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## RESEARCH CONTRIBUTIONS:

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Research Contribution

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# HOSPITALITY UNDERGRADUATE PERCEPTIONS OF THEIR FUTURE JOB SECURITY AS AFFECTED BY INCREASED AUTOMATION AND THE RELATION TO EMOTIONAL INTELLIGENCE

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**ABSTRACT**
Greater automation in foodservice is forecasted to result in significant job displacement by 2030. To maintain their jobs, managers and employees alike will need to display proficiency in social skills associated with emotional intelligence. This study investigated hospitality management undergraduate students' perceptions of job insecurity linked with increasing automation as related to emotional intelligence. Students with both front and back of the house experience had greater emotional intelligence across three subscales compared to those with only front of the house or only back of the house experience. These results provide new evidence for preparing students for a foodservice career through jobs with variations in emotional labor.

**Keywords:** automation; job insecurity; emotional intelligence; hospitality; foodservice

## INTRODUCTION

The world is rapidly changing due to advances in technology centered around computer-based systems. The foodservice industry has responded to these changes through implementing automation in a variety of tasks, driven by higher labor costs coupled simultaneously with decreased technology costs (Tanyeri, 2018). It is projected that compared to 2015, by 2030 the foodservice industry could use automation technology to decrease operating costs by as much as 15% (Harris, Kimson, & Scwedel, 2018). Advances in artificial intelligence have enabled robots to flip burgers, make pizzas, and brew coffee, among other tasks (Tanyeri, 2018). Self-service kiosks and mobile app ordering have been implemented in major restaurant chains, automating a portion of jobs once held by traditional cashiers (Dunn, 2017).

There is very little research on the impact of automation on foodservice jobs, with much of what is known coming from industry sources. Based on a report out of the McKinsey Global Institute, 73% of tasks performed by foodservice and accommodation workers could be automated (Chui, Manyika, & Miremadi, 2016b). Research out of the University of Oxford suggests waiters, cashiers, and food preparation employees rank among the professions with the highest probability of being replaced by automation (Whitehouse & Gambrell, 2017). Job replacement would not take place overnight, but rather steadily, and by the year 2030, 35% of all of food preparation jobs and 5-14% of foodservice host jobs could be replaced by automation (Manyika et al., 2017). Greg Creed, CEO of Yum! Brands, predicts fast-food workers will be replaced by automation within the next ten years (Dunn, 2017). Another study suggest fast-food workers have a 92% chance of their jobs being replaced by automation (Frey & Osborne, 2017). This raises questions as to what kind of psychological impact these changes will have on foodservice workers.

Anecdotal reports indicate greater use of robotics can raise employee concerns over their own job security (Chao & Kozlowski, 1986). While employees who conduct low-skilled tasks characterized by predictable, physical labor (i.e. loading and unloading a dock) tend to exhibit greater concerns over job loss (Chao & Kozlowski, 1986; Vieitez, Carcia, & Rodriguez, 2001), this anxiety could likely spread to more high-skilled employees with technical training and managerial responsibilities given recent advances in technology (Huang & Rust, 2018). Job insecurity plays an important role in occupational health across a broad range of professions. A meta-analytic review suggests job insecurity is related to depression, anxiety, and low satisfaction in life; the review encompassed over 54,000 employees of varying skill levels from varying industries (Llosa, Menéndez-Espina, Agulló-Tomás, & Rodríguez-Suárez, 2018). One study of 148 automobile workers found a significant relationship between employees' perceptions of how secure their jobs were as affected by technological change and their psychological well-being, including anxiety and depression (Vieitez et al., 2001).

While some scenarios reflect a future with massive foodservice worker unemployment, both history and empirical evidence point to the contrary. According to David H. Autor, Professor of Economics at MIT, the employment to population ratio increased in the 20th century despite more ubiquitous automation (2015). This mirrors a report put out over 50 years ago by the Lyndon B. Johnson Administration which reached the conclusion that, rather than threatening employment, "technology eliminates jobs, not work" (Bowen, 1966). For example, with regards to foodservice, this might entail a burger-flipping robot replacing a line cook. However, the increased speed and efficiency of the robot might enable the restaurant to produce more food quicker and at a higher volume, thus necessitating hiring more human workers to fill orders and deliver them than before the robot was installed, a net increase in jobs.

Advanced technology can affect labor dynamics to where humans complement the technology or complete tasks less conducive to automation. For example, "cobots" are a type of helper robot that works alongside humans in manufacturing to increase labor productivity (Harris et al., 2018). One restaurant chain that utilized mobile phone apps and kiosks for digital ordering witnessed increased sales growth by multiple percentage points and a more efficient process, leading to higher volume orders and, ultimately, net job creation (Dunn, 2017). More human labor was reallocated to table service and deliveries. The bigger problem facing foodservice workers may not be job replacement, but rather displacing of lower skilled occupations to those requiring abilities more difficult to automate.

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Conservative estimates indicate 15% of all work activities across all industries worldwide could be displaced by 2030 as a result of automation (Manyika et al., 2017). Food preparation tasks in particular are routine and predictable, making them highly susceptible to automation (Brynjolfsson & McAfee, 2014); foodservice workers spend close to 50% of their time doing food preparation tasks that can be automated (Chui, Manyika, & Miremadi, 2016a). While foodservice hosts and prep cooks are likely to experience a net decrease in employment opportunities, combination food preparation and service worker jobs are expected to increase by nearly 550,000 by 2030 (Manyika et al., 2017). The work environment at a popular fast casual restaurant chain lends support to this forecast, as workers were diverted to less computer friendly tasks such as personal interactions with customers, assembling orders, and checking orders before delivery (Dunn, 2017). In-person interactions are some of the most difficult processes to computerize (Huang & Rust, 2018). For example, the job of foodservice general managers, which entails motivating and interacting with a myriad of personality types, has a low probability of being automated (Whitehouse & Gambrell, 2017).

Generally speaking, computers are very proficient in performing predictable, rule-based tasks such as brewing coffee or producing the same food product over and over (Brynjolfsson & McAfee, 2014). By contrast, human interactions involve unpredictability and randomness given the wide spectrum of emotions and scenarios involved. Research on artificial intelligence by Huang and Rust (2018) suggests jobs that involve empathetic intelligence associated with emotion recognition and regulation are least susceptible to automation. As the workplace becomes more digitized, "intuitive and empathetic skills will be the most lasting comparative advantages of human service" (Huang and Rust, 2018). Alongside large frame pattern recognition and the ability to ideate, humans have greater complex communication skills than computers (Brynjolfsson & McAfee, 2014).

Despite rapid increases in technological innovation, humans are likely to still have the upper hand in this area of social skills for some time in the future (Brynjolfsson & McAfee, 2014). By 2030, workers will spend an estimated 34-38% additional hours devoted to activities that entail social and emotional aptitudes compared to their current position descriptions (Manyika et al., 2017). Social skills are a key factor in employability and increased automation means employers can afford to be more selective in the hiring process (Hogan, Chamorro-Premuzic, & Kaiser, 2013). Both high and low skilled workers must improve their emotional intelligence (EI) to maintain their job security in foodservice while avoiding job displacement.

EI has been identified as "a set of interrelated abilities possessed by individuals to deal with emotions" (Wong & Law, 2002). This skillset encompasses "the ability to perceive accurately, appraise, and express emotion; the ability to access and/or generate feelings when they facilitate thought; the ability to understand emotion and emotional knowledge; and the ability to regulate emotions to promote emotional and intellectual growth" (Mayer & Salovey, 1997). A study of 187 foodservice workers found a positive relation between EI, job satisfaction, and job performance (Sy, Tram, & O'Hara, 2006). Executives in the automated foodservice industry who had higher EI had significantly higher stress management skills and coping abilities compared to those with lower EI (Cha, Cichy, & Kim, 2009). Work incivility can lead to emotional exhaustion, but a study of restaurant frontline service found the extent of this exhaustion was moderated by an employee's ability to regulate emotions (Cho, Bonn, Han, & Lee, 2016). EI carries ramifications for both the mental health of employees and the fiscal health of restaurants; in another study, higher profit performance, customer satisfaction, and employee satisfaction were associated with greater EI of general managers (Langhorn, 2004).

