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Foodservice directors in Texas hospitals were surveyed to document the frequency of participation in sustainable practices and to identify support systems and barriers. The three sustainability practices that had the highest mean frequency were recycling fat, cooking oil, and grease; using reusable plates and dishes; and using reusable silverware. Specific foodservice directors and hospital characteristics significantly influenced adoption of sustainability practices, most notably, directors with more years of experience (2 out of 3 practices) and larger hospitals (all 3 practices). Significant barriers were cost/financial burdens and space limitations. Administrative, customer, and staff support were important to a successful program.

Social Cognitive Factors Influencing Food Safety Behaviors in Independent Chinese and Mexican Restaurants in Kansas

Chinese and Mexican restaurants are among the most popular ethnic operations in the United States. Several studies have noted that more critical food safety violations occur in independent ethnic restaurants than in chain ethnic restaurants. This study explored the social cognitive factors that influence food safety behaviors of food handlers in independent Chinese and Mexican restaurants. One focus group interview and four group interviews, ranging from two to three participants, were conducted. A total of 17 food handlers from independent Mexican and Chinese restaurants in Kansas participated. All interviews were audio-recorded, transcribed, and coded by the main researcher using a thematic codes list. The thematic codes were then compared with the codes generated by another experienced researcher to ensure reliability and inter-coder agreement. The data was analyzed using NVivo 12 Plus for Windows. Nine main themes emerged from the data including self-efficacy, self-regulation, environmental factors, and outcome expectations. Other themes that emerged based on the most frequent statements included cultural background, attitude, and food safety knowledge, respectively. The findings support that the level of food handlers' self-efficacy, self-regulation, physical work conditions and social support, and expectations of the benefits of proper behaviors are integral in influencing food safety behaviors. Operators of independent Chinese and Mexican restaurants and foodservice educators, and policy makers may use these findings when conducting food safety training for food handlers.

Predicting Food Safety Intention: An Extended Model of the Theory of Planned Behavior

The purpose of this study was to use an adapted model of the Theory of Planned Behavior to explore if employees' food safety societal perceptions influence actual practices. A total of 447 foodservice employees currently working in the United States participated in the survey. Employees' attitudes, norms, and controls towards food safety practices were measured. Results indicated that employees' attitude ($\beta = 0.42$), subjective norms ($\beta = 0.09$), and self-efficacy ($\beta = 0.35$) significantly predicted behavior expectations ($p < 0.0001$). Managers should establish behavioral expectations that take into account an individual's behavioral enactment in the face of uncertainties. Improved food safety practices can be established by providing the individual with extrinsic rewards until the individual establishes an explicit sense of control and eventually becomes intrinsically satisfied when performing the food safety practices. Discussions of limitations and theoretical reliance to support foodservice educators are provided.

Food Allergy Communication in Restaurants: Perspectives of Customers with Food Allergies

This study explored food allergy, communication in full-service restaurants from the perspective of customers with food allergies. Results from 291 respondents demonstrated that customers with food allergies felt that they were mostly responsible for preventing food allergy reactions in restaurants and initiating communication with restaurant staff. Food allergy severity, reaction experience, and frequency of dining out predicted customers' frequency of communicating with restaurant staff about food allergies. Food allergy reactions in restaurants occurred occasionally, yet most customers did not notify servers about their condition. The findings highlighted the need for better communication between customers and restaurant staff for the prevention of food allergy reactions.

Research Contribution

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ANALYSIS OF SUSTAINABLE FOOD PRACTICES IN TEXAS ACUTE CARE HOSPITALS

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ABSTRACT

Foodservice directors in Texas hospitals were surveyed to document the frequency of participation in sustainable practices and to identify support systems and barriers. The three sustainability practices that had the highest mean frequency were recycling fat, cooking oil, and grease; using reusable plates and dishes; and using reusable silverware. Specific foodservice directors and hospital characteristics significantly influenced adoption of sustainability practices, most notably, directors with more years of experience (2 out of 3 practices) and larger hospitals (all 3 practices). Significant barriers were cost/ financial burdens and space limitations. Administrative, customer, and staff support were important to a successful program.

Keywords: Sustainability, hospital foodservice, recycling, waste-management, reusable service ware

INTRODUCTION

Hospital foodservice operators are faced with many administrative tasks including financial accountability, customer service initiatives, employee engagement programs, Group Purchasing Organization compliance, and environmental sustainability strategies. The United States adopted the National Environmental Policy Act in 1969 to commit to sustainability and "to create and maintain conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations" (US Environmental Protection Agency, 2016, para. 2). Sustainable practices are related to the growth and production of food, the conservation of resources including energy and water, and the reduction of waste.

The implementation of environmentally sound food sustainability strategies is becoming increasingly important due to the fact that health care facilities in the US emit 9.8% of greenhouse gases (Eckelman & Sherman, 2016). Hospital foodservice greatly impacts the entire foodservice system due to the large amounts of resources used, their considerable purchasing power and waste production (Carino, Porter, Malekpour, & Collins, 2020). The healthcare sector is beginning to understand that food impacts human health not just through nutrition, but through a complex system of social, economic, and environmental connections. To help hospital management staff build sustainable food systems, campaigns such as the Healthy Hospital Initiative, in conjunction with Practice Greenhealth, Healthcare without Harm and the Center for Health Design, have been developed to provide resources and support to hospitals engaging in sustainability programs (Eckelman & Sherman, 2016). Little research exists to determine if hospital membership in these programs increases sustainability efforts.

BACKGROUND

The Environmental Protection Agency and the American Hospital Association developed a memorandum of understanding in 1998 for the purpose of setting ambitious goals for waste reduction (Sustainability Roadmap for Hospitals, n.d.). Waste reduction programs in hospital foodservice operations can involve the implementation of many different practices. Recycling is often the most easily initiated strategy comprising such practices as recycling cooking oil, cardboard and paper, tin and aluminum cans, and plastics. Recycling programs usually encompass the entire facility, not just the foodservice area. They can be financially lucrative if the cost of waste removal services are reduced and have environmental benefits (Sustainability Roadmap for Hospitals, n.d.). A study in 2011 surveyed 290 hospital foodservice directors across the United States to determine the implementation of solid waste sustainable practices (Huang, Gregoire, Tangney, & Stone, 2011). The most commonly implemented sustainable practices included recycling fats, oils, and grease; recycling cardboard and paper; recycling batteries; and promoting reusable silverware.

Waste oil from frying and cooking can be transformed into biodiesel fuel and is preferred due to its environmental benefit (Karabaş, 2019). The sustainable practice of recycling fats, grease, and cooking oil was found to be the most commonly implemented practice by foodservice directors in hospitals (Huang et al., 2011). According to a National Restaurant Association survey conducted in 2018, of 500 restaurant operators (or managers) surveyed, 64% recycled fat, cooking oil and grease, implying that this practice is also common in many foodservice establishments (National Restaurant Association, 2018).

Recycling fat, cooking oil and grease as well as the use of reusable plates/dishes and silverware are sustainable practices that are important to the environment. As hospitals strive to reduce waste, practices that reduce the use of disposable foodservice ware must be considered. The most environmentally preferable form of foodservice ware is reusable dishes and cutlery. Reusable foodservice ware requires fewer material resources and uses less energy in its production than the disposable counterparts. A study completed in 1998 by the Alliance for Environmental Intervention showed that reusable mugs generate lower levels of air and water pollutants and less solid waste in production, use, and disposal than similar disposable products (Dennison, 1998). The majority of plastics are produced solely for packaging and short-lived purposes and are discarded after 1 year. Four percent of the world's oil and gas production (a non-renewable resource) are used to make plastics. These two factors indicate that the use of plastics are not sustainable (Hopewell, Dvorak, & Kosior, 2009). It is important that a sustainability program incorporate reusable service ware.

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Little available research exists on the sustainability practices implemented by hospital foodservice directors in Texas. In addition, there is little evidence on the impact of foodservice director's demographics and hospital demographics on adopting sustainability practices. The objectives of this study were to 1) identify current sustainable practices implemented in the foodservice department in hospitals in Texas, with particular emphasis on the recycling of fat, cooking oil, or grease; reusable plates/dishes and reusable silverware; 2) identify support systems and barriers, and 3) recognize significant demographic factors related to sustainability practices.

METHODS

An online cross-sectional questionnaire was administered through Qualtrics (www.qualtrics.com). The questionnaire was a modification of the questionnaire used, with permission, from the thesis titled "hospital foodservice directors' current practices and attitudes toward sustainability" (Huang, 2007). All data were held confidential; no individual or facility was identified. The researchers' university institutional review board reviewed and approved the research questionnaire, study design, and procedures.

Sample Selection

The population for this study was foodservice directors at general hospitals in Texas. Directors' contact information was retrieved from The Texas Health and Human Services Directory of General and Special Hospitals (Texas Health and Human Services, n.d.). The 2014 directory contained a total of 663 facilities that combined general and special hospitals, licensed to provide varying degrees of care. The hospital list was filtered to include only hospitals that were licensed as general hospitals, yielding a total of 417 facilities. General hospitals are commonly referred to as acute care hospitals. The email addresses for foodservice directors or managers were obtained from multiple sources including foodservice vendors, group purchasing organizations and Texas members of the Association for Healthcare Foodservice listed in the online directory. Additionally, phone calls were made to obtain email addresses for any facilities not found through previously stated sources. Every effort was made to collect contact information from all 417 facilities.

Questionnaire Development

Several terms were defined at the start of the questionnaire to minimize confusion for respondents. Sustainable practices were defined as "simply the actions that hospital foodservice directors take in order to conserve resources" (Huang et al., 2011, pp. 243-244). The modified questionnaire had four main sections:

Section 1: Current Sustainable Practices. Twenty sustainable practices were listed, including recycling various waste streams, serving locally grown or organically grown foods, and using pesticide-free, hormone-free or antibiotic-free meat or dairy products. Participants were asked to indicate the frequency of participation in each of these practices using a 5-point Likert scale ranging from *Never* to *All of the Time*. Participants were asked about participation in farm/garden programs, purchase of energy and water efficient equipment, and participation in energy, water, or waste audits. Additionally, Section 1 included questions regarding the barriers and the support systems connected with sustainable practices.

Section 2: Management Attitude on Sustainable Practices. This section investigated the impact of personal commitment and attitude on the sustainability program. Participants were asked to share the strength of their personal perspectives by replying to a series of nine statements using a 5-point Likert scale ranging from Strongly Disagree to Strongly Agree. The results from this section were not included in this study.

Section 3: Sustainability Organization and Challenge Participation. Six sustainability organizations were listed in this section, and participants were asked to identify any programs they had joined. Four food sustainability challenges were also listed. Additionally, the questionnaire collected information on the existence of "green teams" and on the assignment of responsibility for the sustainability program in each facility.

Section 4: Demographic Information. The final section of the questionnaire gathered demographic information including age, education, credentials, and years of professional service of respondents. Facility demographics were also collected including hospital bed size, total daily meal count, full-time equivalents (FTEs) and foodservice management structure. These items were tabulated for comparison to both sustainable practices and attitudes.

Data Collection Procedure

The questionnaire was administered in February 2015. Information accompanying the questionnaire explained the study's purpose and importance and requested timely participation. Questionnaire participants were guaranteed confidentiality. Questionnaire participants' email addresses were located in the blind copy area to protect confidentiality and questionnaires were sent in groups of 10 to avoid spam filters. Out of 417 hospitals identified, the initial invitation to participate in the study was sent to 410 foodservice director's email addresses. Seventy-six email addresses were returned as invalid, leaving 334 possible respondents. Follow-up emails were sent at one- and two-week intervals after the initial questionnaire. Information was also posted on the social media Facebook pages for the Texas Academy of Nutrition and Dietetics and the Association for Healthcare Foodservice. Follow up phone calls were made in an effort to improve response rates. A final request email was sent out on. The questionnaire remained active for 28 days.

Data Analysis

The IBM Statistical Package for the Social Sciences (SPSS) Version 25 was utilized for all data analysis. Frequencies were analyzed to check each variable for coding errors. Descriptive statistics were calculated for all variables.

RESULTS AND DISCUSSION

Questionnaires were sent electronically to 410 foodservice director's email addresses. Seventy-six email addresses were found to be invalid, leaving 334 possible respondents. Twelve respondents did not agree to participate in the questionnaire. Seventy-three participants responded by completing at least some portion of the questionnaire, resulting in a 22% overall response rate.

Respondent Demographics

All questionnaire responses (n=73) were reviewed for completeness. The questionnaire consisted of 24 multiple response questions and one subjective comment area. Eleven respondents failed to complete at least 50% of the questionnaire and were eliminated from the data file. The final questionnaire sample consisted of 62 respondents that completed half of the questionnaire or more. This sample represented a 19% response rate.

Personal demographic information was collected to create a profile of the personal attributes of the respondents (foodservice directors) (Table 1). Respondents varied in age from 26 to 65+ years with the median age being 46 to 55 years of age. Median educational attainment was a bachelor's degree while over a third had a graduate degree. Forty-two percent were registered/licensed dietitians, 15% were certified chefs, while 26% were certified dietary managers. Only

42.6% of hospitals have someone designated as sustainability coordinator in the foodservice department. In about 65% of these cases (17 of 26), the department director also served as sustainability program coordinator.

Questionnaire respondents were classified based on years of experience as a foodservice director and years of experience in their current position. Respondents also reported longevity in their current position, with the median respondent reporting 6–10 years in the current position.

Facility Demographics

The facilities represented a variety of sizes and locations (Table 2). By location, 35% (*n*=21) of the hospitals were in major metropolitan areas, 41% (*n*=25) were located in rural areas, and 23% (*n*=14) were located in suburban areas. Hospital size information was based on licensed beds, with the median hospital in the 101-200 bed range. Foodservice departments were sized by number of staff (FTEs) and average number of meals served daily which included both retail and patient meals. The questionnaire respondents were questioned on the status of the foodservice department as well as various hospital classifications. The facility population consisted of 64.5% (*n*=40) with "government" (military and veteran hospitals) affiliation and 35.5% (*n*=22) had "no government" affiliation (Table 2).

Sustainable Practices

The questionnaire asked respondents to document the frequency of their participation in 20 sustainable practices related to reducing waste and recycling, and to serving or using sustainable food products. In each instance, participants were asked to use a five-point scale with the range of "never," "rarely," "sometimes," "most of the time," or "all of the time" to assess the strength of practice participation. Responses to the frequency of participation in sustainable practices were compiled in Table 3.

The three sustainability practices having the highest mean frequency (averaging more than three (sometimes) on the 5-point scale) were (1) recycling fat, cooking oil, and grease, (2) using reusable plates and dishes, and (3) using reusable silverware. These practices were compared to hospital foodservice director's demographic variables (Table 4) and hospital demographic variables (Table 5).

