily implemented food recovery programs and received a significant amount of monetary incentives in the form of a tax deduction. According to the guidelines for charitable contribution from Internal Revenue Services (2012), facilities donating food inventory to a qualified organization such as food bank can deduct some of the food cost. The current rules specify that the sum of half of the gross margin (i.e., market value minus cost) in addition to the taxpayer's cost, but not in excess of twice the cost of the donated food or 10% of total income for the year, can be deducted from taxable income (Charitable contribution, 2012).

Government regulations may indirectly reduce the quantity of waste disposal from households and businesses. According to a report from the city of Milwaukee, more than 7,000 cities and counties in the United States encourage residential and commercial units to reduce the quantity of trash by charging more for larger quantities of waste, described as a pay-as-you-throw (PAYT) program (Hall, Krumenauer, Luecke, & Nowak, 2009). The average weight of waste disposal was approximately 20% less in PAYT communities than non-PAYT communities in Sweden (Dahlén & Lagerkvist, 2010).

Sending food scraps to feed animals, especially swine, has been an option for waste management, but the changes in rules and regulations may have resulted in difficulties for farmers and food donors to keep up with the changes. One focus group participant who had donated food scraps for animal feeding in the past stated the impact of changes in governmental regulations making it difficult to do so. The participant had to stop sending leftover food to small hog farms when the FDA and USDA required food scraps to be boiled thoroughly to kill the pathogens because small farms did not have such equipment to follow the rules. Animal feeding is regulated under the U.S. Department of Agriculture 9 CFR Part 166: Swine Health Protection. According to the Federal Register (Animal and Plant, 2002), the general restrictions (part 166.2) and storage of food waste (part 166.4) have been amended many times between 1982 and 2001. Also, not all states allow food scrap feeding to swine; only 28 states allow animal feeding in the United States (USDA, 2010). The latest published Federal Register allowed commercial food waste to be treated at 167ºF for at least 30 minutes in licensed facilities and transported in separate vehicles from those hauling the animals (Swine health protection, 2009).

CONCLUSION AND MANAGERIAL IMPLICATION

Through a focus group and a national survey, this study was able to determine attitudes and perceived barriers regarding sustainable food waste management in a small group of college and university foodservice administrators. Most foodservice administrators appeared to have positive attitudes toward sustainable food waste management programs in their operations. However, attitudes regarding food waste management varied depending on the type of management system (e.g., self-operated vs. contract-managed) and the number of meals served weekly. Results from this study cannot be generalized but may provide a glimpse into food waste management practices in college and university foodservice operations although the low response rate for this study, with only 63 respondents, was a major limitation.

Foodservice administrators may need to evaluate resources and support to find the most suitable food waste management method for their facilities. Government agencies should also develop food waste management programs that focus on the needs of foodservice operators to minimize barriers to implementing sustainable food waste programs. This could result in more foodservice administrators choosing to implement ecologically desirable methods of food waste management.

Further studies with a larger number of colleges and universities should be conducted to verify and identify the accuracy and reliability of the results in this study. Food waste management research can also be expanded to K-12 schools and healthcare foodservice operations, where few studies were conducted. Factors affecting food waste management and available resources may be different for schools or healthcare foodservice facilities as compared to college and university foodservice operations.

Table 3. Difference in College and University Foodservice Administrators' Level of Agreement on Statements Regarding Potential Liability Issues for Donated Foods and Lack of Financial Resources according to the Number of Meals Served a Week (N=63)

	Number of Meals							
	~ 5,999 (n=14)		6,000~14,999 (n=16)		15,000~39,999 (n=17)		≥ 40,000 (n=15)	
Statements	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***
Operational Management								
Our operation does not donate foods to nonprofit organizations because of potential liability issues.*	3.64	1.15[a]	3.00	1.46[ab]	3.07	1.28[ab]	2.27	0.80[b]
Financial Resources and/or Administrative Support								
We do not have the financial resources to initiate a food waste program in our operation.**	3.21	.98[ab]	3.44	1.09[a]	2.65	1.12[ac]	2.47	0.92[b]

Note. M = Mean; SD = Standard Deviation. Likert scales: 1, strongly disagree; 2, disagree; 3, neutral; 4, agree; 5, strongly agree.

* Statistical significance was analyzed by one-way ANOVA ($F[3, 55] = 3.223$, $p < .05$). Values with different superscripts are significantly different ($p < .05$) from each other analyzed by Bonferroni multiple comparisons.

** Statistical significance was analyzed by one-way ANOVA ($F[3, 58] = 3.070$, $p < .05$). Values with different superscripts are significantly different ($p < .05$) from each other analyzed by Bonferroni multiple comparisons.

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