The components of EI, including self-emotion appraisal, others' emotional appraisal, use of emotion, and regulation of emotion, benefit workers by serving as a personal resource for coping with stressful situations (Cheng, Huang, Lee, & Ren, 2012). Low EI is associated with negative reactions to job insecurity (Jordan, Ashkanasy, & Hartel, 2002).Two studies involving nurses and real estate agents found negative correlations between job insecurity and EI (Cheng et al., 2012; Cheung, Gong, & Huang, 2016).

Within foodservice there is variation in the amount of customer interaction that would demand higher EI and skillsets less prone to automation. For example, a server may need to effectively regulate their emotions when conversing with unhappy customers. By contrast, a prep cook who spends their time relatively isolated in the kitchen, divorced from customer interaction, may not have these same demands for strong EI skills. This discrepancy in job requirements can be conceptualized as emotional labor, or "the extent to which the job requires the management of emotions to achieve positive job outcomes" (Wong & Law, 2002). Front of the house positions such as servers, hosts, and cashiers are considered high emotional labor jobs, while back of the house positions, such as cooks and dishwashers, are classified as low emotional labor jobs (Adelman, 1989). Emotional labor can moderate the effect EI has on employee attitudes, as high emotional labor jobs are associated with greater turnover intention and organizational commitment when EI is high (Wong & Law, 2002). Workers exposed to more emotionally demanding jobs may thus be able to cope more effectively with negative emotions.

The information from this study may shed light on the role of EI as a competitive advantage for students entering the foodservice industry, especially as society becomes more technology driven. EI skills are often lacking in school curriculum (Manyika et al., 2017), despite the fact that EI can be improved through training (Mattingly & Kraiger, 2018). One study found hospitality students were able to improve their EI over time when lessons with EI were incorporated as part of the instructional materials (Wolfe, 2017). Many education systems are, in some regards, outdated and based around teaching students skills required to excel in the economy of 19$^{th}$ century England (Brynjolfsson & McAfee, 2014). These skills, which include arithmetic, reading, writing, and memorizing facts, are fundamentally important and should be kept in the curriculum. However, forward planning school curriculums must emphasize social skills and EI to equip students for the workforce as projected automation usage increases. Several studies suggest EI training should be integrated into the curriculum for hospitality students in higher education (Scott-Halsell, Shumate, & Blum, 2007; Wolfe, Phillips, & Asperin, 2014).

The purpose of this study was to investigate hospitality management undergraduate perceptions of job stability as affected by the increasing prevalence of robotics and automation, along with indicators of emotional intelligence. Four study objectives were identified: 1.) Determine if future foodservice workers experience job insecurity due to robotics and automation in the hospitality industry 2.) Determine the relation between EI and job insecurity due to robotics and automation 3.) Determine the relationship between EI and type of foodservice experience 4.) Explore the need for more support for greater skill development in EI in hospitality management curriculum.

## MATERIALS AND METHODS

### Sample and Procedures

A convenience sample of hospitality management students were surveyed from two universities, one in the Northeast and one in the Midwest. Before data collection began, the Institutional Review Board from each university approved the study. An online survey platform was used to collect data.

### Materials

A seven-point Likert scale ranging from "1 = Strongly disagree" to "7 = Strongly agree" was used to measure all survey items. Perceptions of job insecurity rendered by increased robotics and automation in the hospitality industry consisted of ten questions adapted from Chao and Kozlowski (1986). This scale has been used previously to assesses the type of employees in a large-batch manufacturing plant (Chao & Kozlowski, 1986) and a factory that manufactured car components (Vieitez et al., 2001). To the best of the researchers' knowledge, hospitality student perceptions of job insecurity rendered by increased robotics and automation in the hospitality industry have yet to be evaluated. For the sake of brevity, this variable will be referred to as simply "perceptions of job insecurity."

EI was assessed with the scale developed by Wong and Law (2002), previously validated as a psychologically sound tool for measuring EI. This scale included self-emotion appraisal, others' emotion appraisal, use of emotion, and regulation of emotion, each of which consisted of four items each. Cronbach's alpha for this scale was 0.90 for the study sample of undergraduates. Additionally, demographic variables collected included age, gender, years of experience in hotels and foodservice, whether students anticipated working in the hospitality industry after graduation, and type of foodservice experience. Type of foodservice experience was categorized using common terminology used in foodservice operations and familiar to participants, including "Back of the house", "Front of the house", "Both", and "I don't have foodservice experience". Specific examples of front and back of the house jobs were given to participants: (a) Back of the house (i.e. chef, line cook, prep cook, preparing food); (b) Front of the house (i.e. waiting tables, serving food, cashier, host/hostess, busser).

## DATA ANALYSIS

Of the 131 student surveys completed, 31 were largely incomplete and excluded from further analysis, rendering 100 usable surveys. Data was analyzed with IBM SPSS Version 24. Descriptive statistics of the survey were calculated that included variable averages and standard deviations. Cronbach's alpha was used to determine the reliability of all survey variables. Mean job insecurity perceptions were compared to determine differences between students who did and did not anticipate working in hospitality after graduation. The normality assumption was confirmed by the Shapiro Wilk's test, but the Levene's test showed a lack of homogeneity of variance. Therefore, a Welch's F test was used (Jan & Shieh, 2014).

Correlation coefficients were calculated to determine the relationship between average perceptions of job insecurity and averages of the EI indicators. This analysis included all students whether they had hospitality experience or not. Because Shapiro-Wilk tests showed all EI variables violated the required assumption of normality, the correlation between survey variables was calculated using Spearman's rho.

To determine the effect of type of foodservice experience (excluding students without experience) on EI variables, a Welch's F test was used for self-emotion appraisal, because this variable showed a lack of normality. Others' emotional appraisal showed normality and homogeneity of variances, and a traditional one-way ANOVA was conducted. For use of emotion and regulation of emotion, a Welch's F test was used because preliminary analysis showed a lack of normality and homogeneity of variances. Post-hoc tests used included Tukey's HSD for others' emotional appraisal and the Games Howell test for the remaining EI variables.

## RESULTS

Demographic information can be found in Table 1. The proportion of male to female students reflects trends in higher education where the majority of students, as of the fall of 2018, are female (National Center for Education Statistics, n.d.). Close to three-fourths of the students surveyed had some level of foodservice experience. Slightly more than one third of respondents did not anticipate working in hospitality after graduation.

Table 2 contains descriptive information for the ten job insecurity survey items, including mean and standard deviation. On the seven-point Likert scale, students had slightly less than neutral perceptions (M = 3.94, SD = 1.31) of how robotics and automation would impact their job security in the hospitality industry (Table 3). Average perceptions of job insecurity based on where students anticipated working after graduation were as follows: (a) foodservice: M = 4.26, SD = 1.54; (b) hotels: M = 3.77, SD = 0.88; (c) both hotels and foodservice: M = 4.63, SD = 1.52; (d) neither hotels or foodservice: M = 3.63, SD = 1.27. There were no significant differences among the four groups, (*Welch's* $F[3,40.36] = 2.15$, $p = 0.109$). On average, students "Somewhat agree[d]" or "Agree[d]" they possessed EI as shown by the four indicators.

There was no correlation between student's perceptions of job insecurity and any of the EI indicators (Table 4). However, all EI indicators were significantly correlated with one another at $p < 0.001$. The greatest correlation observed was between self-emotion appraisal and regulation of emotion, ($r_s[98] = 0.71$, $p < 0.001$). The weakest correlation observed was between perceptions of job insecurity and regulation of emotion, ($r_s[100] = 0.003$, $p = 0.98$).