The three key sustainability practices variations based on six selected socio-demographic variables were examined (Table 4). No significant mean differences were detected among these practices by age, education, whether the respondent was a registered dietitian (RD), whether the individual was a certified chef, years as a foodservice director, and whether the hospital had a sustainability coordinator. Two of these findings agreed with Huang et al. (2011) who found no differences between sustainability scores and educational levels and years as a foodservice director. Interestingly, foodservice directors who had the RD credentials had lower mean sustainability scores than non-RD foodservice directors and directors aged 35-40 had lower scores than the other age ranges (ages less than 35, 41-45, 46-50, 51-60, over 60) (Huang et al., 2011). However, a significant mean difference (p = 0.014) was found for encouraging usage of plates and dishes for the certified dietary managers; certified dietary managers had a significantly higher mean (M = 3.96) compared to not being

Table 1. Demographic Characteristics of Hospital Foodservice Directors (n = 62)

Variable	Description	Frequency	Percent
Age	26–35 years old	10	16.1
	36–45 years old	12	19.4
	46–55 years old	18	29.0
	56–65 years old	19	30.6
	Over 65 years old	3	4.8
Highest education completed	High School Graduate	8	13.1
	Associate's Degree	10	16.4
	Bachelor's Degree	20	32.8
	Master's Degree	21	34.4
	Doctorate Degree	0	0.0
	Other	2	3.3
Credentials	Registered/Licensed Dietitian	26	41.9
	Certified Chef	9	14.5
	Certified Dietary Manager	16	25.8
	Other	11	17.7
Years as foodservice director	Less than 6 years	13	27.1
	6–10 years	6	12.5
	11–15 years	7	14.6
	16–20 years	7	14.6
	21–25 years	4	8.3
	More than 25 years	11	22.9
Years in current position	Less than 6 years	24	47.1
	6–10 years	9	17.6
	11–15 years	8	15.7
	16–20 years	2	3.9
	21–25 years	1	2.0
	More than 25 years	7	13.7
Sustainability Coordinator	No	35	57.5
	Yes	26	42.6

certified dietary managers (M = 2.85). Finally, a significant mean difference (p = 0.046) was found on encouraging usage of plates and dishes with those working in their current position 16 or more years (M = 4.20), having a significantly higher mean than those individuals who had been in their current position for 10 or less years (M = 2.88). On the other hand, Huang et al. (2011) did not find any differences in sustainability practices and years the foodservice director had worked (Huang et al., 2011).

The data for significant mean differences in these three key sustainability practices based on hospital characteristics were examined. No significant mean differences were detected for the following variables: number of licensed beds, foodservice management, and whether the hospital was a government or non-government hospital. One or more significant mean differences were found for the location of the hospital, FTEs, average number of meals served daily, and whether or not the hospital was for profit.

All three dependent variables exhibited significant mean differences for hospital location (major metropolitan area, suburban area, or rural area). For recycling fat, cooking oil, and grease, metropolitan areas had the highest mean (M = 4.48) while rural areas had the lowest mean (M = 3.32). Two pairwise comparisons were significant with metropolitan areas significantly higher than rural areas (p = 0.026) and suburban areas were significantly higher than rural areas (p = 0.035). For encouraging reusable silverware, rural areas (M = 3.52) had a significantly higher (p = 0.028) mean compared to suburban areas (M = 2.29). For encouraging reusable plates and dishes, while the model was significant (p = 0.048), the pairwise comparison test did not produce any significant mean differences. The pattern in the data were not very strong or clear for hospital location. The size of the hospital appeared to be more important than the location.

Significant mean differences were found for FTEs for recycling fat, cooking oil, and grease (p = 0.046) as well as encouraging reusable silverware (p = 0.012). For recycling, those with 11 to 50 FTEs had a significantly higher mean (p = 0.043) than those with only 10 or fewer FTEs. For encouraging reusable plates and dishes, the only significant pairwise difference (p = 0.007) was between those with 51 to 100 FTEs compared to 10 or less FTEs with the largest hospitals having the higher mean. The results regarding the number of FTEs from this study directly correlated with Huang et al. (2011), who found that increases in FTEs had positive impacts on the adoption of sustainability practices (Huang et al., 2011).

All three key sustainability practices exhibited significant mean differences with average number of meals served daily. For recycling fat, cooking oil, and grease, two pairwise differences were noted; in both instances, the larger hospitals (measured by number of meals) had a significantly higher mean. Specifically, those producing more than 2,000 meals had a significantly higher mean than those serving 100 meals or less (p = 0.004) and those serving 1,001 to 2,000 meals had a higher mean than those serving only 100 meals or less (p = 0.015). For encouraging reusable plates and dishes, two more significant pairwise differences were noted: (1) hospitals serving over 500 meals had a significantly higher mean (p = 0.002) than those with 100 or less meals and (2) those with 1,001 to 2,000 meals had a significantly higher mean than the hospitals with 100 meals or less (p = 0.002). With average number of meals served daily, encouraging reusable silverware had almost identical results for these two comparisons (p = 0.034 and p = 0.002 respectively). In all these instances, the larger hospitals had higher sustainability measure means. These results were not consistent with a study conducted in New Brunswick. The researchers surveyed foodservice managers in healthcare settings and found that 86% of facilities practiced waste reduction, but there were no significant differences between the size of the facilities and their waste reduction practices (Robichaud, Cormier, & Gaudet-Leblanc, 1995).

Other Sustainable Practices

Many organizations have been developed to provide resources and support to hospitals engaging in sustainability programs and

Table 2. Demographic Characteristics of Hospitals (n=62)

Variable	Description	Frequency	Valid Percent
Location	Major metropolitan area	21	35.0
	Suburban area	14	23.3
	Rural area	25	41.7
Licensed beds	100 beds or less	24	40.7
	101 to 200 beds	8	13.6
	201 to 300 beds	11	18.6
	301 to 400 beds	7	11.9
	401 to 500 beds	6	10.2
	More than 500 beds	3	5.1
Full-time equivalents	10 FTEs or less	17	27.9
	11 to 50 FTEs	26	42.6
	51 to 100 FTEs	14	23.0
	More than 100 FTEs	4	6.6
Average number of meals served daily	100 meals or less	11	19.0
	101 to 500 meals	19	32.8
	501 to 1000 meals	7	12.1
	1001 to 2000 meals	12	20.7
	More than 2000 meals	9	15.5
Foodservice management	Self-operated	35	60.3
	Contract managed	23	39.7
Hospital type	For profit	27	54.0
	Not for profit	23	46.0
	Government	40	64.5
	Non-government	22	35.5

Table 3. Sustainability Practices (n=62)

	Never		Rarely		Sometimes		Most of the time		All of the time		
Description	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**Mean ± SD**
Practices related to reducing waste or recycling											
Recycle fat, cooking oil, or grease	11	17.7	2	3.2	4	11.3	7	11.3	38	61.3	3.95 ± 1.56
Encourage reusable plates/dishes	12	19.4	7	11.3	17	27.4	15	24.2	11	17.7	3.10 ± 1.36
Encourage reusable silverware	13	21.0	9	14.5	11	17.7	17	27.4	12	19.4	3.10 ± 1.43
Recycle cardboard	27	43.5	2	3.2	2	3.2	7	11.3	24	38.7	2.98 ± 1.87
Recycle paper	24	39.3	5	8.2	5	8.2	11	18.0	16	26.2	2.84 ± 1.70
Use products made of 100% recycled materials	12	19.7	9	14.8	32	52.5	5	8.2	3	4.9	2.64 ± 1.05
Recycle tin or aluminum cans	27	43.5	7	11.3	6	9.7	9	14.5	13	21.0	2.58 ± 1.65
Encourage reusable beverage containers	20	32.3	9	14.5	18	29.0	11	17.7	4	6.5	2.52 ± 1.29
Use biodegradable disposable products	23	37.1	9	14.5	21	33.9	6	9.7	3	4.8	2.31 ± 1.21
Recycle plastic	33	53.2	6	9.7	4	6.5	9	14.5	10	16.1	2.31 ± 1.61
Donate food to the needy	32	52.5	11	18.0	15	14.6	1	1.6	2	3.3	1.85 ± 1.06
Compost food scraps	50	82.0	2	3.3	3	4.9	2	3.3	4	6.6	1.49 ± 1.16
Practices related to the service/use of sustainable food products											
Fair Trade coffee / tea	22	35.5	11	17.7	11	17.7	8	129	10	16.1	2.56 ± 1.49
Locally grown or produced foods	21	33.9	6	9.7	24	38.7	11	17.7	0	0.0	2.40 ± 1.14
rBGH-free or rBST-free dairy products	26	42.6	10	16.4	13	21.3	5	8.2	7	11.5	2.30 ± 1.40
Antibiotic free meat products	28	45.2	10	16.1	13	21.0	5	8.1	6	9.7	2.31 ± 1.36
Pesticide free food products	26	41.9	15	24.2	13	21.0	2	3.2	6	9.7	2.15 ± 1.28
Free range animal products	25	40.3	14	22.6	16	25.8	3	4.8	4	6.5	2.15 ± 1.20
Organically grown foods	33	58.2	12	19.4	16	25.8	1	1.6	0	0.0	1.76 ± 0.90
Organic dairy products	38	61.3	10	16.1	14	22.6	0	0.0	0	0.0	1.61 ± 0.84

promoting the human and environmental health benefits of a sustainable lifestyle. The Healthy Hospital Initiative, in conjunction with Practice Greenhealth, Healthcare without Harm and the Center for Health Design is one of those organizations and represents 1300 hospitals nationwide (Healthier Hospitals Initiative, n.d.) Hospital foodservice directors were surveyed on their participation in 6 organizations with the expectation that being a member of these organizations would increase sustainability practices. The Healthy Hospital Initiative had the highest participation, at 18% (n=11) while 79% were not members of any organization. Comparison data were analyzed for Healthy Hospital Initiative and the adoption of sustainability practices and it was found that being a member did not influence higher sustainability efforts at a $p > 0.05$. Furthermore, one test (encouraging usage of plates and dishes) was significant ($p = 0.048$), but was in the opposite direction as predicted, with not associated with Healthy Hospital Initiative having the significantly higher mean. However, other studies have found that participating in hospital sustainability challenges and initiatives increased sustainability practices (Gray, Orme, Pitt, & Jones, 2017; Ranke, Mitchell, St. George, & D'Adamo, 2015). The sample size for membership in Healthy Hospital Initiative was very small, which may have impacted the results. There is some uncertainty about the impact of organizational membership on a variety of hospital-related sustainability functions; however, membership in these organizations should not be discounted.

BARRIERS AND SUPPORTS

In the implementation of any program or practice, factors exist that both hinder and support the success of sustainability programs. The identification of barriers and support systems was a key objective of this research. Table 6 documents the factors identified by respondents.

Barriers

Foodservice directors commonly cite issues which are considered to hinder the implementation of sustainability practices. Respondents were asked to select all the barriers that they encountered which hindered the success of their sustainability programs. Almost 80% (n=48) of respondents indicated that "cost and financial burden" was a hindrance to the success of their sustainability programs. Additionally, 72% (n=44) of respondents reported that their facility space was not conducive to sustainability programs. Almost 70%

Table 4: Comparisons of Three Sustainability Practices by Hospital Foodservice Director's Demographic Variables (n=62)

	Sustainability Practices					
	Recycle fat, cooking oil, and grease		Encourage usage of plates and dishes		Encourage reusable silverware	
Variable	Group Mean	*p* Value	Group Mean	*p* Value	Group Mean	*p* Value
Age						
26-35	3.90		2.70		2.50	
36-45	3.50		2.33		2.50	
46-55	4.39		3.56		3.56	
56-65	4.00		3.26		3.26	
66 or older	3.00		3.67		3.67	
Total	3.95	0.882	3.10	0.147	3.10	0.129
Education						
High School	3.50		3.88		3.63	
Associates	3.40		3.50		3.60	
Bachelor	4.15		2.95		3.00	
Masters	4.24		2.81		2.81	
Total	3.97	0.129	3.12	0.248	3.12	0.318
Credentials						
Registered Dietitian	4.15		2.96		2.92	
Not a Registered Dietitian	3.81		3.19		3.22	
Total	3.95	0.391	3.10	0.511	3.10	0.422
Certified Chef	3.89		3.33		3.22	
Not a Certified Chef	3.96		3.06		3.08	
Total	3.95	0.898	3.10	0.578	3.10	0.779
Certified Dietary Manager	3.94		3.81		3.56	
Not a Certified Dietary Manager	3.96		2.85		2.93	
Total	3.95	0.967	3.10	0.014	3.10	0.133
Years as Foodservice Director						
Less than 6 years	3.62		2.38		2.62	
6–10 years	4.33		3.00		2.83	
11–15 years	4.43		3.14		3.14	
16–20 years	3.71		3.71		3.00	
21–25 years	4.75		2.75		2.25	
More than 25 years	3.73		3.73		3.64	
Total	3.96	0.741	3.10	0.134	2.98	0.468
Years in Current Position						
Less than 6 years	3.88		2.71		2.67	
6–10 years	4.22		3.33		3.22	
11–15 years	3.88		3.63		3.63	
16–20 years	4.00		3.50		4.50	
21–25 years	5.00		5.00		5.00	
More than 25 years	3.86		4.29		4.29	
Total	3.96	0.980		0.046		0.020
Sustainability Coordinator						
No	3.83		2.91		3.03	
Yes	4.23		3.27		3.12	
Total	4.00	0.313	3.07	0.340	3.07	0.807

(n=41) of respondents noted that products were not available on purchasing contracts and 50% (n=30) of respondents noted that the desired products were not available. Almost 50% (n=30) of respondents indicated that sustainability programs were not supported by customers and 41% (n=25) indicated that their programs were not supported by administration. Only 25% (n=15) of respondents believed that regulatory agency oversight was a hindrance to the success of their sustainability programs. Respondents commented that pest issues were a barrier to recycling and also noted that management lacked the time to devote to sustainability.

An investigation in sustainable practices in hospital foodservice in Montana reported similar barriers (Montague, Wilcox, & Harmon, 2014). Some of the barriers that were documented in this study included hesitation from hospital administrators to adopt sustainable practices due to costs and food safety concerns from locally sourced foods. In addition, directors were concerned about abiding by vendor contracts, a decrease in consistency of delivery and products, and the increase in workload and costs that might be incurred by adopting sustainable practices.

Supports

In the present study, respondents were also asked to identify actions that provided support and contributed to the success of their sustainability programs. Administrator, staff and customers can be a large influencer on sustainability practices, both positive and negative. Almost 70% (n=35) of respondents indicated that the support of administration had been particularly helpful in making their sustainability program successful. Additionally, 62.7% (n=32) of

Table 5. Comparisons of Three Sustainability Practices by Hospital Demographic Variables (n=62)

	Sustainability Practices					
	Recycle fat, cooking oil, and grease		Encourage usage of plates and dishes		Encourage reusable silverware	
Variable	**Group Mean**	***p* Value**	**Group Mean**	***p* Value**	**Group Mean**	***p* Value**
Location						
Major metro area	4.48		3.00		2.90	
Suburban area	4.57		2.29		2.57	
Rural area	3.32		3.52		3.60	
Total	4.02	0.010	3.05	0.032	3.12	0.048
Licensed Beds						
100 beds or less	3.42		3.67		3.46	
101 to 200 beds	4.63		3.25		3.38	
201 to 300 beds	4.18		2.27		2.27	
301 to 400 beds	4.71		2.86		2.86	
401 to 500 beds	4.17		2.67		2.83	
More than 500 beds	5.00		3.00		2.67	
Total	4.03	0.170	3.12	0.098	3.05	0.313
Full time Equivalents						
10 FTEs or less	3.12		3.71		3.82	
11 to 50 FTEs	4.38		2.92		3.08	
51 to 100 FTEs	4.00		2.43		2.29	
More than 100 FTEs	4.75		3.50		3.50	
Total	3.97	0.046	3.07	0.072	3.13	0.012
Average Number of Meals Served Daily						
100 meals or less	2.73		4.18		4.27	
101 to 500 meals	4.11		3.32		3.05	
501 to 1000 meals	4.43		2.43		2.43	
1001 to 2000 meals	4.42		2.17		2.08	
More than 2000 meals	4.78		3.22		3.44	
Total	4.05	0.014	3.12	0.003	3.07	0.002
Foodservice Management						
Self-operated	3.77		3.06		3.23	
Contract managed	4.50		2.91		2.83	
Total	3.98	0.203	3.00	0.710	3.07	0.270
Hospital Type						
For profit	3.93		3.30		3.41	
Not for profit	4.04		2.92		2.84	
Total	3.98	0.796	3.12	0.501	3.13	0.015
Government	3.50		3.20		3.23	
Non-government	4.15		3.13		3.13	
Total	4.04	0.286	3.19	0.896	3.21	0.857

respondents credited customer support, and 60.8% (n=31) cited staff support as important factors. Huang et al. (2011) also found that administrators, customers, and staff were the most influential on decisions regarding sustainable practices (Huang et al., 2011). Over 56% (n=30) indicated that a vendor that provided product information was an important support for their program. Less than 40% (n=20) of respondents identified customer education campaigns as a supportive factor, and only 38% (n=19) identified that attending educational conferences on sustainability promoted the success of their program. Only 35% of respondents (n=18) believed that a clear mission statement and clearly defined sustainability goals were factors in the success of their sustainability program. One respondent commented that collaboration with other departments such as environmental services was important. Several respondents commented that their sustainability program was their own initiative and that they did not receive much support.

Limitations of this Study

Several limitations to this study have been identified. A current list of the email addresses of the population, foodservice directors in general, acute care hospitals in Texas, does not exist; therefore, this study was limited by the researchers' inability to collect contact information on the complete population. The low response rate was another limitation of the study. The response rate may have been impacted by email spam filters, personal reluctance to respond to the questionnaire, and the job demands of the responding professionals. The low response rate may also be due to possible response bias. Foodservice directors who did not have sustainability programs may have been hesitant to reply, while those with well-developed programs may have seen this study as an opportunity to boast their success. A review of the results indicated that the data did contain responses from both ends of the spectrum, and thus, these responses hopefully represent the spectrum of sustainable programs in Texas at

Table 6. Barriers and Supports to Sustainability Programs (n=62)			
Barriers and Supports	**Description**	**Frequency**	**Percent**
Barriers	Cost/financial burden	48	78.7
	Facility space not conducive	44	72.1
	Products not on purchasing contracts	41	68.3
	Staffing Issues	38	63.3
	Desired products are not available	30	50.0
	Programs not supported by customers	30	49.2
	Programs not supported by administration	25	41.0
	Lack of knowledge of sustainable practices	22	37.3
	Regulatory agency oversight	15	26.3
Supports	Administration support	35	68.6
	Customer support	32	62.7
	Staff support	31	60.8
	Vendors providing product information	30	56.6
	Organized program participation (i.e. Healthy Hospital Initiative)	25	50.0
	Budgetary support for sustainable initiatives	24	47.1
	Customer education campaigns	20	39.2
	Attending educational conferences on sustainability	19	38.0
	A clear mission statement and sustainability goals	18	35.3

the time of data collection. The researchers intended to analyze further hospital type characteristics, namely chain-owned versus free standing. However, there was uncertainty in the final data set and the results could not be compared to the 3 sustainability factors.

In future studies of hospital sustainability, several items could be examined in more detail. Each of the sustainable practices contained in this study have the potential to become individual studies that would include a detailed cost benefit analysis, a product availability search and the identification of specific supports and barriers to that practice. The depth of these practice focused studies would take already strong sustainability programs to even greater levels.

CONCLUSIONS AND APPLICATIONS

Results of this study indicate that hospital foodservice departments in the State of Texas have implemented some sustainable practices. The practices with the highest mean frequency were recycling fat, cooking oil, and grease; using reusable plates and dishes; and using reusable silverware. The adoption of these practices varied significantly based on the demographic characteristics of the foodservice director and of the facility. In particular, directors with more years of experience (2 out of 3 practices) and larger hospitals (all 3 practices) were more likely to engage in 2 or more of the sustainability practices that were analyzed in this study.

It was disconcerting to find that professional credentials did not have a positive relationship to the strength of the sustainability program (except for one sustainable practice for certified dietary managers). The initial educational component for registered dietitians, certified chefs, and certified dietary managers should be reviewed and standardized to include sustainability rationale and processes. Ongoing education for all disciplines should be provided to keep the commitment to a healthy environment in the forefront of professional practice.

Foodservice directors identified cost/financial burden as the most significant barrier to implementing sustainable food practices. They also clearly identified that most important support systems needed for successful sustainability programs are the support of administration, customers, and staff.

The significant factors identified in this study which influence the extent/success of the sustainability programs in Texas hospital foodservices can provide guidance for hospital foodservice directors and administrative leaders who are intent on implementing a new sustainability program or improving their existing programs. In this study, successful sustainability programs had the following characteristics:

- Support of administration, customers, and staff
- Foodservice managers with 16 or more years of experience
- Larger hospitals (51-100 FTEs and serving > 1000 meals per day)

The list of program features presented here represents the most influential characteristics found in this Texas study to positively influence the strength of the sustainability program. As healthcare leaders look for ways to impact the foodservice sustainability programs, the results of this study can help them understand the opportunities and challenges they may face based on foodservice director and hospital demographics.

Healthcare professionals must look beyond the provision of daily clinical services and meals to see the bigger picture. It is estimated that one of the biggest global threats in the 21st Century is climate change (Costello et al., 2009). To make a commitment to a healthy future, foodservice professionals must continue to embrace the challenges and turn them into opportunities to improve sustainability throughout their operations and organizations.

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Research Contribution

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SOCIAL COGNITIVE FACTORS INFLUENCING FOOD SAFETY BEHAVIORS IN INDEPENDENT CHINESE AND MEXICAN RESTAURANTS IN KANSAS

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ABSTRACT

Chinese and Mexican restaurants are among the most popular ethnic operations in the United States. Several studies have noted that more critical food safety violations occur in independent ethnic restaurants than in chain ethnic restaurants. This study explored the social cognitive factors that influence food safety behaviors of food handlers in independent Chinese and Mexican restaurants. One focus group interview and four group interviews, ranging from two to three participants, were conducted. A total of 17 food handlers from independent Mexican and Chinese restaurants in Kansas participated. All interviews were audio-recorded, transcribed, and coded by the main researcher using a thematic codes list. The thematic codes were then compared with the codes generated by another experienced researcher to ensure reliability and inter-coder agreement. The data was analyzed using NVivo 12 Plus for Windows. Nine main themes emerged from the data including self-efficacy, self-regulation, environmental factors, and outcome expectations. Other themes that emerged based on the most frequent statements included cultural background, attitude, and food safety knowledge, respectively. The findings support that the level of food handlers' self-efficacy, self-regulation, physical work conditions and social support, and expectations of the benefits of proper behaviors are integral in influencing food safety behaviors. Operators of independent Chinese and Mexican restaurants and foodservice educators, and policy makers may use these findings when conducting food safety training for food handlers.

Keywords: Food safety behavior, behavioral expectations, food safety attitudes, behavioral conformity

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INTRODUCTION

The demand for ethnic food has grown worldwide in response to the influence of media exposure and travel-related food and cultural experiences (Clemes, Gan, & Sriwongrat, 2013). Ethnic restaurants, especially Chinese, Italian, and Mexican have gained popularity and have become mainstream in the diet of most Americans (Agarwal & Dahm, 2015; Lee, Niode, Simonne, & Bruhn, 2012; Liu & Jang, 2009). Despite the rapid growth in ethnic foods and the popularity of ethnic restaurants, several researchers have noted that ethnic restaurants have been associated with foodborne outbreaks (Kwon, Roberts, Shanklin, Liu, & Yen, 2010; Lee, Hwang, & Mustapha, 2014; Liu & Lee, 2017).

In a study designed to explore restaurant traits linked to foodborne outbreaks, ethnic restaurants were found to be more likely to have outbreaks due to complex food preparation methods used (CDC, 2011). A substantial body of research has illustrated that more critical food safety violations occur in independent ethnic restaurants than in chain ethnic restaurants (Kwon et al., 2010; Liu & Lee, 2017; Murphy, DiPietro, Kock, & Lee, 2011).

Kwon et al. (2010) compared critical and non-critical food safety violations between 500 independent ethnic and non-ethnic restaurants in 14 Kansas counties. They found that independent ethnic restaurants had a significantly higher number of critical food safety violations than independent non-ethnic restaurants.

Liu and Lee (2017) compared differences in food code violations between ethnic and non-ethnic restaurants, as well as independent and chain restaurants, using health inspection data from foodservice operations in Louisiana. The researchers found that ethnic restaurants have more violations than non-ethnic restaurants in categories related to time/temperature abuse, cross-contamination, food condition, food-contact surfaces, and food labeling; and chain restaurants had fewer violations than independent restaurants.

Most frequently reported food safety violations in independent ethnic restaurants were identified as poor time and temperature control, cross-contamination, inadequate hand hygiene, and lack of physical facility maintenance (Kwon, Choi, Liu, & Lee, 2012). The viability of an independent ethnic restaurant as a small business is challenged by its uniqueness as a family-owned ethnic group business (Jones & Fellers, 1999). Most ethnic restaurants are small-scale businesses with limited resources that can be used to improve food safety, especially in independent ethnic restaurants (Liu & Lee, 2017). Liu, Kwon, Shanklin, Canter, and Webb (2014) identified employees' fatigue, learning capability, and financial resources as the top three barriers that impede food safety training in Chinese restaurants. Food safety inspectors' lack of familiarity with the ethnic food (Mauer et al., 2006) and lack of food safety inspection guidelines that are specifically designed for ethnic restaurants (Liu & Lee, 2017) were other barriers to food safety improvement in independent ethnic restaurants.

Little research has been done to understand the social cognitive factors that may influence food safety behaviors, especially in independent ethnic restaurants. The Social Cognitive Theory (SCT; Bandura, 1986) has been used to explain a diverse set of health behaviors such as smoking cessation (Bektas, Ozturk, & Armstrong, 2010), reducing weight and increasing exercise (Haider, Sharma, & Bernard, 2012), and improving dietary habits (Ahlstrom, 2009; Gaines & Turner, 2009). The overarching concept of the SCT is reciprocal determinism, which means that a constant interaction exists among the characteristics of a person, their behaviors, and their environment (Gaines & Turner, 2009). The SCT seeks to provide a comprehensive understanding of both why and how people change their health behaviors and the social and physical environments that influence behavior change (McAlister, Perry, & Parcel, 2008). Although it

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recognizes how environments shape a behavior, this theory focuses on individuals' potential abilities to modify and construct environments to fit specific purposes they set for themselves (McAlister et al., 2008).

The purpose of this study was to explore the social cognitive factors that influence food safety behaviors of food handlers in independent Chinese and Mexican restaurants. A specific objective of the study was to utilize the most frequently discussed thematic items identified to generate an item pool for the measurement scales in a survey instrument that was used in the next phase of the study. The developed scales were then used to measure the four constructs of the Social Cognitive Theory (self-efficacy, self-regulation, outcome expectations, and environmental determinants), food safety behavioral intentions, and self-reported food safety behaviors.

METHODS

Krueger and Casey (2000) and Morgan (1997) recommended that the ideal focus group would have six to eight participants, but not more than 10. For this study, one focus group interview and four group interviews ranging from two to three participants were conducted with a total of 17 food handlers from independent Mexican and Chinese restaurants. The group interviews were conducted in place of typical focus group interviews due to the difficulty researchers had in getting enough employees to gather at the same time for the focus group. Approval from the University's Institutional Review Board (IRB) where the study was conducted, was received prior to contacting potential participants.

Sample and data collection

A convenience sample of independent Mexican and Chinese restaurants owners/managers (n = 30) were contacted to request their permission to recruit participants from their operations. After obtaining the owners' or managers' approval, a flyer containing information about the study and a sign-up sheet were delivered to the restaurants in person. To ensure consistency, participants were randomly chosen based on two selection criteria. First, participants should be at least 18 years of age at the time of recruitment. Second, participants needed to be a food handler in a non-supervisory job. A total of 17 food handlers representing eight restaurants agreed to participate in the focus group and group interviews.

All interviews were held in a location deemed convenient for participants and away from their work site. Due to time limitations, two groups chose to be interviewed at their work site. Each interview lasted on average about one hour with the shortest lasting only 45 minutes and the longest lasting almost 2 hours. Each participant was provided a consent form to sign and received $20 as a token of appreciation for their participation.

Interview guide

The interview guide is provided in the appendix. The interview questions explored the social cognitive elements that may influence the participants' food safety behaviors. All interviews followed a questioning route with sequenced open-ended questions and other probe questions as needed. As described by Krueger and Casey (2000), the opening, introductory, and transition questions were meant to have the participants talk and think about the topic. The key and ending questions were more specific and focused to yield the most useful information.

The questioning route was prepared based on previous research (Abbot, Byrd-Bredbenner, Schaffner, Bruhn, & Blalock, 2009; Bearth, Cousin, & Siegrist 2014; Clayton, Griffith, Price, & Peters, 2002; Howells et al., 2008; Meysenburg, Albrecht, Litchfield, & Ritter-Gooder, 2014; Pilling, Brannon, Shanklin, Howells, & Roberts, 2008; York, Brannon, Roberts, Shanklin, & Howells, 2009). A demographic and operational information questionnaire was completed by participants at the end of each session. Each guide was developed in English and translated to each language.

Data analysis

The interviews were conducted in the spoken language of participants. Three interviews were conducted in Spanish and two interviews were conducted in English. The focus group and group interviews were audio-recorded, transcribed, and coded by the main researcher using a thematic codes list including both pre-established and free codes. Non-English interviews were translated into English by a bilingual researcher with experience in qualitative studies. To ensure reliability and inter-coder agreement, an experienced researcher was asked to independently transcribe and code the recordings (Creswell, 2009). Coding themes were then examined, and any disagreement was resolved. The coded data was analyzed using the procedures of NVivo 12 Plus for Windows (Version 12; QSR International Pty Ltd., 2017) to identify themes and patterns. Multiple procedures were implemented to ensure validity in terms of the accuracy and credibility of the results. Using different data sources from participants in different restaurants enabled triangulation to improve the dependability of the data. In addition, a peer debriefing procedure having an experienced researcher review the focus group and group interviews and ask questions about the procedures as recommended by Creswell (2009) added to the validity of the results.