Main effects for type of foodservice experience were found with self-emotion appraisal (*Welch's* $F[2, 15.9] = 3.66$, $p = 0.049$), use of emotion (*Welch's* $F[2, 15.18] = 7.06$, $p = 0.007$), and regulation of

**Table 1: Demographics of Hospitality Students Surveyed (n =100)**

| Demographics (Mean ± SD) | | Frequency |
|---|---|---|
| Age (20 ± 2.09) | | |
| Gender | Male | 30 |
| | Female | 70 |
| Years of experience working in hotels (0.5 ± 0.99) | | |
| Years of experience working in foodservice (2.2 ± 2.1) | | |
| Type of foodservice experience | Back of the house | 7 |
| | Front of the house | 36 |
| | Both back and front of the house | 29 |
| | I don't have foodservice experience | 28 |
| Anticipated sector working in after graduation | Foodservice | 20 |
| | Hotels | 29 |
| | Hotels and foodservice | 15 |
| | I don't anticipate working in either foodservice or hotels | 36 |

**Table 2: Descriptive Statistics of Perceptions of Job Insecurity* as Affected by Robotics and Automation in Hospitality**

| | Mean ± SD |
|---|---|
| With more and more robots and automation everywhere, my chances of finding another job in the hospitality industry are small. | 3.75 ± 1.67 |
| Robots and other new forms of automation reduce my job security in the hospitality industry. | 3.97 ± 1.65 |
| My job skills in the hospitality industry are rapidly becoming obsolete. | 3.91 ± 1.44 |
| Robots & automation seriously threaten my future in the hospitality industry. | 3.87 ± 1.66 |
| The introduction of robots & automation will slowly displace jobs in the hospitality industry. | 4.35 ± 1.57 |
| I have only a small chance of keeping my job in the hospitality industry as technological advances increase. | 3.63 ± 1.60 |
| I fear that someday I will lose my job in the hospitality industry to robots & automation. | 3.75 ± 1.59 |
| Robots & automation will make me less useful as a worker in the hospitality industry. | 3.93 ± 1.71 |
| Increased automation and robots will mean less and less work for people in the hospitality industry. | 4.34 ± 1.55 |
| As a result of robots & automation in the workforce, I will have a smaller and smaller part in the hospitality industry. | 3.94 ± 1.55 |

*Perceptions of job insecurity were measured on a 7-point Likert scale ranging from "1 = Strongly disagree" to "7 = Strongly agree".

emotion (*Welch's F*[2, 16.06] = 4.41, $p$ = 0.03). There was no main effect of type of foodservice experience on others' emotion appraisal (*F*[2, 69] = 0.701, $p$ = 0.50).

Self-emotion appraisal was higher for students who had both front and back of the house experience in foodservice (M = 5.97, SD = 0.67) than students that had only front of the house experience (M = 5.47, SD = 0.79) (Table 5). Use of emotion was higher for students with both front and back of the house experience in foodservice (M = 6.24, SD = 0.47) than only front of the house experience (M = 5.69, SD = 0.87) (Table 5). Regulation of emotion was higher for students with both front and back of the house experience in foodservice (M = 5.89, SD = 0.57) than only front of the house experience (M = 5.39, SD = 1.05) (Table 5).

A post-hoc analysis was conducted to determine if EI was related to years of foodservice experience. No significant correlations were found between years of foodservice experience and self-emotion appraisal, use of emotion, and regulation of emotion. This suggests that type of foodservice experience may explain EI better than time spent working in the industry.

**DISCUSSION**

The present study was designed to gauge current perceptions of job insecurity rendered by greater automation and robotics in hospitality along with emotional intelligence indicators. Based on respondents' perceptions of job insecurity, students had mixed reactions as to whether their jobs in hospitality would be affected by more robotics and automation. Students, on average, had slightly less than neutral perceptions. Perceptions had no relation to what type of jobs they planned to pursue upon completion of their undergraduate degree. Prior research in a manufacturing plant has shown perceptions of job insecurity differ between high and low skill workers, with higher skill workers perceiving robots as having a positive impact on their jobs (Chao & Kozlowski, 1986). Another study of employees in a car component factory found similar results, employees with a higher level of job qualification and greater levels of education had main effects on perceptions of job security (Vieitez et al., 2001). The present study did not assess students using any metric involving skill level and including this may have shed additional insight on perceptions.

The overall neutral perceptions of job insecurity, even among students who intended to work in foodservice after completing their degree, shows ambivalence to estimates of how likely hospitality jobs will be automated in the coming years (Chui et al., 2016b; Frey & Osborne, 2017; Manyika et al., 2017; Whitehouse & Gambrell, 2017). Chefs and general managers, professions that generally involve high levels of creativity and EI, have a low probability of being replaced by automation (Whitehouse & Gambrell, 2017). Among jobs unique to foodservice not yet mentioned, bartenders, dishwashers, and housekeeping workers have a very high chance of being automated (Whitehouse & Gambrell, 2017). This was a base-line study where the students expressed their current understanding without the benefit of reading current literature detailing the types of automation that will impact the industry. Future studies should determine whether perceptions of job insecurity are affected by exposure to foodservice industry trends in automation use.

In contrast to prior research, the present study found no negative correlation between perceptions of job insecurity and EI indicators. Students reported, on average, greater EI compared to perceptions of job insecurity. EI can reflect an individual's ability to cope with stressful circumstances and is negatively correlated with psychological strain (Cheung et al., 2016). The slightly higher EI observed in the students and increased capacity to manage undesirable perceptions of job insecurity may therefore explain why no negative correlations were found.

There was a main effect of type of foodservice experience on EI indicators that included self-emotion appraisal, use of emotion, and regulation of emotion. These three variables were significantly higher for students who had both back and front of the house experience compared to just front of the house experience. This could be attributed to several factors. Students who have worked as both a line cook (back of the house) and a server (front of the house), for example, may have been exposed to more unique job scenarios that led to greater increases in their abilities to identify emotions within themselves, use emotions to their advantage, and cope with negative emotions. Higher EI is associated with greater adaptability to situational demands (Salovey, Mayer, Goldman, Turvey, & Palfai, 1995). Alternatively, as opposed to more diverse work experiences leading to higher EI, students with already high EI may be more likely

**Table 3: Descriptive Statistics and Reliability of Survey Variables**

| | Mean ± SD | Cronbach's α |
|---|---|---|
| Perception of job insecurity | 3.94 ± 1.31 | .944 |
| Self-emotion appraisal | 5.66 ± 0.821 | .771 |
| Others' emotion appraisal | 5.62 ± 0.753 | .667 |
| Use of emotion | 5.85 ± 0.841 | .783 |
| Regulation of emotion | 5.56 ± 0.893 | .752 |

**Table 4: Correlation Matrix of Survey Variables**

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Perception of job insecurity | - | | | | |
| Self-emotion appraisal | .059 | - | | | |
| Others' emotion appraisal | .189 | .634* | - | | |
| Use of emotion | .066 | .59* | .551* | - | |
| Regulation of emotion | .003 | .71* | .506* | .632* | - |

*Correlation is significant at the 0.001 level (2-tailed).

**Table 5: Post Hoc Results for Self-emotion Appraisal by Type of Foodservice Experience, for Use of Emotion by Type of Foodservice Experience, and for Regulation of Emotion by Type of Foodservice Experience**

***Mean Differences (Xi – Xj)***
***(Effect Sizes are indicated in parentheses)***

| | Self-emotion appraisal | | | | Use of emotion | | | | Regulation of emotion | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Mean** | **1** | **2** | **3** | **Mean** | **1** | **2** | **3** | **Mean** | **1** | **2** | **3** |
| Back of the house | 5.54 | -- | | | 5.18 | -- | | | 5.11 | -- | | |
| Front of the house | 5.47 | 0.063 (0.069) | -- | | 5.69 | -0.516 (-0.506) | -- | | 5.39 | -0.281 (-0.788) | -- | |
| Both back and front of the house | 5.97 | -0.43 (-0.493) | *-0.493** *(-0.566)* | -- | 6.24 | -1.06 (-1.21) | - 0.547** (-0.783) | -- | 5.89 | -0.781 (-1.02) | -0.499* (-0.59) | -- |

*$p$<0.05
**$p$<0.01

to seek out and engage in a broader range of foodservice jobs. Additionally, it should be noted that the back of the house sample was smaller than the front of house and possibly why there was no main effect for the back of the house respondents.

**CONCLUSIONS AND APPLICATIONS**

The findings support the need to encourage hospitality students to work in different foodservice jobs that necessitate varying degrees of emotional labor and that this may be independent of time spent working in foodservice. Diverse working environments also give students the opportunity to practice complex communication skills, an important asset for maintaining job security and potentially minimizing job displacement as automation becomes more prevalent in the years to come (Brynjolfsson & McAfee, 2014).

Prior research has shown hospitality professionals score higher than hospitality undergraduates on EI indicators pertaining to problem solving (Wolfe et al., 2014). This evidence, in combination with the present study, highlights how real-world experiences in foodservice could provide opportunities to develop EI outside of the classroom. EI training incorporated in higher education curriculum could be complemented by giving students the opportunity to apply that information through internships or work-study programs in foodservice.

This study had several limitations. Whether the undergraduates had experience with EI training as part of their schooling was not measured, and this variable may have shed more insight on the EI values observed. Others' emotion appraisal had a Cronbach's alpha value of .667 that is only slightly below what is considered satisfactory for a subscale (Nunnally, 1978). Deleting items from this subscale would result in no improvements in reliability. Results that relate to this variable should be interpreted with caution, as this sample may not have a complete understanding of this concept. However, the EI scale with its four variables was reliable overall with a Cronbach's alpha value of .90.

Concerning the sample of students, seven undergraduates had only back of the house experience, and surveying more students that fit this category would aid in substantiating the study findings that relate to the effect of type of foodservice experience on EI indicators. Nevertheless, the validity of the results was supported in that homogeneity of variance was tested, and either a classic one-way ANOVA or a Welch's F test was used based on whether this assumption was violated.

The study was cross-sectional in design. Future work could utilize a longitudinal study to address how student perceptions of job insecurity change over the duration of their schooling. A portion of the students surveyed are likely to enter management positions in foodservice, which have a low forecasted probability of being automated. Future research should study perceptions of job insecurity of workers who have a higher probability of having their jobs displaced by automation and robotics, such as prep cooks and cashiers. This would be useful from an occupational health standpoint to gauge the psychological well-being of employees and provide EI training to help cope with potential changes in labor dynamics.

Lastly, this study relied on self-reports of EI, as opposed to assessments from other people and ability-based measures. Self-reported measures of EI can be prone to response bias, which can inflate scores compared to peer reports of EI (Keefer, 2015; Lievens, Klehe, & Libbrecht, 2011). This does not, however, undermine the role that personal beliefs play in influencing behavior. Self-reports of EI provide insight into how individuals adapt and cope with adverse circumstances or perceptions, which can then shape observable behavior (Keefer, 2015). It should be noted how self-report measures of EI may measure a distinct set of abilities and are thus not a direct replacement for other forms of EI assessment (Keefer, 2015). Future research should explore other-reports and ability-based measures of EI to expand our understanding of how EI relates to perceptions of job insecurity and type of foodservice experience.

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Research Contribution

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# A CONTENT ANALYSIS OF FOOD SAFETY POLICIES AND PROCEDURES FOR STUDENT-LED FOOD EVENTS AT COLLEGES AND UNIVERSITIES IN THE UNITED STATES

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**ABSTRACT**
The purpose of this study was to identify similarities and differences in food safety policies and procedures for student-led food events in colleges and universities (CUs). Thirty-seven websites were analyzed using content analysis; food safety policies and gaps in existing food safety policies and procedures for student-led food events were identified. A lack of information about food safety policies and procedures for student-led food events was identified. The results of this study will be beneficial for improving food safety information on CUs' websites and assisting students who prepare for food safety compliance during student-led food events.

**Keywords:** content analysis, food safety, policies and procedures, student-led food events

## INTRODUCTION

Annually, 9.4 million foodborne illnesses (FBIs), caused by 31 identified pathogens, result in 1,351 deaths and 55,961 hospitalizations in the United States (U.S.) (Scallan et al., 2011). Even though FBI outbreaks estimated by Scallan et al. (2011) were different from the report by the Centers for Diesease Control and Prevention (2013) that accounted for 1,526 FBI outbreaks during 2009 and 2010, FBIs still represent a major public health issue in the U.S.

Ensuring food safety at college and universities (CUs) is important because food is served to many customers on campus and therefore, contaminated food could affect a large number of people. With respect to food safety on campus, many researchers have found that a lack of food safety awareness among college students is a factor in non-compliance with proper food safety practices (Byrd-Bredbenner, Maurer, Wheatley, Cottone, & Clancy, 2007; Green & Knechtges, 2015; Hertzman, Stefanelli, & Farrish, 2008; McArthur, Holbert, & Forsythe, 2007; Sanlier, 2009). College students' appear to have both insufficient food safety knowledge as well as poor safe food handling practices (Egan et al., 2007; Hertzman, Kitterlin, Farrish, & Stefanelli, 2011; Sanier & Konaklioglu, 2012; Stein, Dirks, & Quinlan, 2010; Yarrow, Remig, & Higgins, 2009). Factors contributing to unsafe food handling practices among college students include a lack of cooking experience (Morrone & Rathbun, 2003), poor personal hygiene (Byrd-Bredbenner et al., 2007), and lack of self-confidence about cooking (Byrd-Bredbenner, Maurer, Wheatley, Schaffner, Bruhn, & Blalock, 2007).

Even though some factors contributing to unsafe food handling practices have been identified, college students' food handling practices could likely be improved by establishing a positive food safety culture. According to previous studies, such a culture would encourage improvement of food handling practices (Taylor, 2011; Yiannas, 2009). This study adopted the concept of organizational culture, defined as a collaborative awareness of an organization with respect to policies, procedures, and practices (Schein, 1985). As a part of organizational culture, food safety culture could play a crucial role in providing proper guidelines for food safety interventions (Yiannas, 2009). Thereby, many CUs had established food safety policies and procedures to both control college students' food handling practices and address FBI incidences and/or allegations.

### Food Safety Policies and Procedures at CUs

This study focused on food safety policies and procedures for student-led food events at CUs. Because there is no widely known definition for describing a student-led food event, it can be seen that some CUs presented an individual scope toward student-led food events, and varying definitions and scope of food events may result in the establishment of differing food safety requirements for student-led food events. Thereby, researchers of this study defined a student-led food event as any event organized by a registered student organization where food will be prepared and/or provided to consumers either on or off campus.

Varying levels of food safety policies and procedures may exist in CUs, and some delegate the management of food safety at student-led events to entities such as Environmental Health and Safety and Risk Management (University of California-San Francisco, 2017; Texas State University, n.d.; University of Minnesota, 2015). Some CUs have food safety policies and procedures in place to address food safety issues during student-led food events while others do not. For example, Texas A&M University (Texas A&M University Standard Administrative Procedure, 2004), the University of Massachusetts (University of Massachusetts Environmental Health and Safety, n.d.), and Iowa State University (Iowa State University Office of Risk Management, 2016) all have both food safety training and requirements for food-handler permits in place for student-led food events, while Auburn University (n.d.) and California State Polytechnic University at Pomona (n.d.) appear to have only food permits in place, and the University of Alabama (n.d.) has both a food handler's permit and food safety inspections in place for such events. Because the Internet is a useful information source for researchers and practitioners, various ways of administering food safety policies and procedures for student-led food events at CUs could be analyzed by investigating institution websites.