RESULTS AND DISCUSSION

Demographic and Operational Characteristics

Demographics of participants and their operational characteristics are presented in Table 1. The majority (n = 11) of participants were female and 11 participants were Hispanic, while six participants were Chinese. Participants were well-diversified regarding educational level. Only three participants indicated they had previous food safety training and one participant indicated they had a food safety certification. All operations were independent Mexican (n = 3) or Chinese restaurants (n = 5).

Identified Themes and Sub-Themes

Analysis of the focus group and group interviews responses showed nine main themes across all responses. The themes were identified based on the frequency of statements mentioned by the participants. The themes and sub-themes are summarized in Table 2.

Theme 1 represented self-efficacy. Self-efficacy represents the confidence in one's ability to perform a behavior. Participants in both the focus group and group interviews talked about their confidence to perform hand washing, handling practices of food and contact surfaces, and use of a thermometer. The statements mentioned were in response to a question asking about the extent of their confidence and ability to perform these three behaviors. The participants expressed their confidence by statements like, *"I am confident I do it every time before I serve"* and *"constantly, I already have fifteen years of work in a restaurant and I have to wash my hands."* One participant also addressed the importance of the ability and willingness to perform food safety practices saying, *"but for me the main thing is the ability and the intelligence and the will."* Another participant emphasized his or her confidence to perform hand washing as a basic rule, *"I am very confident. It is a very basic rule that everyone follows here even when it is a busy time".* These responses suggested that a food handler with high self-efficacy will more likely engage in proper food safety practices than someone with low self-efficacy. Previous

research has also indicated that self-efficacy is one of the important influencers of food safety behaviors (Beavers, Murphy, & Richards, 2015; Quick, Byrd-Bredbenner, & Corda, 2013).

Theme 2 encompassed self-regulation that means controlling oneself through self-monitoring, goal setting, and processing information to achieve a goal (Bandura, 1991). This theme incorporated four sub-themes including habit, goals setting, self-monitoring, and self-regulated learning strategies. Participants emphasized the role of habit in shaping their behavior. In response to the intention to perform hand washing, one participant mentioned that *"I can tell you that I always do it because it is a habit."* Another participant expressed the role of habit in guiding their hand washing behavior saying, *"I think most of the time I just follow what I did yesterday and the day before that."* Another participant also addressed the power of habit saying, *"the habit makes you something mechanical [perform it automatically], something that you do not even think about or plan because you already know what you are going to do every day".*

Having a goal in mind when performing food safety behaviors was apparent from the discussion of participants. One participant referring to another participant from the same restaurant stated that, *"he does not do it because he has to do it, but because we have in mind that I have to, I have to wash my hands, it's not in our mind, in a hemisphere of our brain."* Another participant stated that finishing a task within a certain time was another goal, *"sometimes we set the goal by making sure it [the food] is handled within certain time".* Another participant from another group also said that "*the goal is my preparation list that I have to finish*." Other goals related to finishing a task or serving foods that appeal to customers were reported. One participant mentioned, *"I try to make sure that all the food is hot and arrived warm to the client, that's the goal."* Similarly, another participant stated, *"the goal is for everything to be tasty, for it to come out good".* Regarding the sub-theme of self-monitoring, some participants indicated that they self-monitor their food safety practices. One participant said, *"I remind myself that we did not have to leave meat more than 15 minutes outside."* Another participant also stated that *"it is practiced every day because for example, she [a coworker] checks on me and I check what she is doing because I understand we are seeing each other."*

The way by which participants learned self-regulation was another sub-theme that emerged. One participant mentioned that *"… I grabbed a book and it was where I learned, because there are all those rules [in that book]."* Another participant highlighted the role of experience in developing self-regulation strategies saying, *"the interest to do it and the experience that we have been acquiring through the years. Every day we learn something new that we have very present."* These findings are in line with Hall and Fong (2007) who argued that repetitive health behaviors, which are easy to self-control, are a function of both past behaviors represented in habits and self-regulation.

Theme 3 represented environmental factors that may influence food safety behavior. One participant highlighted the role of work conditions in their restaurant as a constraint to properly follow hand washing behavior saying, *"in practice it is 5% that follows it, because there is neither time nor the conditions are the most adequate to wash hands."* Similarly, another participant expressed their concern about having to use disinfectants which are irritating to their skin, stating *"the condition must be expressed [expressing concerns about work conditions] to the employer so that the employer puts in whatever is necessary for person to work…. The employer can put another disinfectant that is not harmful to their [the food worker's] skin."*

Table 1. Focus Group and Group Interviews: Demographic and Operational Characteristics

Characteristic	Frequency
Age Group	
18-25 years	3
26-33 years	3
34-41 years	5
42-49 years	3
50 years and older	3
Gender	
Female	11
Male	6
Ethnicity	
Hispanic or Latino	11
Asian	6
Education	
less than high school	2
High school/GED	6
Associate degree	2
Some college	2
Bachelor's degree	3
Graduate degree	2
Position	
Prep cook	8
Line cook	6
Other	2
Executive chef	1
Years of Experience	
5 years or less	13
6-15 years	3
16-25 years	1
Type of Service	
Casual dining	11
Quick service (Fast food)	5
Quick casual	1
Food Safety Training	
No	14
Yes	3
Food Safety Certification	
No	16
Yes	1

Two participants mentioned that the availability of necessary supplies and tools is important to facilitate their food safety behavior. They said, *"soap, disinfectant, thermometers, gloves. Everything we need to do things."* And *"we have the sink to wash our hands. We have everything we need. And you have it at hand in front of you, so you do not forget."* The role of social support by managers or supervisors in influencing food safety behavior is apparent. One participant said, *"I think the manager, or the supervisor has to set a good model in every good manufacturing practice. They have to do this on themselves and then they will monitor others and give them rewards or punishment if needed."* Previous research also provided a consistent evidence of the importance of the adequacy of necessary equipment and access to supplies to perform proper food safety behaviors (Strohbehn et al., 2014; York et al., 2009).

The role of time constraints in following food safety behaviors properly stood out from the discussion of one group of participants. One participant said, *"sometimes circumstances do not give [allow] you to follow the procedures of how food should be handled and how areas should be disinfected. Because it is so much the number of people and it gets so busy that it does not give [allow] you time for*

Table 2. Identified Themes and Sub-Themes	
Theme	**Frequency**
Self-Efficacy	14
Self-Regulation	
Habit	26
Goals setting	17
Self-monitoring	7
Self-regulation learning strategies	7
Environmental Factors	
Physical environmental factors (equipment and resources)	18
Time constraints	17
Social environmental factors	12
Training and access to food safety information	4
Inspection by officials	3
Outcome Expectations	
Reducing risk of foodborne illnesses, avoiding lawsuits, and maintaining good reputation	46
Time constraints and cost of supplies	5
Behavioral Intentions	4
Food safety Behaviors	
Hand washing	22
Cleaning, sanitizing, and avoiding cross-contamination	22
Use of a thermometer	11
Cultural Background	33
Attitude	6
Knowledge	4

anything." Another participant also mentioned, *"then the procedure is lost because there is not enough time or the necessary personnel to do the work."*

Training and access to food safety information as an external influencer of the behavior was evident. One participant said, *"I don't think there is training here, that we as Hispanics are a lot of do this and do the other thing [lots of instructions that do not pertain to them], but in American restaurants we do not have it either, that information is not there at hand."* Another participant also said, *"every worker before being a food server has to go through a series of training to make sure good practices are practiced."* Inspection by health authorities was another external influencer mentioned by some participants. One participant said, *"the first most basic of a restaurant and for me is what the inspector says hot hot and cold cold [maintain the temperature of food]"*. The participant continued and said in reference to cleaning and sanitizing work surfaces, *"and we have to clean it as I say is not that one has invented it, is that the State inspection requires it."* Similarly, previous research indicated that inadequate resources or supplies, lack of training, lack of reminders, restaurant procedures, and time constraints are among the most frequently reported barriers to performing proper food safety practices (Green & Selman, 2005; Pilling et al., 2008; York et al., 2009).

Theme 4 represented outcome expectations regarding the advantages and/or disadvantages of following food safety behaviors. Participants across all groups emphasized the advantages of following proper food safety behaviors. One participant said, *"avoid lawsuits, diseases. Quality. So that the client is satisfied."* Another participant also mentioned, *"so if you realize how important it is to follow the rules because you never know when you can infect someone"*. Avoiding loss of job and closure was mentioned by a participant saying, *"if someone got sick because of eating our food, we are going to lose our job, they are going to shut down, the inspection comes, and everybody will lose job."* Another participant also said, *"have more people coming to eat with us because they see you [serving] very hygienic food and restaurant [clean restaurant]. The opinion of the clients"* On the other hand, participants did not associate following food safety practices as a disadvantage. One participant said, *"it looks as disadvantage but compared to advantages it is nothing. You spend on food safety like hand wash soap, and hats. You have to spend cost on those kinds of things."* Another participant also mentioned, *"there is no disadvantage, for me it is all an advantage to do things correctly."* Roseman and Kurzynske (2006) examined the relationship between food safety risk perception and adherence to proper food safety practices. Their findings suggested that outcome expectations regarding the beliefs and perception of potential risks of poor food handling behavior could stimulate following proper food safety behaviors. Liu et al. (2014) indicated that Chinese restaurateurs value face saving as a foundation of their culture and making them aware of the negative consequences of improper food safety behaviors will likely motivate them to provide food safety training to their employees.

Theme 5 encompassed food safety behavioral intentions. Participants discussed their intention to carry out food safety behaviors and how it guides their behaviors. One participant expressed the importance of employees' behavioral intention saying, *"in many places, you have the rules that you have to follow, and it depends on them [a food worker] whether they want to do it or not, because they are told, you are going to do this and this, but it is already dependent on the person."* Another participant mentioned how his or her behavioral intention has decreased the longer he/she has been in the food service industry, stating, *"I think my desire or my intention to follow this rule kind of decrease as the time increases working in this industry. So, after a long time maybe I get bored."* This response suggested that decreased behavioral intention over time may cause a food worker to be over-confident that they are likely to cut corners in performing recommended food safety behaviors. Previous research highlighted the importance of behavioral intention in influencing food safety behavior. Pilling et al. (2008) examined the influence of restaurant employees' intentions on performing food safety behaviors and found a significant difference between employees' level of intention and beliefs about food safety behaviors.

Theme 6 represented three food safety behaviors, including hand washing, handling of food, cleaning and sanitizing work surfaces, and use of a thermometer. When asked about the frequency of practicing hand washing, participants reported several practices. One participant said, *"I sing a song like happy birthday when I wash my hands."* Another participant mentioned, "*every time you start the work you have to wash your hands."* Another participant also stated, *"once you are leaving the work area when you come back you have to wash your hands. I only wash my hands when I leave and come back to the work area."* And when asked about how they wash their hands, one participant said, *"the definition [of hand washing] would be something quick. Without brush."*

Participants mentioned several practices related to proper cleaning and sanitizing of food contact surfaces. For example, one participant talked about preventing cross-contamination saying, *"in the case of preparation, a different color is used, a different cutting board for vegetables and meats."* Similarly, another participant stated, *"I have to strictly separate the raw material from the cooked material."*

Cleaning of food contact surfaces was another practice mentioned by participants. For instance, one participant said, *"when we start, it's the first thing we do. Clean everything well with chlorine to disinfect well."* Although only a few participants reported often using a thermometer, they mentioned other practices to ensure food reached the desired temperature. For example, one participant said, *"we do not really measure the temperature of the food, but we make sure it is in a safe environment [condition]. For the hot food we make sure it is boiled or over a hundred."* When asked about when they use a thermometer, one participant stated, *"when I don't trust cooking to the right temperature."* Some participants mentioned the proper use of a thermometer. One participant said, *"well, you put it in the food to the bottom [the thickest part of the food] and there it will mark the degrees to which the food is at and whether it is hot, or it is cold."* Another participant mentioned, *"what I do, sometimes, is to put the thermometer inside the food to take the temperature."* Niode, Bruhn, and Simonne (2011) conducted interviews with 41 managers of Asian and Mexican restaurants in Northern California and found that approximately 10% of Mexican restaurants and 62% of Asian restaurants did not use food thermometers to check doneness. The researchers indicated that 47.6% of the participants from Asian restaurants who do not know the cooking temperature, use their traditional methods to check the doneness of food through appearance or seeing the food boiling. Similarly, Li (2015) found that food thermometers are used less by food handlers in independent Chinese restaurants and attributed that to lack of motivation, lack of risk perception, lack of time, or unavailability of food thermometers. Feng and Bruhn (2019) reviewed eighty-five studies about the knowledge, attitude, and behaviors related to thermometer use of consumers and food workers. They found that there were two major barriers to the use of thermometers including belief that a thermometer is not necessary and difficulty of selecting and using a thermometer.

Theme 7 represented the cultural background of food handlers and its influence on their food safety behaviors. This theme dominated the discussion of a Chinese and a Mexican group. One participant said, *"as we come with a different culture and that influences the practices that I have."* Another participant stated, *"whenever they come to do the inspection, they ask questions that I seriously do not know how to answer because this the cooking method we use. Unless I did it this way, I have to take it from the menu."* Another participant also mentioned, *"one arrives in this country and begins to learn, but the culture that one brings is to the root because not all we do in the restaurant is what they teach us [public health authorities]".* Understanding the cultural background of employees in ethnic restaurants and its influence on food handling practices is vital to fully appreciate the challenges to implementing proper food safety practices in these operations and develop food safety training programs that address potential cultural misconception of workers (Liu et al., 2014; Niode et al., Niode, Bruhn, & Simonne 2011).

Theme 8 represented employees' attitude to food safety. When asked about what practices they perform to ensure food safety, one of the participants elaborated, *"first the attitude. After having the tools that we have, if we do not have the attitude we will not do it."* Another participant stated, *"many people do not have the responsibility to do things correctly and the attitude also falls".* Other participants also explained how they approach food safety, *"I have to prepare for that person, I have to prepare it as if it were for me….we sincerely like it, that's why we are both working together, we like it, and we do it well."* Howells et al. (2008) indicated that educating food handlers on the consequences of improper practices might improve their attitude towards food safety. Therefore, unless employees' expectations support that a specific food safety behavior makes a difference in the safety of the food served, their attitude and belief about the behavior will be negative (Ball, Wilcock, & Aung, 2010).