Student-led food events are held at many CUs in the U.S., but food safety policies and procedures for student-led food events are not always in place (Kang & Rajagopal, unpublished). Moreover, because no known studies have utilized content analysis to explore food safety policies and procedures for student-led food events in CUs, the purpose of this study was to identify both similarities and differences in food safety policies and procedures for student-led food events in U.S. CUs. The study aimed to answer the following research questions: 1) What are the common food safety policies and procedures that create food safety cultures for student-led food

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events in CUs, and 2) What are the differences in food safety policies and procedures that create food safety culture for CU student-led food events?

## METHODS

### Sample Selection

The sample was obtained from lists of registered higher education institutions provided by the United States Department of Agriculture National Institute of Food Agriculture (2016) and the Association of Public and Land-Grant Universities (n.d.). Based on a prior questionnaire (Kang & Rajagopal, unpublished), 75 valid questionnaires were returned from 231 CUs in the U.S. (i.e., a 32.5% response rate). Among the 75 participants, 55 (73.3%) reported they allowed food to be prepared and/or served to the public during student-led food events, while 20 participants (26.7%) reported they do not (Table 1). Among 55 participants that allowed student-led food events, 40 participants indicated that their institutions had established food safety policies and procedures for student-led food events at unit, department, and/or college levels. This study extensively analyzed food safety policies and procedures (e.g., environmental health and safety, risk management, event administration, student organization) from the websites of these 40 CUs that had established food safety policies and procedures for student-led food events in place.

### Data Collection

The website of each CU in the sample (n=40) was examined by performing content analysis to identify commonly used terms and content gaps associated with food safety policies and procedures. The investigation showed that 37 out of 40 participating CUs provided the contents of food safety policies and procedures on their websites. Three CUs that provided no food safety policies on their websites were sent emails requesting them to share their food safety policies and procedures for student-led food events with the researchers of this study.

Website information related to food safety policies and procedures for student-led food events were procured reflecting a variety of data types, including textual, graphical, and documentation formats (e.g., food handler's permit form, food-event checklist chart, temporary handwashing station diagram). The food safety information on CUs' websites was copied and transferred to Microsoft® Word, and separate documents were also copied and transferred to Microsoft® Word. CU data associated with food safety policies and procedures were saved separately in a file and analyzed by qualitative data-analysis software (MAXQDA Version 13); graphical data was directly imported to qualitative data-analysis software (MAXQDA Version 13).

### Content Analysis

Content analysis is "a research technique for the objective, systematic and quantitative description of the manifest content of communication" (Berelson, 1952, p. 18). Content analysis is known as a method for supporting empirical research claims because coding schemes can be explained by quantifying manifest coding units as an objective method of analysis (Bryman, 2012). Data can be divided into quantifiable units to ensure that coding units' frequencies can be counted when identifying data demonstrated in manifest content (Bryman, 2012; Miles, Huberma, & Saldana, 2014). Content analysis is a useful tool for investigating trends and patterns in documents (Miles, Huberman, & Saldana, 2014). For example, Stemler and Bebell (1998) conducted a content analysis of mission statements of K-12 schools to examine whether academic test scores of such institutions align with their mission statements. The researchers of the present study chose content analysis because it is a useful tool for analyzing unobtrusive data (Lune & Berg, 2017).

### Data Analysis

Data associated with food safety policies and procedures were directly copied from CU websites. Computer-assisted qualitative data analysis software, MAXQDA Version 13, was used to perform content analysis. MAXQDA is a professional software used for qualitative data analysis of textual, graphical, audio, and video data (Franzosi, Doyle, McClelland, Rankin, & Vicari, 2013).

After identifying the coding schemes, the coding units identified were clustered to discover emergent themes. Prior to identifying themes, the identified coding schemes were classified by using the five major FBI risk factors identified by United States Food and Drug Administration (FDA) (2009) as *a priori* sub-categories of *food safety risk*: (a) contaminated equipment, (b) food from unsafe sources, (c) inadequate cooking, (d) improper food handling, and (e) poor personal hygiene (Table 2). Because coding schemes for this study were identified by a single coder, *a priori* subcategories identified by FDA (2009) were employed to overcome limitations of inter-coder reliability or inter-coder agreement of emergent coding units from multiple coders. Accordingly, an index of coder agreement such as Cohen's kappa (Cohen, 1960) was not computed. Despite a limitation of a single coder, Campbell, Quincy, Osserman, and Pedersen (2013) stated coding schemes identified by a single coder would be useful to reduce coding errors. For this study, coding schemes identified by a single coder were reviewed by other researchers of this study to agree with emergent coding schemes. Similar to what Lune and Berg (2017) described, researchers of this study employed the FDA's five major FBI risk factors as subcategories to classify the identified coding schemes.

Individually-identified keywords and frequent phrases were then classified into each coding scheme. To analyze the identified coding schemes by content analysis, the research method conducted by Ambrozic, Jevsnik, and Raspor (2010) was adopted to apply consistent criteria for selection of coding schemes from commonly mentioned words on CUs' websites. Graphical data were also classified into each coding scheme (Figure 1).

A code matrix tool utilizing the MAXQDA software generated an extensive chart that presented word frequency counts, and a code co-

**Table 1: Food Safety Policies and Procedures for Student-led Food Events at CUs (n=42-75)**

| Current food safety procedures for student-led food events | n | (%) |
|---|---|---|
| Permission to prepare and/or serve food to the public during student-led food events | | |
| Yes | 55 | (73.3) |
| No | 20 | (26.7) |
| Existence of food safety policies and procedures for student-led food events at the unit/college/department level[a] | | |
| Yes | 40 | (75.5) |
| No | 7 | (13.2) |
| I don't know | 6 | (11.3) |

[a] Total response is less than 75 due to unanswered question.

**Table 2: Commonly Mentioned Words associated with Student-led Food Events (n=37)**

| Theme | Subcategory | Coding Scheme | Commonly mentioned words |
|---|---|---|---|
| Food Safety Risk | Contaminated equipment | Contamination | Cross-contamination; separate serving utensils |
| | Food from unsafe sources | Vendor | Registered vendor; licensed source; reliable supplier; authorized vendor; contracted vendor; approved source; no home canned food |
| | Inadequate cooking | TCS[a] | Rapid bacterial growth; high protein food; poultry; egg; pork; beef; raw seed sprouts; cooked rice; potatoes; beans; leftover foods; perishable foods; temperature control; custards; foods containing dairy products; proper thawing; proper cooling; discard, four hours; serving time not to exceed one hour |
| | | Non-TCS[a] | Bake sales; baked goods; dry food; candies; cakes without cream; cookies |
| | Improper food handling | Food Safety Practices | Hair restraint; sanitize the area; food safety knowledge; protect food; no jewelry; clean cloths |
| | | Use a thermometer | Check internal temperature; minimum internal temperature |
| | Poor personal hygiene | Handwashing | 20 seconds; temporary handwashing facilities; soap; hot water; paper towel |
| | | Gloves | Disposable food handling gloves; Ready-to-eat food; food safe (non-latex) gloves |
| Food Safety Policies | Policies | Guidelines | Food safety regulations; accordance with the state; campus policies |
| | | Event-scope | Private event; public event; food event; registered student organization |
| | Food handling permit | Food Waiver Form | Food services waiver; waiver of policy; third-party vendor-donated food and drink; exemption from permit |
| | | Event Application Form | Temporary event; event authorization form |
| | | Environmental Health and Safety | Food handler permit; permitted; a temporary food facility; temporary permit; temporary food facility permit; Environmental Health and Safety approval |
| | | Local Health | Food handling permit from the Local Health Department; Local Health Department Sanitarian; County Health Department Requirements |
| | Inspection | Inspection | Inspection; monitor; observation; conduct routine inspections; maintain sanitation inspection |
| | Education | Training | Train volunteers; Food safety training; online food safety training |
| | Sanitation | Dishwashing | A three-compartment sink; 1 tablespoon chlorine bleach in 1-gallon warm water; using plastic cutting boards-not wood; Utensils and dishes should be air dried |
| | | Waste Handling | Durable and lined garbage containers; liquid waste into a sanitary sewer or collect in a portable container; do not put discarded grease in the sanitary sewer |
| Epidemiology | FBI | FBI | Common symptoms; diarrhea; abdominal cramping; fever; a headache; vomiting; stools |
| | FBI-source | FBI-Source | Bacteria; parasites; viruses; dirty hands; harmful microorganisms |
| | FBI incident/allegation procedures | Checklist | Report any incidents such as foodborne illness to the Safety/Risk Manager; the Director of Health Services and the Vice President for Student Affairs; foodborne illness diagnosis; medical diagnosis within three months |
| | Allergy | Food Allergy | Nuts; Peanut; Egg; Milk; Wheat; Soy; fish; shellfish; allergic reaction; eliminate the use of latex gloves |

[a] According to the amendment of FDA Food Code 2013, "potentially hazardous food/TCS" was replaced to "TCS" as a universal term.

occurrence model was also employed to identify relationships between codes of risk factors of FBIs and food safety policies for student-led food events in CUs. Word frequency counts method was used to identify the most frequent words associated with food safety policies and procedures because word frequency count method is recognized as the most appropriate approach for performing content analysis (Lune & Berg, 2017).

## RESULTS AND DISCUSSION

### Categories and Coding Units

Data from CUs' websites were analyzed to identify coding schemes and themes. Table 2 presents the three identified themes associated with student-led food events at CUs: (1) "*food safety risk*", (2) "*food safety policies*", and (3) "*epidemiology.*" The theme of "*food safety risk*" consisted of the five major risk factors of FBIs (FDA, 2009), namely, "*contaminated equipment,*" "*food from unsafe sources,*" "*inadequate cooking,*" "*improper food handling,*" and "*poor personal hygiene*". Each subcategory reflected coding schemes using commonly mentioned words associated with the theme. For example, commonly mentioned words related to "*food from unsafe sources*" emerged from "*registered vendor,*" "*licensed source,*" "*reliable supplier,*" "*authorized vendor,*" "*contracted vendor,*" "*approved source,*" and "*no home canned food.*" Similar to the method used in exploring commonly mentioned words; "*inadequate cooking*" contained four coding units: "*Time/Temperature Control for Safety Food* (*TCS*)," "*non-TCS,*" "*perishable food,*" and "*time and temperature*

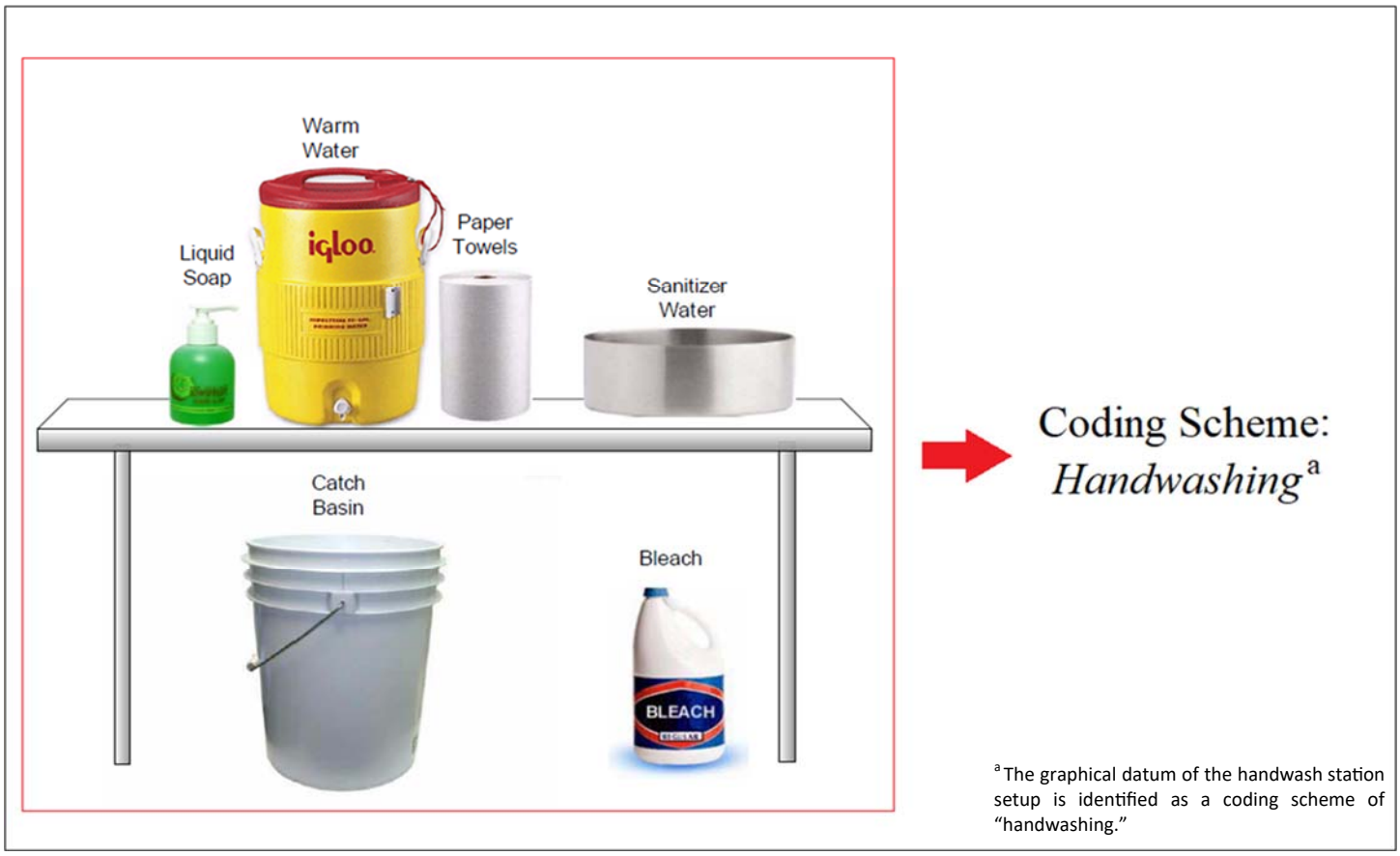


**Figure 1: Example of determining a coding scheme from graphical datum**

*control*." In accordance with the amendment of Food Code (FDA, 2017), "potentially hazardous food/TCS" was replaced with TCS as a universal term in this study even though the CU websites presented "*perishable food*."

As shown in Table 2, the study investigated CUs' various methods of permitting student-led food events. Student-led food events, for example, could either be approved by the entity (e.g., Environmental Health and Safety, Risk Management) or by the Local Health Department. Some other CUs required the only submission of an application form to gain permission to host a student-led food event. Even though food safety culture could play an important role in implementing food safety guidelines (Yiannas, 2009), various requirements for hosting student-led food events at each CU might create a different food safety culture that would produce disparate levels of food safety preparedness for CUs' student-led food events. High levels of standards (e.g., completion of food safety training and food safety quiz, requirements of food handler's permit and temporary handwashing station) for student-led food events' preparedness could motivate students to follow safe food handling practices by creating a positive culture at events (Arendt, Strohbehn, and Jun, 2015). In addition, methods of permitting student-led food events can differ according to the types of foods served. For example, most CUs have a food waiver form in place for non-TCSs (e.g., baked goods, cookies, and candies) because non-TCSs are not subject to time or temperature control to be considered safe for consumption (Knechtges, 2012).