Theme 9 represented food safety knowledge. Some participants indicated the importance of food safety knowledge. When asked about factors that make it easier to perform hand washing, one participant stated, *"but what makes it easier for you to do it is that you already know that if you do not do it the bacteria can come if you already know that bacteria can get there, you are like this you have to wash your hands."* Another participant mentioned, *"it is important because we know that if the hot food is not more than 135 degrees [fahrenheit] it begins to spoil."* Another participant emphasized the importance of improving food safety knowledge, *"Improvement for oneself for knowledge. If we ever get to another place [another operation], and they tell you to see how you do this, can you read the thermometer? It is to improve knowledge."* The importance of food safety knowledge and training has been highlighted in previous research. Osaili et al. (2013) evaluated food safety knowledge of food handlers in fast food restaurants and found that food workers who completed a food safety training course had higher overall food safety knowledge scores than those who did not complete it. Even though food safety knowledge is an essential component of promoting food safety behavior, numerous studies indicated that it is not always sufficient to translate to behavior change (Clayton et al., 2002; Green, 2008; Pilling et al., 2008; York et al., 2009).

The nine main themes that emerged from the data comprised all the social cognitive factors including self-efficacy, self-regulation, environmental factors, and outcome expectations. Other themes that emerged based on the most frequent statements included cultural background, attitude, and food safety knowledge respectively. The identified major subthemes included habits, physical environmental factors, and the advantages of performing proper food safety behaviors by reducing risk of foodborne illnesses, avoiding lawsuits, and maintaining good reputation.

CONCLUSIONS

The purpose of this study was to explore the social cognitive factors that influence food safety behaviors of food handlers in independent Chinese and Mexican restaurants. The results of the focus group and group interviews highlighted several other factors along with the social cognitive factors that influence food safety behaviors in independent Chinese and Mexican restaurants. The findings of this

study can guide future studies to investigate and target food safety behavior interventions more effectively. The results showed the influence of cultural background on food safety behaviors. To support a positive organizational culture of food safety, public health officials should consider the influence of ethnic culture of employees in independent Chinese and Mexican restaurants when conducting food safety training for foodservice employees. The results also suggest that operators in independent Chinese and Mexican restaurants need to support food handlers' self-efficacy. Consistent encouragement of food handlers can reinforce confidence enough to bring about more efforts toward improving food safety behaviors.

The role of habit in informing food safety behaviors was evident from the results. Operators of independent Chinese and Mexican restaurants are recommended to motivate their food handlers to follow self-regulation strategies like monitoring their food safety practices, setting goals, and evaluating their performance to gain a sustained intention and habit to perform proper behaviors through time. The results support that the physical environment represented in access to resources and supplies and social support represented in motivation can positively influence food handlers' adherence to proper food safety behaviors.

The findings indicated that participants were aware of the negative outcomes of improper food safety practices. Therefore, operators of independent Chinese and Mexican restaurants should use persuasive messages with food handlers to improve their behaviors or continue to perform proper food safety behaviors to avoid potential negative ramifications. These messages can be expressed verbally or in writing in the spoken language of food handlers. Previous research established that food handlers do not always act on their food safety knowledge due to time pressure, lack of supplies, or not being aware of the critical nature of food safety behaviors. The findings of this study support that foodservice operators need to communicate messages of why, when, and how to perform certain behaviors to food handlers to promote their self-efficacy, outcome expectations, and overall compliance.

Limitations

To reduce researcher bias, the recordings were coded by two experienced researchers to validate data analysis and interpretation. The restaurants in this study were chosen because of the convenience of travel distance and therefore, selection bias is possible. The participants in this study may have provided socially desirable responses, because they might want to be perceived as adherent of best food safety practices and gave answers that reflect that perception. This was addressed in the interview guide by including and using probe questions to draw out additional information or clarify the responses.

Future Research

Future research is encouraged to explore social cognitive factors that may affect food safety behaviors in other independent ethnic restaurants. Future studies may use a qualitative approach to understand the role of habit in motivating food safety behaviors and factors that sustain good work habits.

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APPENDIX

Type of question	Question
Opening	Can you tell me how long you have been working in your restaurant/foodservice industry?
Introductory	When you think of food safety behavior, what is the first thing that comes to your mind?
Transition	Think back to when you started your job as a food handler, what factors would you say influenced your food safety behavior?
Key questions	**Self-efficacy** How confident are you about washing hands? **Probe:** Can you explain how to wash your hands properly? To what extent do you feel confident in your ability to clean and sanitize food contact surfaces? **Probe:** When should you clean and sanitize food contact surfaces? To what extent do you feel confident in your ability to use a food thermometer? **Probe:** How do you use the thermometer to check the temperature of the food? **Self-regulation** What goals do you have in mind when you prepare/cook the food? Do you self-monitor your food handling practices? **Probe:** How did you learn these self-regulation strategies? **Outcome expectations** What are some advantages related to performing proper hand washing/ using a thermometer/ proper handling of food and work surfaces? **Probe:** What are some reasons why you would want to carry out these food safety behaviors? What are some disadvantages related to performing hand washing/ using a thermometer/ proper handling of food and work surfaces? **Probe:** What are some reasons why you think there could be disadvantages from performing these food safety behaviors? **Environmental determinants** What factors in your workplace would make it easier for you to perform these behaviors? What factors in your workplace would make it difficult to perform these behaviors? **Probe:** Can you think about physical and/or social factors? **Behavioral intention** Can you tell me about your intentions to carry out hand washing/using a thermometer/proper handling of food and work surfaces in the past two weeks? **Probe:** If you intend to perform proper food safety behaviors, what would your plan look like?
Transition	What practices do you perform to ensure safe handling or preparation of food?
Key question	**Food safety behavior** When do you wash your hands in a typical work day? When do you use a thermometer? What practices do you perform to ensure proper handling of food and work surfaces?
Ending question	Do you have anything else you would like to share that we haven't discussed?

Research Contribution

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PREDICTING FOOD SAFETY INTENTION: AN EXTENDED MODEL OF THE THEORY OF PLANNED BEHAVIOR

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ABSTRACT

The purpose of this study was to use an adapted model of the Theory of Planned Behavior to explore if employees' food safety societal perceptions influence actual practices. A total of 447 foodservice employees currently working in the United States participated in the survey. Employees' attitudes, norms, and controls towards food safety practices were measured. Results indicated that employees' attitude (β = 0.42), subjective norms (β = 0.09), and self-efficacy (β = 0.35) significantly predicted behavior expectations ($p < 0.0001$). Managers should establish behavioral expectations that take into account an individual's behavioral enactment in the face of uncertainties. Improved food safety practices can be established by providing the individual with extrinsic rewards until the individual establishes an explicit sense of control and eventually becomes intrinsically satisfied when performing the food safety practices. Discussions of limitations and theoretical reliance to support foodservice educators are provided.

Keywords: Food safety behavior, behavioral expectations, food safety attitudes, behavioral conformity

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INTRODUCTION

Between 1998 to 2016, approximately 19,986 foodborne illness outbreaks and 387,788 foodborne diseases were reported (Center for Control Disease and Prevention, 2016). As in previous years, the foodservice industry was still the most commonly reported location where foodborne disease outbreaks occurred (Center for Control Disease and Prevention, 2017). Approximately 61% of foodborne illness outbreaks were attributed to a lack of personal hygiene and improper food handling by foodservice employees (Angelo et al., 2016). Other reports suggested that 97% of foodborne illness outbreaks were traced back to human error (Griffith et al., 2010). Among these, several causes have been identified, such as failing to adhere to safe food preparation time and temperature guidelines, directly introducing pathogens while preparing food when ill, or cross-contaminating ready-to-eat foods with raw food (Angelo et al., 2017; Debess et al., 2009; U.S. Food and Drug Administration, 2017; Green et al., 2007).

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Most human causes and behaviors could be corrected, and should be prevented by adequately monitoring and re-training for preventive controls (Roberts et al., 2012). Indeed, some literature suggests that training or corrective actions should occur at both the line and management level (Roberts et al., 2012). Therefore, the purpose of this study was to explore if employees' food safety societal perceptions influence actual practices.

BACKGROUND

In the foodservice industry, improper food preparation procedures can result in sickness and/or foodborne illness outbreaks (Cliver, Potter, & Riemann, 2011). Food safety policy in the United States consists of three components: risk assessment, management, and communication (Kaplan, 2012). Effective food safety management is often considered to be a cyclical process, with repeated evaluations of the impact of threats and vulnerabilities, which are often guided by evidence-based practice and sounding theories (Davies, 2010). However, current food safety certification has provided little guidance on how to routinely develop and implement both risk evaluation and the effective food safety theoretical guided practices (Arendt et al., 2012). Despite the precise definition of food safety practices like handwashing and cooling procedures, ServSafe textbook often provides little assurance regarding best-practices of risk analysis, risk avoidance, and risk evaluations (National Restaurant Association, 2010).

Previous studies have reported that food safety training is effective in increasing sanitation inspection scores, the microbiological quality of food, and self-reported changes in food safety practices (Cates et al., 2009; Cliver, Potter, & Riemann, 2011; Hedberg et al., 2006; Husain, Wan Muda, Noor Jamil, Nik Hanafi, & Abdul Rahman, 2016; McElroy & Cutter, 2004; Park, Kwak, & Chang, 2010; Yu, Neal, Dawson, & Madera, 2018). However, other studies have also identified behavioral dissonance within existing food safety training programs, as food safety training and an increase in food safety knowledge does not effectively transfer into individual food safety practices and proper food safety behaviors (Arendt, Paez, & Strohbehn, 2013; Lin & Roberts, 2017; Roberts et al., 2008, 2009; Song, Sandelowski, & Happ, 2010). This renunciation of behaviors has become even more urgent over the past decade; thus, a surge of interest among foodservice researchers and law enforcement regulators has turned many to behavioral theories to help identify behavioral trends or behavioral barriers within existing food safety practices (Arendt, Paez, & Strohbehn, 2013; Roberts et al., 2008; Song, Sandelowski, & Happ, 2010).

An established behavioral theory is important to current food safety literature and can help provide practical guidance to education and training, thus helping with overall practices. A well-defined and properly adapted behavioral theory can help discern personal experiences and identify the cause of behavioral actions (Fishbein & Ajzen, 2011). For example, understanding the individuals' attitudes and behavioral conformities related to food safety practices can help

explain barriers and controls related to necessary food safety practices. The psychological approach of using the attitude and behavioral conformity construct as an adjudication before the practice can help test the individual cognitive process (Fishbein & Ajzen, 2011, Paulhus & Trapnell, 2008). Thus, the process can help disintegrate information related to food safety, test theoretical boundaries, and adapt to the specifically defined food safety practices (Paulhus, 2002; Paulhus & Trapnell, 2008). The specific focus of this study aimed to explore evidence-based behavioral constructs that influence employees' food safety practices. The research used an adaptation of the current behavioral theory and was tested on exploration and behavioral conformity, thus providing contributions to the current understanding of food safety behaviors.

Theoretical Framework – Theory of Planned Behavior (TPB)

The Theory of Planned Behavior (TPB) proposes a model about how human action is guided. It predicts the occurrence of explicit behavior, if the behavior is intentional (Ajzen, 1991). Ajzen (2011) states that, as in the original theory of reasoned action, a central factor in the TPB is the individual's intention to perform a given behavior. Intentions are assumed to capture the motivational factors that influence behavior; however, intention has limitations (Venkatesh et al., 2008). Behavioral intention is a reflection of an individual's internal beliefs or schema, but fails to capture known reflections of external factors (Ajzen, 1991). Therefore, later discussion of the behavioral literature has considered nonvolitional factors, such as behavioral controls, to make up the consideration of the external factors and relative facilitating conditions (Ajzen, 1991; Sheeran et al., 2003). Behavioral controls often considered explicit control or implicit control, which combined to account for the control over the behavior (Fishbein & Ajzen, 2011). However, an individual's intention in the TPB often assumes that, in the case of routine behaviors, the intention is implicit and activated automatically to guide the performance of the behavior (Ajzen & Dasgupta, 2015).

Behavioral expectations

Behavioral expectation can address the explicit side of a facilitating condition or explicit behavioral control by adding an individual's explicit sense of control over behavioral enactment in the face of uncertainties (Venkatesh et al., 2008). Behavioral expectations can produce behavioral conformity, which is the extent to which organizational members are required to think and behave differently than they otherwise would be in the case of the person/norm conflict (Balthazard & Cooke, 2006). There are many situations in which the ability to perform an intended behavior is uncertain. Additionally, some of the unforeseen events and impediments may change the initial behavioral intention (Venkatesh et al. 2006). Therefore, the behavioral expectation might help capture many external factors to behavioral intention (Ajzen & Dasgupta, 2015).

An adaptation of behavioral expectations within the TPB model was used for this study. The model, presented in Figure 1, acknowledges the limitation of the original TPB by using behavioral expectations as the immediate construct to produce behavior or conformity (Fishbein & Ajzen, 2011); therefore, the model extends the TPB theory by using behavioral expectation instead of behavioral intention as the immediate antecedent of actual behavior. In order to overcome the limitations of not including the explicit side of the behavior and test the utility of the contractual relationships, the TPB variables of interest, which include attitudes, subjective norms, and self-efficacy, were retained.

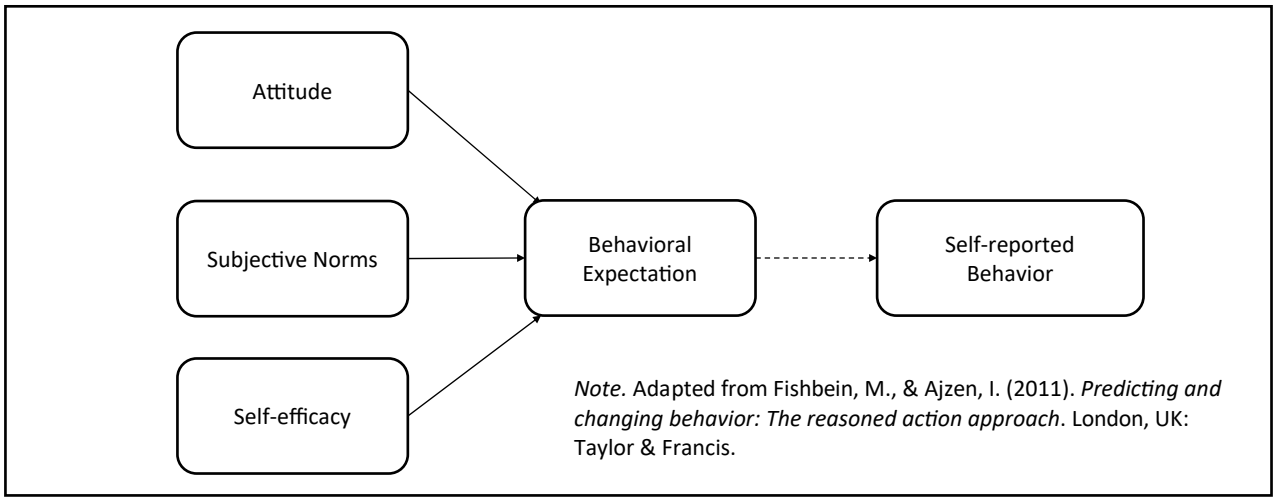
OBJECTIVES

The purpose of this study is to explore if employees' societal perceptions about food safety influence actual practices. Specifically, this study explored the influence of employees' attitudes, subjective norms, and self-efficacy on food safety behaviors. Specific research hypotheses are:

- H_1. There is a significant positive relationship between employees' attitudes towards food safety practices and behavioral expectations about food safety practices.
- H_2. There is a significant positive relationship between employees' subjective norms towards food safety practices and behavioral expectations about food safety practices.
- H_3. There is a significant positive relationship between employees' self-efficacy towards food safety practices and behavioral expectations about food safety practices.
- H_4. There is a significant positive relationship between employees' behavioral expectations towards food safety practices and self -reported food safety practices.

METHODS

For this study, a market company was paid to reach out to potential qualifying members within an existing company panel. Survey data were collected during a five-month period, allowing for waves of sampling collection to avoid common method biases.



Note. Adapted from Fishbein, M., & Ajzen, I. (2011). *Predicting and changing behavior: The reasoned action approach*. London, UK: Taylor & Francis.

Figure 1. The Behavioral Expectation Model Adapted from The TPB.

Sample and Procedures

Before data collection, the Institutional Review Board at the university approved the research protocol for the study. Participants were recruited online from an existing marketing company panel (http://prime-research.com), with geographic IP verification to ensure that the individual foodservice workers were currently working in the continental United States. Participants went through a set of pre-screening validation to ensure that they possessed appropriate qualifications. The recruitment process contained multiple phases of distribution in different months of 2018 to control for common method variance (Podsakoff et al., 2012).

Foodservice employees were surveyed to document their diversity and priorities based on the TPB behavioral constructs (Bock et al., 2005; Fishbein & Ajzen, 2011) and food safety knowledge (Roberts et al., 2008). The sample size was considered sufficient following guidelines of Fishbein and Ajzen (2014) and the statistical power analysis showed that the power was above 0.80.

Instruments

The questionnaire contained a total of 34 questions based on the three constructs of interest (Appendix 1). The survey constructs were measured using a five-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) on most of the questions. *Behavioral expectations to conduct food safety practices* were assessed using three questions adapted from Venkatesh et al. (2008). An example of the items was "*I expect to follow food safety practices at work on most days in this week*." Attitudes, subjective norms, and self-efficacy were measured using three questions adapted from Fishbein and Ajzen, (2011). Some examples of the items included: "*I think that practicing food safety over the next 12 weeks would be extremely good – extremely bad*", "*Most people who are important to me would approve-disapprove of me if I practice food safety regularly over the next 12 weeks",* and "*How much personal control do you feel you have over whether you follow food safety practices at work on most days in this week*?" The assessment of *self-reported behavior* was adapted from Roberts et al. (2008). One example of the questions includes: "*In the course of the past month, how often have you followed food safety practices at work?"* and the scale varied from 1 (*every day*) to 5 (*a few times*). Sample questions were shortened from a version of the original TPB questions (Ajzen, 1991).

Pilot Study

Before data collection, the instruments were screened by a panel (n = 4) of food safety researchers for face validity and content clarity. A pilot test was conducted with a convenient sample of 24 restaurant employees within a 50-mile radius of a Midwest university. With 23 valid responses collected during the fall of 2017, the suggestions were incorporated to improve question clarity and to avoid excessive time being spent on the response. The pilot study improved the prescreening of participants by enhancing three prescreening questions and four attention check questions (i.e. please check strongly agree) to test the online modules and help avoid fraudulent responses (i.e. participants check agree on all responses). Additional demographic questions were added to help document non-traditional foodservice venues like ice-cream/coffee shops, community delis, or catering.

Data Analysis

For the analysis, the Statistical Package for the Social Sciences (SPSS Version 21.0) was used. Frequencies, percentages, and multiple regression were used for data analysis. Cronbach's alpha was used to determine the construct reliability among the normative measurement scales (Trochim & Donnelly, 2005) . A threshold of 0.70 was used to demonstrate consistency.

RESULTS AND DISCUSSION

Demographic Information and Constructs

A total of 642 people viewed the survey, and a representative sample of 447 (69.6%) participants completed the survey. Participants' demographic information was collected, including age, gender, and education level, employment status, and years in the foodservice industry. Some additional questions related to the type of foodservice organizations, and whether participants were food safety certified, were also collected as background factors.

Survey Results

The descriptive profiles of survey participants are listed in Table 1. Data from the sample show that most of the participants were females, with a high school diploma, and employed full time. Overall, the results indicated that the employees' attitude (6.79 ± 0.047; Cronbach's α = 0.89), subjective norm (6.56 ± 0.4; Cronbach's α = 0.86), and self-efficacy (6.73 ± 0.8; Cronbach's α = 0.85) for food

Table 1. Characteristics of Participants (n = 447)

Demographics	*n*	*%*	*Employment information*	*n*	*%*
Gender			***Employment Status***		
Male	174	38.9	Full time	408	91.3
Female	273	61.1	Part time	39	8.7
Age			***Food Safety Certification***		
18 - 24	81	18.1	Yes, ServSafe certified	252	56.4
25 - 34	163	36.5	Yes, other certification	36	8.1
35 - 44	108	24.2	No, not certified	120	26.8
45 - 54	59	13.2	***Years in the Industry***		
55 - 64	33	7.4	Less than 1 year	6	1.4
65 - 74	3	0.7	1-5 years	139	32.2
75 or older	0	0	6-20 years	220	50.9
Education Level			More than 20 years	67	15.5
Some high school	25	5.6	***Type of Foodservice***		
High school graduate	138	30.9	Fast food	163	36.5
Associate degree	126	28.2	Fast casual	55	12.3
Bachelor's degree	46	10.3	Family style/ casual	111	24.8
Master's degree	69	15.4	Fine dining	50	11.2
Doctorate degree	3	0.7	Dining hall/ School	29	6.5
			Other, i.e., ice cream, deli	39	8.7

Note: Responses may not equal 100% due to non-response to some of the demographic questions.

safety practices were high. Most of the participants reported a high level of behavioral expectations (6.73 ± 0.08; Cronbach's α= 0.85) and self-reported behavioral practices (6.69 ± 0.04; Cronbach's α= 0.96). The average Cronbach's alpha of tau-equivalent reliability indicated that the psychometric tests recorded a higher level of internal consistency and reliability compared to scales from Fishbein and Ajzen (2011).

The regression analysis shows that attitude (F = 77.09, β = 0.42, p < 0.001, Hypothesis 1 supported), subjective norms (F = 77.09, β = 0.09, p < 0.01, Hypothesis 2 supported), and self-efficacy (F = 77.09, β = 0.35, p < 0.001, Hypothesis 3 supported) had a significant positive effect on behavioral expectation (Table 2). The overall model explained 35.5% of the variance in behavioral expectations towards food safety practices. Additional regression analysis shows behavioral expectation has a significant effect on self-reported food safety practices (F = 213.87, β = 0.85, p < 0.0001, Hypothesis 4 supported). The results suggest that behavioral expectation has a significant and positive relationship towards predicting self-reported behaviors. The data have supported establishing an extended food safety behavioral model, using behavioral expectations as the core constructs for the explanation of food safety behavior.

CONCLUSIONS AND APPLICATIONS

The purpose of this study was to explore employees' if societal perceptions about food safety influence actual practices, using an adapted TPB model. Data have supported that an extended food safety behavioral model, using behavioral expectation as the core construct, explains the self-reported food safety behavior. All the correlations have been tested, and the model explained about 35.5% of the total variances of behavioral expectations, which is higher than the previous meta-analysis of behavioral expectations (Webb & Sheeran, 2006). The data suggest that the behavioral expectation of food safety practices was established upon an appraisal of cognitive, attitudinal constructs, especially attitudes, subjective norms, and self-efficacy.

Recent research has examined differences between behavioral intention, expectation towards conformity, with evidence that behavioral expectation is a better predictor of actual behavior (Fishbein & Ajzen, 2011). Indeed, the results of this study have noted that behavioral expectation has a significant and positive relationship towards predicting self-reported food safety behaviors. Thus, the results of this study enrich the existing understanding of behavioral food safety practices by using and validating additional cognitive constructs within the foodservice environment.

More importantly, this study used behavioral expectations instead of behavioral intention (Fishbein & Ajzen, 2011), and extended the current understanding of the cognitive food safety practices by adopting concepts that help increase or induce behavioral conformity (Cialdini & Goldstein, 2004). Foodservice managers should note that, compared to behavioral intention, the behavioral expectation increases the probability that a food safety practice will be committed or repeated by increasing rewarding outcomes or reactions to it (also known as positive reinforcement, which can manifest as obtaining approval, money, food, or pleasant feelings). The behavioral expectation also takes into account the individual's behavioral enactment in the face of uncertainties. Thus, behavior is established by providing extrinsic rewards until the individual has instituted an explicit sense of control and become intrinsically satisfied when preforming the food safety practices.

The study model explained 35.5% of the variance in behavioral expectations towards food safety practices, which was considerably higher than the average documented by previous meta-analysis (Webb & Sheeran, 2006) in terms of explained variances. Comparing our findings with previous studies (Arendt et al., 2013; Song et al., 2010), our results indicate that it is crucial to foster an adequate attitude about food safety practices during training by creating food safety norms at work. Oftentimes, employees related to their peers and coworkers' behavior when considering their performance of food safety expectations. Self-efficacy control is also an indicator of how comfortable employees are with performing food safety practices, and the expectations of the practices. The results of the study have confirmed the critical attitudinal pathway structure when related to performing food safety practices or expected behaviors.

The continual improvement of food safety behavioral theories is important to the literature. Thus, the improved theory can help provide practical guidance and theoretical reliance to support foodservice managers and educators. Thus, the study involving new behavioral constructs, produces new knowledge related to the perception of explicit control and the ability to perform an intended behavior when facing uncertainties.

Limitations

Some limitations of this study include social desirability bias and self-reported data related to surveys. Participants can purposefully alter their responses in order to fit the investigator's purpose. Causality interpretation of the study results should proceed with prudence. However, the study used waves of the data collection process and limited access to one survey per IP address with geographic verification to help alleviate the problem.

Another concern of using a survey is that it might introduce demand characteristics bias (Nichols & Maner, 2008). Participants can purposely or unconsciously alter their answers to fit the researcher's survey instruction or when doing the survey away from their actual place of work. This threat was minimized by asking participants to consider their work practices in addition to addressing grand tour questions (Braun & Clarke, 2006).

Table 2. Multiple Regression Model for Predicting Behavioral Expectations

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	754.87	3	251.63	77.09	0.00
Residual	1370.89	420	3.26		
Total	2125.77	423			
			Standardized Coefficients		
Model			**Beta**	**t**	**Sig.**
(Constant)				3.80	0.000
Attitude			0.73	5.8-	0.000
Subjective norm			0.28	3.16	0.002
Self-efficacy			0.51	6.83	0.000

Note: Dependent Variable, Behavioral Intention; df =degree of freedom; F = F-statistic; Sig = Significance; T = T-statistic

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APPENDIX 1. QUESTIONNAIRE

Section 1: Basic screening

1. Are you currently a restaurant/foodservice employee? Yes___ No___
2. Are you currently living in one of the fifty states of the United States? Yes___ No___

Section 2: Behavioral expectation

Please answer each of the following questions by clicking the option to the statement. Please read each question carefully.

3. I expect to follow food safety practices at work in this week.
   - _Strongly disagree
   - _Disagree
   - _Somewhat disagree
   - _Neither
   - _Somewhat agree
   - _Agree
   - _Strongly agree
4. I will follow food safety practices at work in this week.\
   - _Strongly disagree
   - _Disagree
   - _Somewhat disagree
   - _Neither
   - _Somewhat agree
   - _Agree
   - _Strongly agree
5. I am likely to follow food safety practices at work in this week.
   - _Strongly disagree
   - _Disagree
   - _Somewhat disagree
   - _Neither
   - _Somewhat agree
   - _Agree
   - _Strongly agree
6. I am going to follow food safety practices at work in this week.
   - _Strongly disagree
   - _Disagree
   - _Somewhat disagree
   - _Neither
   - _Somewhat agree
   - _Agree
   - _Strongly agree

Section 3: Planned attitude

Please answer each of the following questions by clicking the option to the statement. Please read each question carefully.

7. I think that following food safety practices at work over the next 12 weeks would be ...
   - _extremely harmful
   - _harmful
   - _somewhat harmful
   - _neither
   - _somewhat beneficial
   - _beneficial
   - _extremely beneficial
8. I think that following food safety practices at work over the next 12 weeks would be ...
   - _extremely worthless
   - _worthless
   - _somewhat worthless
   - _neither
   - _somewhat valuable
   - _valuable
   - _extremely valuable
9. I think that following food safety practices at work over the next 12 weeks would be ...
   - _extremely bad
   - _bad
   - _somewhat bad
   - _neither
   - _somewhat good
   - _good
   - _extremely good

Section 4: Subjective norm

Please answer each of the following questions by clicking the option to the statement. Please read each question carefully.

10. Most people who are important to me would: approve me if I follow food safety practices at work regularly over the next 12 weeks.
    _Strongly disagree
    _Disagree
    _Somewhat disagree
    _Neither
    _Somewhat agree
    _Agree
    _Strongly agree
11. Most people who are important to me would: encourage me if I follow food safety practices at work regularly over the next 12 weeks.
    _Strongly disagree
    _Disagree
    _Somewhat disagree
    _Neither
    _Somewhat agree
    _Agree
    _Strongly agree
12. Most people who are important to me would: support me if I follow food safety practices at work over the next 12 weeks.
    _Strongly disagree
    _Disagree
    _Somewhat disagree
    _Neither
    _Somewhat agree
    _Agree
    _Strongly agree

Section 5: Self-efficacy control

13. If it were entirely up to me, I am confident that I would be able to follow food safety practices at work on most days of the week.
    _Strongly disagree
    _Disagree
    _Somewhat disagree
    _Neither
    _Somewhat agree
    _Agree
    _Strongly agree
14. How confident are you that you will be able to follow food safety practices at work on most days of the week?
    _very unsure
    _unsure
    _somewhat unsure
    _neither
    _somewhat sure
    _sure
    _very sure
15. I believe I have the ability to follow food safety practices at work on most days in this week.
    _I definitely do not
    _I do not
    _slightly do not
    _neither
    _slightly do
    _I do
    _I definitely do
16. To what extent do you see yourself as being capable of following food safety practices at work on most days in this week?
    _very unlikely
    _unlikely
    _somewhat unlikely
    _neither
    _somewhat likely
    _likely
    _very likely

Section 6: Self-reported behavior
In the course of the past month, how often have you followed food safety practices at work

17. In the course of the past month, how often have you followed food safety practices at work
    _Never
    _A few times
    _A number of times, but less than half
    _On about half the days
    _Most days
    _Almost everyday
    _Everyday

18. Please estimate how often you have followed food safety practices at work.
    _Never
    _A few times
    _A number of times, but less than half
    _On about half the days
    _Most days
    _Almost everyday
    _Everyday
19. On how many days in the course of the past month have you followed food safety practices at work.
    _Never
    _A few times
    _A number of times, but less than half
    _On about half the days
    _Most days
    _Almost everyday
    _Everyday

Section 7: Demographics (refer to Table 1 in the manuscript)

Research Contribution

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FOOD ALLERGY COMMUNICATION IN FULL-SERVICE RESTAURANTS: PERSPECTIVES OF CUSTOMERS WITH FOOD ALLERGIES

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ABSTRACT

This study explored food allergy, communication in full-service restaurants from the perspective of customers with food allergies. Results from 291 respondents demonstrated that customers with food allergies felt that they were mostly responsible for preventing food allergy reactions in restaurants and initiating communication with restaurant staff. Food allergy severity, reaction experience, and frequency of dining out predicted customers' frequency of communicating with restaurant staff about food allergies. Food allergy reactions in restaurants occurred occasionally, yet most customers did not notify servers about their condition. The findings highlighted the need for better communication between customers and restaurant staff for the prevention of food allergy reactions.