Of the 37 CUs, 20 presented information related to food safety inspection. The criteria used for conducting food safety inspections for student-led food events was mostly lacking in the CUs' websites (Table 3), with most relying on checking for possession of valid permits as a simple way to conduct food safety inspections. However, the information on those websites presented neither detailed checklists for food safety inspectors nor a food safety checklist for students seeking to host student-led food events. There also was a lack of detailed information about the frequency of conducting food safety inspections for student-led food events. For example, of the 20 CUs that presented information about food safety inspections, only five had in place information about randomly conducting food safety inspections, so information about food safety inspections did not provide much helpful information with respect to understanding the guidelines for food safety inspections during student-led food events. Despite a variety of online resources, a previous study (Hesse et al., 2005) showed 62.4% of study participants trusted their physicians when obtaining information, including food safety information. In addition, ongoing reminders about safe food handling would be beneficial for ensuring food safety compliance (Arendt et al., 2015). Thereby, direct and constant food safety intervention through food safety inspections for student-led food events would likely be more effective for ensuring food safety practices than solely providing food safety information on websites or through a mobile phone application.

A review of CU websites suggested that only fourteen of the CUs provide information about food safety training for student-led food events (Table 3). A lack of such training may affect food handlers' food safety knowledge because both food safety knowledge and practices can be improved through food safety training (Arendt et al., 2015; Green & Knechtges, 2015; Roberts et al., 2008; York et al., 2009), so food safety training may be recommended to improve both the retention of food safety knowledge and food safety practices of college students who host student-led food events. The actual method of conducting food safety training at CUs is of interest; some

| Table 3: Code Matrix associated with Student-led Food Events at CUs (n=37) | | | | |
|---|---|---|---|---|
| **Theme** | **Frequency[a]** | **Coding Scheme** | **Frequency[a]** | **Number of CUs** |
| Food Safety Risk | 284 | TCS[b] | 83 | 25 |
| | | Food from Unsafe Safe Source | 35 | 21 |
| | | Handwashing | 31 | 15 |
| | | Food Safety Practices | 30 | 14 |
| | | Non-TCS[b] | 29 | 18 |
| | | Improper Food Handling | 16 | 11 |
| | | Inadequate Cooking | 16 | 9 |
| | | Poor Personal Hygiene | 12 | 9 |
| | | Contaminated Equipment | 12 | 8 |
| | | Gloves | 11 | 7 |
| | | Use a Thermometer | 9 | 8 |
| Food Safety Policies | 373 | Guidelines | 141 | 33 |
| | | Food Handling Permit-EH&S[c] | 73 | 23 |
| | | Food Safety Inspection | 33 | 20 |
| | | Food Handling Permit-Local Health | 28 | 12 |
| | | Event-scope | 25 | 17 |
| | | Training | 22 | 14 |
| | | Waste Handling | 16 | 14 |
| | | Food Waiver Form | 13 | 7 |
| | | Dishwashing | 12 | 9 |
| | | Event Application Form | 10 | 7 |
| Epidemiology | 37 | FBI Incidence/Allegation Procedures | 18 | 9 |
| | | Food Allergy | 9 | 1 |
| | | FBI[d] | 4 | 4 |
| | | Checklist | 3 | 3 |
| | | FBI Source | 3 | 2 |

[a] Frequency totals are 694.
[b] According to the amendment of FDA Food Code 2013, "potentially hazardous food/TCS" was replaced to "TCS" as a universal term.
[c] EH&S: Environmental Health and Safety
[d] FBI: Foodborne Illness

CUs have online training in place, while others provide either face-to-face or hybrid food safety training. To maintain students' retention of food safety knowledge, a weekly updated email about food safety information could be implemented with food safety training (Arendt et al., 2013).

Of the 37 CUs that presented food safety information on their websites, only nine (24.3%) CUs provided information about food safety procedures to help students address suspected FBI incidents (Table 3). The other 28 CUs (75.7%) that presented food safety information on their websites did not provide detailed information about food safety procedures. They only provided brief information to direct students to contact appropriate personnel (e.g., Director of Environmental Health and Safety, Vice President of Student Affairs) if they might confront an FBI issue. Detailed information on how to address FBI incidents is therefore lacking. Arendt at al. (2013) found several barriers to why consumers do not report ~~f~~ FBIs such as being unsure of the cause, the amount of time from consumption to illness, and lack of knowledge. Thereby, providing detailed information for reporting of FBIs or suspected FBIs for student-led food events would be helpful not only to create a positive food safety culture that motivates food safety behaviors but also to assist in tracking FBIs at a state and national level.

Subcategories and coding schemes were combined to examine the gravity of each theme associated with food safety policies and procedures for student-led food events. Table 3 presents clustered subcategories and coding schemes combined by each theme. As the figure shows, there were more clustered coding schemes under *food safety policies* than for *food safety risk* or *epidemiology*. The number of clustered coding schemes associated with a theme of *epidemiology* (n=37) was lower than for themes of *food safety policies* (n=373) and *food safety risk* (n=284). The theme of *Epidemiology* represents the food safety procedures that report and/or address FBI incidents or allegations. Accordingly, the findings indicates a lack of information about food safety procedures that address FBI incidents or allegations during student-led food events. Furthermore, the majority of investigated CUs (97.3%, n=36) presented no information on their website related to how to handle and prevent allergic reactions during student-led food events.

**Code Matrix and Code Co-occurrence Models**

The code matrix table generated by MAXQDA reflects the number of CUs in each coding scheme represented (Table 3). For example, food safety guidelines were the most frequent coding scheme (n=141) and it was presented on 33 of 37 CUs' websites. Similarly, as seen in Table 3, while information about food allergy appeared as a coding unit nine times, it was present on only one CU's website. In other words, food allergy occurred as a code nine times on one website.

The most frequently mentioned theme was *food safety policies*, while the least frequently mentioned theme was *epidemiology*. As can be seen in Table 3, few CUs (n=9) presented information about FBI incidence and/or allegation. There was a general lack of information about how to address FBI incidence and/or allegation was identified on the websites.

MAXQDA also generated a code co-occurrence model (Figure 2), the purpose of which was to examine relationships between *food safety policies* and coding schemes of food safety risks. As shown in Figure 2, all coding schemes including subcategories were linked to the theme of *food safety policies*. This could be interpreted as meaning that food safety policies and procedures overarch all risk factors of FBIs and allergies associated with student-led events at CUs.