Keywords: Food allergy, communication, message, responsibility, strategies

INTRODUCTION

A food allergy is a chronic, complicated health condition in which the immune system attacks a food protein that is not supposed to be harmful to the human body (Mayo Clinic, 2019). It is estimated that about 32 million individuals suffer from food allergies in the United States (Food Allergy Research and Education [FARE], 2020; Gupta et al., 2019). This health condition is unequally distributed among populations of different age groups (Rous & Hunt, 2004). Nearly one in 17 children less than three years of age, one in 25 school-aged children, and one in 13 children under 18 years have food allergies, compared to 11% of adults (Crespo, James, Fernandez-Rodriguez, & Rodriguez, 2006; FARE, 2020; Gupta et al., 2018; Young, Munoz-Furlong, & Sicherer, 2009). A more recently published article that surveyed 40,433 American adults further showed that the food allergy prevalence among American adults could be as high as 10.8%. (Gupta et al., 2019).

Although the "Major Eight" allergens (i.e., eggs, fish, milk, peanuts, soy, shellfish, tree nuts, and wheat) account for 90% of food allergy reaction cases in the U.S. (Boyce et al., 2011; FARE, 2020), other less common food allergens, such as corn, beef, seeds, spices, herbs, and citrus also cause food allergy reactions (FARE, 2020a). Symptoms of food allergy reactions range from mild (e.g., skin irritation) to severe. In severe cases, anaphylactic shock can occur and lead to life-threatening symptoms, such as loss of consciousness, difficulty breathing, coma, and even death (Mayo Clinic, 2019). Statistics have shown that 100 to 200 deaths occur yearly due to severe allergic reactions to food (National Institute of Allergy and Infectious Diseases, 2017). Moreover, food allergy reactions are responsible for 200,000 emergency room visits annually (Clark, Espinola, Rudders, Banerji, & Camargo, 2011). Between 2004 and 2006, there was a total of 9,537 hospitalizations due to diagnosed food allergies among children and infants, compared to 4,135 cases between 2001 and 2003 (Centers for Disease Control and Prevention, 2008). Additionally, hospitalizations due to food allergies tripled between the late 1990s and the mid-2000s among children with food allergies (Branum & Lukacs, 2008).

An individual may suffer from a food allergy reaction after consuming food served at various locations, including commercial and non-commercial foodservice establishments, social event venues, and homes (Bock et al., 2007; Wanich, Weiss, Furlong, & Sicherer, 2008). However, customers with food allergies reported that food allergy reactions that occurred in restaurants (Furlong, DeSimone, & Sicherer, 2001; Knoblaugh et al., 2007; Kwon & Lee, 2012) were mostly caused by hidden allergens in food items (Anibarro, Seoane, & Mugica, 2007), cross-contact when foods were prepared in close proximity with food allergens, shared cooking utensils or equipment, or when food allergens were transferred via food preparers' hands (Eigenmann & Zamora, 2002; Kwon & Lee, 2012). In specific, cross-contacts with shared cooking equipment or service supplies were responsible for about 22% of reported food allergen exposures by customers with peanut and tree nut allergies (Furlong et al., 2001). Furthermore, the lack of awareness and food allergy training among foodservice employees, resulting in insufficient food allergy knowledge and improper food allergen handling practices, have also contributed to many food allergy incidents (Ajala et al., 2010; Bailey et al., 2014, Dupuis et al., 2016; Lee & Sozen, 2016; Lee & Sozen, 2018; Lefèvre et al., 2018; Radke et al., 2016; Soon, 2018; Wham & Sharma, 2014). At the federal level, the U.S. Food Code requires that restaurant managers or operators should be knowledgeable about major food allergens, cross-contact, and symptoms of allergic reactions. Further, employees should be properly trained about food allergies as related to their assigned duties (Food and Drug Administration, 2017).

An ineffective communication chain between customers with food allergies and servers and between servers and chefs may also lead to food allergy reactions in restaurants (Furlong et al., 2001; Kwon & Lee, 2012; Lee & Xu, 2015; Leftwich et al., 2011; Pratten & Towers, 2003; Soon, 2018). Customers with food allergies may experience an allergic reaction even after speaking to servers and chefs about their special needs and referring to the menu descriptions (Knoblaugh et al., 2007). While restaurant staff agreed that customers with food allergies should inform them about their food allergies (Lee & Sozen, 2016; Wen & Kwon, 2017; Soon, 2018), many customers with food allergies assumed that the foods were safe and did not notify restaurant employees about their special dietary needs (Mandabach et al., 2005).

Begen et al. (2018) found that written communication (e.g., restaurant websites, menus, and online recipes) was the customers' preferred method for food allergy communication, especially when customers with food allergies dined at an

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unfamiliar location. Verbal communication was used to seek further clarification regarding the food items. Consistent with the previous literature (Leftwich et al., 2011), Begen et al.'s study (2018) found that customers with food allergies were hesitant to communicate about their food allergies due to potential social embarrassment. On the contrary, restaurant employees felt that it is appropriate for customers with food allergies to request information about the ingredients and preparation methods of the food items (McAdams, Deng, & MacLaurin, 2018). This gap in perception and communication need to be further explored, as effective communication may be used as a tool to reduce food allergy reactions in the restaurants. Therefore, the purpose of this study was to explore food allergy communication in restaurants from the perspective of customers with food allergies. The specific objectives were to (1) examine the effectiveness of current food allergy messages on restaurant menus in encouraging customers to communicate with restaurant staff about their food allergies, (2) explore perceived responsibility regarding the prevention of food allergy reactions, the initiation of communication about food allergies, and the handling of food allergy requests from customers' perspectives, (3) identify factors that predict customers' frequency of communicating with restaurant staff about their food allergies, and (4) provide communication-related strategies to restaurateurs to prevent food allergy reactions in their operations.

METHODOLOGY

The research protocol was approved by the Institutional Review Board of two large universities in the U.S. prior to data collection. The population of this study was restaurant customers with food allergies in the U.S. The sample was recruited via Amazon Mechanical Turk (MTurk;) (https://www.mturk.com), where participants receive compensation through completing tasks (e.g., online surveys) for which they are qualified. MTurk is a widely-used data collection platform with the advantage of collecting data in a short period of time. Additionally, MTurk can reach a large pool of the target population and the reliability of results has been well established in previous studies (Paolacci et al., 2010; Rand, 2012; Shank, 2016). To ensure those study participants were customers with food allergies in the U.S., filtering questions were asked at the very beginning of the survey to screen out participants who do not have food allergies or do not currently live in the U.S. For example, participants were asked to "select the following that best describes you (please check all that apply)," and if "an adult with food allergies" was not selected, they would be led to the end of the survey.

Instrument Development

Questions on the online survey instrument were developed based on a review of the previous literature (Tonsor, Schroeder, & Pennings, 2009; Kwon & Lee, 2012; Lee & Xu, 2015; Wen & Kwon, 2016; 2017; 2019). This survey instrument consisted of four sections. Section one collected information about participants' demographics characteristics (e.g., age, gender, and educational background), the severity of their food allergy, frequency of dining out, previous food allergic reaction experiences after dining out in restaurants, frequency of communicating with restaurant staff about their food allergies, and their risk perceptions toward dining out with food allergies. The risk perception scale was adapted from the food safety risk perception scale developed by Tonsor, Schroeder, and Pennings (2009).

In section two, participants were asked to rate the effectiveness of current food allergy messages on restaurant menus and indicate their intention to communicate with restaurant staff about their food allergies after reading each message. The four most common food allergy messages identified by Wen and Kwon (2019) were used in this section. These four messages included, "*Please notify your server if anyone in your party has any food allergies," "Items on the menu may contain or come in contact with peanuts, shellfish, or other ingredients that may cause allergic reactions," "We try our best to accommodate food allergies but cannot guarantee that the food will be entirely free of allergens," and, "The restaurant has separate menus for customers with food allergies."*

Section three asked participants to rate the effectiveness of food allergy-related communication strategies in preventing food allergy reactions in restaurants. The list of communication strategies was adopted from previous research about food allergy risk communication in restaurants (Wen & Kwon, 2016; 2019).

In the last section, participants were asked to indicate who they perceived to be responsible for preventing food allergy reactions, initiating communication about food allergies, and handling allergen-free requests in restaurants. All the items in sections two, three, and four were measured using seven-point Likert scales. The survey instrument was reviewed and revised by two researchers with vast experience in conducting food allergy-related research prior to uploading it onto the Qualtrics survey platform.

Data Collection

The survey instrument was pilot tested (N=30) on MTurk to ensure the inter-item reliability of the survey questions. The results of the pilot test indicated that the Cronbach's alpha values for all constructs were above 0.7. For example, the Cronbach's alpha value for intention to communicate was above 0.9 for all messages, and the alpha value for communication strategies was 0.843. Therefore, no further revisions were made prior to the final data collection.

The Qualtrics survey link was distributed to the potential participants. Participants read the survey instructions and indicated their willingness to participate at the very beginning of the survey. Those who passed the filtering questions (i.e., participants who are 18 years old and older, have a food allergy, and have dined out at a restaurant in the past month) were eligible to participate in this study. Two attention-check questions were included in the survey to screen out those failing to pay attention or read the questions carefully while completing the survey. For instance, among the communication strategy questions, participants were instructed to select "Very Ineffective" as their response to one of the items. Those who did not read the questions and selected other options were automatically led to the end of the survey and were excluded from the final data collection. A total of 26 participants were screened out in the first attention check question, and five participants were screened out on the second attention check question. The survey was available on MTurk in summer 2018 for five days, and it was closed when the desired amount of responses was collected. Of 322 participants who were qualified and agreed to participate in this study, 291 responses were valid and used for data analyses.

Data Analyses

The data collected in this study was analyzed by using The Statistical Package for the Social Sciences (SPSS), Version 25.0. Descriptive statistics, such as means, frequencies, and standard deviations were calculated to summarize the data. Multiple linear regression analyses were conducted to identify the predictors of the dependent variables (e.g., customers' frequency of communicating with restaurant staff about food allergies). For the ranking questions, 3 points were given to those ranked as most responsible person, 2 points were given to those ranked as second most responsible person, while one point was given to those ranked as the third most responsible person.

Afterward, weighted averages were calculated, as presented in Table 3. Statistical significance was determined at p <0.05.

RESULTS AND DISCUSSION

Participants' Demographic Characteristics

A total of 291 valid and complete responses was collected via MTurk. The demographic characteristics of the participants were summarized in Table 1. The majority of respondents were male (n = 184; 63.23%), Caucasian (n = 181; 62.19%), and have Bachelor's degrees (n = 157; 53.95%). The ethnicity breakdown of participants is very close to the U.S. census estimation of 2019 (U.S. Census Bureau, 2019). Most participants self-reported that they were allergic to more than one food allergen. In terms of the severity of food allergies, most participants indicated that their food allergies range from mild (n = 127; 43.64%) to moderate (n = 138; 47.42%). The majority of the participants (n = 192; 66.0%) in this study reported dining out at least once a month. This finding was consistent with previous research that found that rather than avoid dining out altogether, customers with food allergies preferred to take preventive measures when they decide to dine out (Kwon, Sauer, Wen, Bisges, & Myers, 2013), partially because dining out with friends and family is one of the most important social needs of Americans (National Restaurant Association, 2019).

The results of this study further revealed that 69.26% (n = 203) of participants had experienced food allergy reactions after dining out in restaurants, which is quite concerning. The percentage of food allergy reactions reported here is much higher than the findings from previous studies that nearly 15% (Furlong et al., 2001), 33% (Wanich et al., 2008), and 50% (Kwon & Lee, 2012) of respondents had experienced food allergy reactions after eating in restaurants.

The Effectiveness of Food Allergy Messages on Menus

As reported by a survey of restaurant service staff (Wen & Kwon, 2019), four different types of food allergy messages were frequently included in restaurant menus. In this study, participants were asked to rate the effectiveness of these messages in encouraging customers to communicate with restaurant staff about their food allergies (Table 2). The results showed that the participants were most likely to communicate with restaurant staff about their food allergies when the restaurant indicated that they have a separate menu for customers with food allergies (5.27±1.48). When a one-way analysis of variance (ANOVA) analysis with repeated measures with a Greenhouse-Geisser correction was conducted, no significant differences were identified among the mean scores of the communication intentions of the four different types of messages (F (2.636, 764.315)=0.833, p=0.463). This finding implied that all messages could have the same level of effectiveness in encouraging customers to communicate about their food allergies with restaurant staff.

Perceived Responsibility

Participants were asked to rank the responsibility of different people in preventing food allergy reactions in restaurants based on their perception. The results of this study showed that customers with food allergies ranked themselves as the person most responsible in preventing food allergy reactions in restaurants, followed by the front -of-the-house service staff, managerial staff, and back-of-the-house staff (Table 3). This finding was consistent with previous studies that demonstrated customers with food allergies perceived themselves as the most responsible person in preventing food allergy reactions (Lee & Sozen, 2016; Mandabach et al., 2005; Wen & Kwon, 2017). However, front-of-the-house restaurant service staff perceived that the back-of-the-house kitchen staff were mostly responsible for preventing food allergic reactions (Wen & Kwon, 2017).

Table 1. Characteristics and Dining Behaviors of the Participants (N= 291)

Characteristics	N	%
Gender		
Male	184	63.23
Female	106	36.43
Prefer not to answer	1	0.34
Age		
19 - 30	217	74.57
31 - 40	64	21.99
41 - 69	10	3.44
Prefer not to answer	1	0.34
Race/Ethnicity		
White or Caucasian	181	62.19
Black or African	53	18.21
Asian/Asian	27	9.28
Hispanic/Latino	18	6.19
American Indian or Alaskan Native	8	2.75
Others	4	1.37
Educational background		
Less than high school	1	0.34
High school graduate or GED	26	8.93
Some college	47	16.15
Associate degree	18	6.19
Bachelor's degree	157	53.95
Graduate degree (Masters or Doctorate)	41	14.09
Professional degree	1	0.34
Participants' food allergies[a]		
Peanuts	85	29.21
Shellfish	83	28.52
Milk	77	26.46
Egg	72	24.74
Fish	70	24.05
Soy	50	17.18
Wheat	44	15.12
Tree nuts	43	14.78
Others	30	10.31
Severity of participants' food allergies		
Mild (i.e., rashes, swollen lips, non-life threatening)	127	43.64
Moderate (i.e., nausea, vomiting, nasal congestion, seldom life threatening)	138	47.42
Severe (i.e., require administration of epinephrine or immediate medical attention)	26	8.93
Frequency of dining out at full-service restaurants		
Never	9	3.09
Rarely (less than once in 6 months)	47	16.15
Infrequently (less than once a month)	43	14.78
Sometimes (1-2 times a month)	123	42.27
Often (3-4 times a month)	47	16.15
Frequently (2-3 times a week)	21	7.22
Very frequently (≥ 4 times a week)	1	0.34

[a] *Participants may be allergic to one or more common food allergens.*

More specifically, participants in this study believed that customers are most responsible for *initiating communication* with restaurant staff if the customer has food allergies (5.56±1.43). At the same time, chefs are most responsible for *handling requests* for allergen-free foods (5.38±1.36) (Table 4). These findings corroborated the results of

Table 2. Food Allergy Messages on Restaurant Menus

Food allergy message	Mean±SD
"Restaurants have separate menus for customers with food allergies."	5.27±1.48
"Please notify your server if anyone in your party has any food allergies."	5.20±1.40
"We try our best to accommodate food allergies but cannot guarantee that the food will be entirely free of allergens."	5.20±1.49
"Items on menu may contain or come in contact with peanuts, shellfish or other ingredients that may cause an allergic reaction."	5.16±1.52

Note. Perceived Effectiveness Scale, 1 = least effective; 7 = most effective.

previous studies that surveyed restaurant service staff in full-service restaurants which found customers are responsible for initiating communication (Lee & Sozen, 2016; Wen & Kwon, 2017). However, restaurant service staff perceived that they themselves should handle allergen-free food requests (Wen & Kwon, 2017), while customers in the current study believed that the chef should bear more responsibility when serving customers with food allergies in full-service restaurants. This result supported the finding of a previous study that analyzed online reviews related to customers' dining experiences with food allergies that the chef's presence in handling allergen-free requests may lead to customer satisfaction (Wen et al., 2019).

Communicating with Restaurant Staff about Food Allergies

In terms of communicating with restaurant staff, only 72 participants (24.74%) indicated that they always or frequently communicate about their food allergies when placing orders (Table 5). This is concerning, as 203 participants in this study (69.76%) reported that they had experienced food allergy reactions after dining out in restaurants.

Multiple linear regression analyses were conducted to identify factors that influence customers' frequency of communicating with restaurant staff about food allergies when placing orders in full-service restaurants (Table 6). The results indicated that three predictors (i.e., food allergy severity, food allergy reaction experience, and frequency of dining out) together explained 12.90% of the variance (R^2=0.129, F(8, 281)=5.199, p <0.001). The more severe customers' food allergies are, the more likely that they will communicate with restaurant staff about their food allergies (β=0.232, p <0.001). Consumers were more likely to communicate with restaurant staff if they had experienced a food allergy reaction after dining in restaurants (β=0.155, p =0.008). Besides, the more frequently they dined out, the more likely it became that customers would communicate with restaurant staff about their food allergies (β=0.1626, p =0.005).

Regarding the reasons why customers chose to not always communicate with restaurant staff about their food allergies, 63.57% (n=185) of the participants in this study indicated that they know which food items are safe to consume and 40.89% (n=119) said that they could ensure their own safety. Furthermore, 28.18% (n=82) of participants identified "restaurant employees do not seem to care or know about food allergies", 27.49% (n=80) considered their "food allergies are too mild to communicate", and 19.93% (n=58) indicated "it is too embarrassing to discuss their food allergies with the restaurant employees" as reasons that prevented them from communicating about their food allergies. Participants who chose the 'other' option also commented that they *"don't want to be perceived as a 'complainer,'"* and, *"it's too much of a hassle to have to ask what I can eat."* The results here reflected the findings from previous studies that customers did not discuss their food allergies because of the potential social embarrassment (Begen et al., 2018), or they thought the foods were safe (Sampson, Mendelson, & Rosen, 1992). The results together highlighted the need to eliminate concerns from customers and encourage them to communicate with restaurant staff about their food allergies to reduce the chance of food allergy reactions in restaurants.

Food Allergy Communication Strategies

The participants were asked to indicate their opinions on the effectiveness of various strategies in preventing food allergy reactions at restaurants (Table 7). The results showed that servers who ask customers about their special needs once they have been greeted was the most effective strategy (5.58±1.46), followed by customers being informed about uncommon ingredients in the menu items (5.40±1.47). The results of the ANOVA with repeated measures with a Greenhouse-Geisser correction indicated that there were significant differences among the effectiveness of different strategies (F(6.078, 0.045)=13.508, p <0.001).

In addition to the strategies listed in Table 7, participants were also asked to provide other strategies that would enhance food allergy communication in restaurants. A total of 15 participants suggested that the restaurant should include all of the ingredients on the menu so that customers can select foods without allergens. More specifically, the ingredient list should also include the type of oil used. On the menu, several participants (n=14) suggested that the major allergens present in each dish should be identified with a symbol or an icon next to the menu item. Restaurateurs may also use pictures of these food allergens to make it visually appealing to customers. In addition to a warning statement on the menus, some participants (n=7) suggested that restaurant websites could serve as an important communication tool to inform customers about ingredients included in menu items and to encourage customers to communicate with restaurant staff about their food allergies before visiting the restaurant or before placing orders. A few participants (n=3) also emphasized the importance of training about how to serve and prepare foods for customers with food allergies. Other strategies, such as calling the restaurant before visiting, reading online reviews ahead of time, and using a mobile app to filter menu items were also mentioned by the participants. Some of these strategies were consistent with the findings from previous research (Kwon & Lee, 2012).

Table 3. Perceived Responsibilities in Preventing Food Allergy Reactions in Full-service Restaurants (n=291)

Parties	Rank 1 (3 points)	Rank 2 (2 points)	Rank 3 (1 point)	Rank 4 (0 points)	Weighted average ranking
Customers with food allergies	184	32	35	35	2.24
Front-of-the-house service staff	37	105	86	60	1.40
Managerial staff	41	79	79	90	1.24
Back-of-the-house kitchen staff	34	73	85	95	1.14

Table 4. Perceived Responsibilities of Customers with Food Allergies and Full-service Restaurant Employees in Food Allergy Communication (n=291)

Items	Mean±SD
Initiate communication	
It is the **customer**'s responsibility to *initiate communication* with restaurant staff if the customer has food allergies.	5.56±1.43
It is the **restaurant server**'s responsibility to *initiate communication* with customers if the customer has food allergies.	4.53±1.70
Handle requests	
It is the **chef**'s responsibility to *handle requests* for allergen-free food.	5.38±1.36
It is the **restaurant server**'s responsibility to *handle requests* for allergen-free food.	5.31±1.45
It is the **restaurant manager**'s responsibility to *handle requests* for allergen-free food.	4.73±1.59

Note. Scale 1= Strongly Disagree and 7 = Strongly Agree

CONCLUSION AND IMPLICATIONS

Many Americans, adults and children, are affected by food allergies (FARE, 2020). Adults with food allergies and parents of children with food allergies have expressed their anxiety, worries, and fear when dining out (Begen et al., 2018; Kwon et al., 2013; Leftwich et al., 2011). They often need to negotiate and take positive risks as steps for food allergy management when dining out (Begen et al., 2018). To alleviate these issues, it is important for restaurateurs to understand the needs of customers with food allergies and be better prepared when serving this group of customers. Because miscommunication and lack of communication between customers with food allergies and restaurant staff were identified as two of the most critical triggers of food allergy reactions in restaurants, research is needed to identify communication-related issues in restaurants and identify ways to encourage communication about food allergies between these two parties. Previous studies were conducted among restaurateurs to understand their perceptions of food allergy communication (Wen & Kwon, 2016, 2017, 2019). However, research regarding customers with food allergies on this issue is limited.

To address this gap in the literature, this study was conducted to explore food allergy communication in restaurants from the perspectives of customers with food allergies. This study found no statistical difference in the effectiveness of various kinds of messages in encouraging customers to communicate with restaurant staff about their food allergies. Costumers with food allergies perceived that they should be mostly responsible to prevent food allergy reactions in restaurants, as well as to initiate communication about food allergies with restaurant staff. The results of the multiple regression analyses identified that food allergy severity, food allergy reaction experience, and the frequency of dining out were significant predictors of customers' frequency of communicating about food allergies with the restaurant staff. The majority of the participants indicated that they do not always notify the servers about their food allergies because they know which food items are safe to consume. Participants believed that the most effective strategy in food allergy communication is to have the servers ask them about their special needs once they have been greeted. The servers should also inform them about any uncommon ingredients in the menu items when an order is placed.

Practical Implications

In addition to addressing the gap in the literature by exploring customers' perspectives in food allergy communication in restaurants, the results of this study also provided restaurateurs, customers with food allergies, food allergy advocates, policy makers, and foodservice educators with important insights. Customers with food allergies, front-of-the-house staff, managers, and back-of-the-house staff seemed to have different roles in the prevention of food allergy reactions based on the findings of this study. For instance, customers with food allergies should be the ones that disclose their special dietary requests, while chefs are in charge of making sure the food allergens are handled appropriately in food preparation. These findings are useful in employee food allergy training as they aid the management in developing a guideline that outlines the specific roles played by each position in the restaurant operation, which collectively will better serve customers with food allergies. More specifically, front-of-the-house staff should be trained to inquire about customers' dietary restrictions to prevent potential social embarrassment, while customers need to announce/disclose their food allergies. Second, restaurant servers should inform customers about any changes to the ingredients when orders are taken, since some customers with food allergies rely on the ingredient list on the menu when ordering food, and they do not necessarily discuss their food allergies directly with the servers.

Data collected from the open-ended questions further indicated that the participants would like to see a symbol or an icon next to the food items that contain one of the Big 8 food allergens in the U.S.. Restaurateurs may adopt this strategy to make food items containing major food allergens more prominent and identifiable to customers with food allergies. In addition to printed menus in restaurants, customers with food allergies identified restaurant websites as important communication platforms. If feasible, restaurateurs may consider posting the complete list of ingredients of menu items online to allow customers to make more informed decisions when deciding where to dine.

Food allergy advocates and policy makers may use the results of this study to prepare food allergy service guidelines for the restaurant industry and food allergy community. In addition to educating restaurant staff about food allergies, it is critical to develop related guidelines for customers with food allergies regarding the prevention

Table 5. Frequency of Communicating with Full-service Restaurant Staff about Food Allergies

Frequency	N	%
Never	21	7.22
Rarely (in less than 10% of cases)	59	20.28
Occasionally (in about 30% of cases)	77	26.46
Sometimes (in about 50% of cases)	62	21.31
Frequently (in about 70% of cases)	39	13.40
Always (in about 90% of cases)	33	11.34

Table 6. Multiple Regression Analyses Predicting Customers' Frequency of Communicating Food Allergies (N=291)					
Variables	**B**	**S.E. B**	**β**	**t**	**Sig.**
Gender	-0.222	.0171	-0.075	-1.298	0.195
Education background	-0.059	0.069	-0.049	-0.852	0.395
Number of food allergens	-0.016	0.058	-0.016	-0.271	0.787
Severity of food allergies	0.519	0.129	0.232	4.017	0.000***
Food allergy reaction experience	0.483	0.181	0.155	2.668	0.008**
Frequency of eating out	0.189	0.068	0.162	2.798	0.005**
Risk perception	-0.014	0.104	-0.008	-0.137	0.891
Perceived responsibilities	0.029	0.059	0.029	0.490	0.624
R^2	0.129***				
Adjusted R^2	0.104				
F for changes in R^2	5.199				

Note. ***p < 0.001; **p < 0.01; *p < 0.05.

of food allergy reactions when dining out. Special attention should be paid to the communication process. On the other hand, policy makers may enforce the inclusion of food allergy messages on restaurant menus. Meanwhile, customers with food allergies should be encouraged to always notify restaurant staff of their food allergies when placing orders instead of making false assumptions. A study conducted by Redke et al. (2016) indicated that as much as 55% of the restaurants surveyed (n = 278) included a note on the menus, reminding the customers to inform the restaurant if they or other individuals in their party have food allergies. The current study found that less than 25% of participants reported that they always or frequently communicate about their food allergies when placing orders. This is alarming, as nearly one third of the fatalities related to food allergies were caused by foods from foodservice operations (Bock et al., 2007; Wanich et al., 2008). With the potential changes in food ingredients and cross-contact in food preparation areas, policy makers may support consumer education programs to remind customers to be proactive for the prevention of food allergy reactions.

As current students who majored in hospitality management are also current or future employees of the foodservice industry, it is important that topics about food allergy communication is included in education modules or curriculum. Even though food allergies is one of the topics in food safety courses (e.g., ServSafe® certification courses) in different types of hospitality and foodservice education programs, it is noteworthy that most teaching modules focus on knowledge about food allergens and awareness of the severity of food allergies, very few of them discussed the importance of communication. Therefore, foodservice educators should use these results and add content about food allergy communication to the teaching modules of food allergies in food safety courses. For example, content related to how to establish a consistent line of communication among there staff when taking allergen-free orders will be very useful for hospitality management students.

Limitations and Future Research

This study is not without limitations. As the data were collected through online surveys, those individuals who do not use computers or do not have access to the internet were excluded from taking this survey. Also, the participants were recruited through MTurk, a market research company. Because of this, this study only included customers with food allergies whose contact information already existed in the company's database. Future studies should recruit participants from other channels, including members of food allergy organizations and food allergy social media support groups. Furthermore, the participants may have been influenced by social desirability bias. Therefore, the results of this study should be interpreted with caution. Although the food allergy messages and communication strategies evaluated in the current study were adopted from previous research, they may not include all the effective messages. Future studies may use other research methods, such as experimental design, to examine the most effective ways of encouraging customers to communicate with restaurant staff about their food allergies. On the other hand, this study only explored the messages in full-service restaurants; future studies may expand the context to different types of foodservice operations. Finally, this study was conducted in the U.S., so the results may not be generalizable to restaurant operations in other countries. Future studies may explore food allergy communication in other countries and compare the results with those of the current study.

Table 7. Perceived Effectiveness of Food Allergy Communication Strategies in Full-service Restaurants	
Strategies	**(Mean±SD)**
The servers ask customers about special dietary needs as soon as they are greeted.	5.58±1.46
Customers are informed if there are uncommon ingredients included in menu items.	5.40±1.47
Customers are informed when the restaurant is unable to provide allergen-free meals.	5.33±1.56
A statement is included on the menu to advise customers to notify the server if anyone has a food allergy.	5.31±1.42
Restaurant staff informs customers about how allergen-free orders were prepared in the kitchen.	5.21±1.44
A written protocol is in place specifying the standard procedures for serving customers with food allergies.	5.05±1.47
A sign or poster is displayed in the dining area asking customers to notify the server if anyone has a food allergy.	5.00±1.46
The chef visits the table to provide assurance that the meal is allergen-free.	4.86±1.68

Note. Scale 1= Strongly Disagree and 7 = Strongly Agree

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