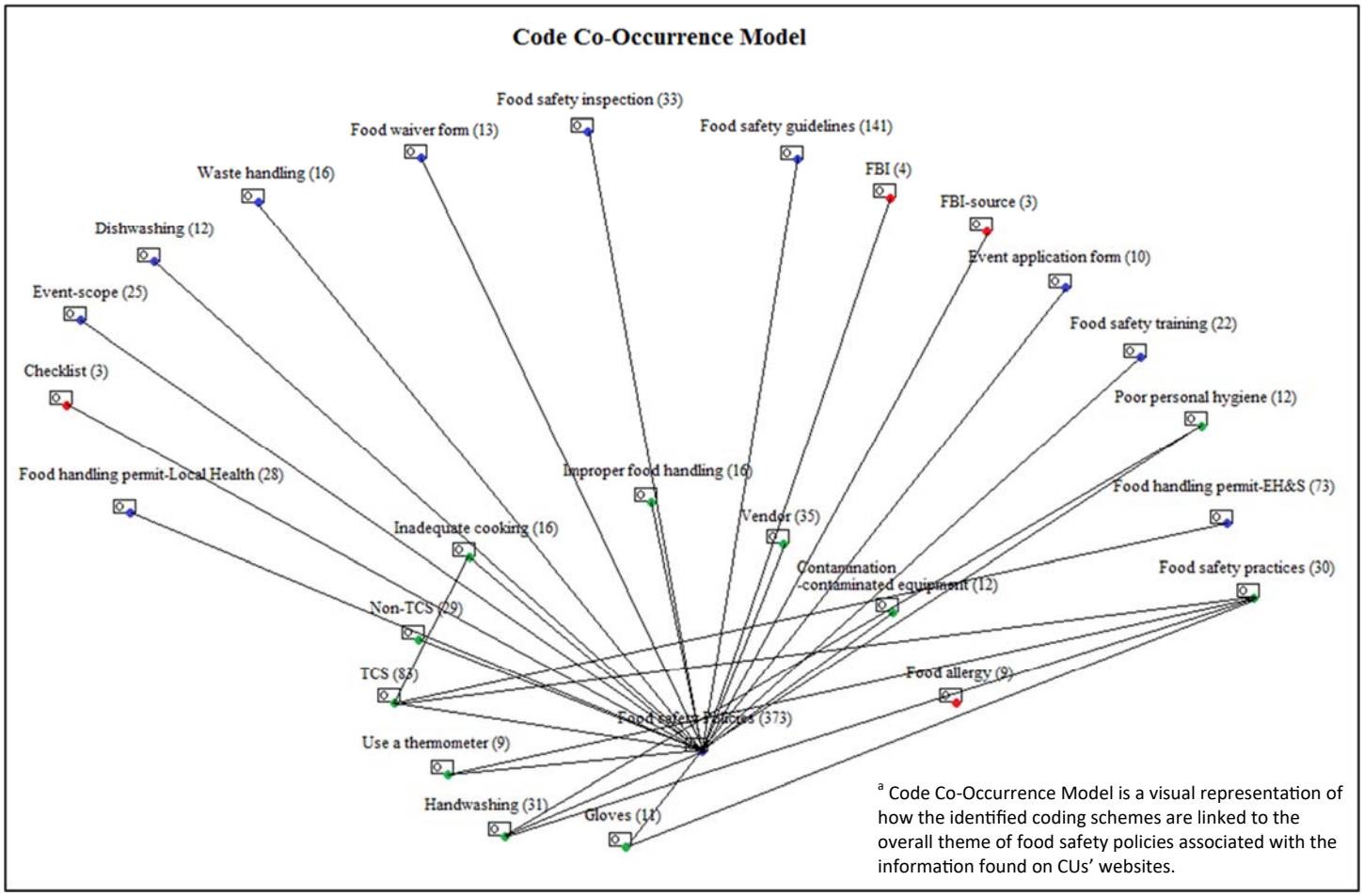


**Figure 2: Code Co-occurrence Model associated with Student-led Food Events at CUs (n=37)**

**CONCLUSIONS AND APPLICATIONS**

This study is one of the first studies to perform content analysis to assess food safety policies and procedures for student-led food events at CUs. The purposive sample (n=40) focused on CUs that both allow student-led food events and have food safety policies and procedures in place for such events. Although there were three CUs in the sample did not present information about food safety policies and procedures on their websites even though they did allow student-led food events, most of the 37 CUs focused primarily on providing information about *inadequate looking* and *improper food handling* in terms of *food safety risk*, while information about *contaminated equipment* and *food from unsafe sources* was least frequently mentioned on CU websites.

Most CUs believed that to avoid the risk of FBIs, safe food handling by college students was of utmost importance. As can be seen in Table 3, *food from unsafe sources* (n=35) and *contaminated equipment* (n=12) appeared less frequently on websites than *improper food handling* (n=55; with frequencies of *improper handling* [n=16], *food safety practices* [n=30], and *use a thermometer* [n=9]). Moreover, although most CUs considered safe food handling practices to be an important factor for ensuring food safety during student-led events, only 14 (37.8%) of the 37 CUs included food safety training on their website. In addition, 20 (54.1%) of the 37 CUs provided information about food safety inspections, indicating that while safe food handling practices by college students can be ensured by food safety training and inspections, most CUs focus on just delivering information on food safety handling rather than taking direct action (i.e., food safety inspections) for food safety assurance. This study recommends ongoing food safety monitoring to ensure students' food safety practices for student-led food events.

Approximately four percent of U.S. adults have *food allergies* (National Institute of Allergy and Infectious Diseases, 2017), but food allergy information was not found on CU websites except for one that provided detailed allergy information (Table 3). Similar to the lack of food allergy information found on CU websites, a lack of food-allergy training for university food handlers was described by Choi and Rajagopal (2013), so information related to avoiding cross-contact or avoiding common food allergen ingredients (i.e., milk, egg, peanut, tree nut, wheat, soy, fish, shellfish, sesame) (Food Allergy Research & Education, n.d.) should be provided.

While widely-accepted guidelines for approving student-led food events were not found, some student-led food events can be approved by a CU entity and/or a state/local office, and application submission is the only requirement for hosting student-led food events at other CUs. Requiring only application submission for approval to host a student-led food event may not be an ideal policy because it does not ensure food safety knowledge of college students who host student-led food events.

Finally, there was a lack of information about food safety procedures addressing FBI incidents or allegations. As mentioned earlier, only nine (24.3%) of 37 CUs included information helping students cope with FBI incidents or allegations, and information about professional observation or inspection for student-led food events was lacking. The absence of either information about food safety procedures or

food safety observations and inspections may result in student inability to cope with FBI incidents or allegations. As previously mentioned, food safety professionals' observation or inspection of student-led food events would be recommended for correcting students' improper handling practices.

This study recommends the establishment of a food safety preparedness checklist for student-led food events, with three segments that address food safety prior to the event, on the day of the event, and after the event. A Delphi technique has been utilized as a method to collect data from the experts of the domain (Dalkey & Helmer, 1962). Thereby, to establish a food safety preparedness checklist for student-led food events, future studies may conduct an e -Delphi discussion with CUs' food safety professionals to tailor a food safety preparedness checklist for different types of student-led food events. Such a developed food safety preparedness checklist would benefit both students who host student-led food events and CU personnel who oversee student-led food events.

This study identified both a lack of detailed food safety information about how to address FBI incidents and/or allegations for student-led food events and a lack of easy access to food safety information on CU websites, so making such information available and easy to access by students is definitely needed. Implementation of a mobile application for delivering food safety information to students hosting student-led food events is recommended to improve accessibility to food safety information. A developed food safety preparedness checklist can be disseminated on the CU's website as well as a mobile application.

**Limitations**

The relatively small number of CUs investigated (n=37) poses a limitation to this study, mainly because of the lack of information about food safety policies and procedures found on the reviewed websites. Although information was obtained by searching for food safety terms (e.g., food safety policies, food event, Environmental Health and Safety, food handler permit, risk management, food safety guideline) on CU websites, difficulty related to access to such food safety information may have been a limiting factor as well.

As mentioned in the introduction section, another limitation of this study is the absence of a widely accepted definition for describing student-led food events. Both seeking a universal definition for a student-led food event and classifying the scope of student-led food events would be beneficial in defining the extent of food safety policies and procedures in the future.

Lastly, from an education perspective, involving graduate and/or undergraduate students in the development or refinement of food safety student-led events materials would provide opportunity for study and integration as a class assignment. By partnering with an institution, instructors could have students develop training videos, moble applications, or other resources to assist in running student-led events. Intervention studies could then be utilized to study the effectiveness of these student developed materials.

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Research Contribution

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# FOOD ALLERGY KNOWLEDGE, ATTITUDES, PRACTICES, AND TRAINING EXPERIENCES OF EMPLOYEES IN CHINESE RESTAURANTS

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**ABSTRACT**

This study explored food allergy knowledge, attitudes, practices, and training experiences of Chinese restaurant employees (n = 98). Meals consumed at Chinese restaurants can be potentially hazardous for individuals with food allergies due to reactions resulting from hidden allergens, cross-contact, communication issues, and a lack of knowledge among food handlers. Results confirmed food allergy knowledge gaps (M = 7.5 ± 2.8) and most (67%) reported no previous food allergy training. Positive attitudes towards individuals with a food allergy and safe food allergy handling practices were found suggesting opportunities to provide training. Training preferences of these employees are also reported.

**Keywords:** food allergy, foodservice, Chinese restaurants, ethnic food, training needs

## INTRODUCTION

Meals consumed away from home can pose a substantial health risk to individuals with food allergies. For individuals with food allergies, contact or ingestion of even small amounts of an allergen can pose a significant risk of reaction, the result of an overreaction of the body's immune system (American Academy of Allergy, Asthma & Immunology [AAAAI], 2018). Food allergy is distinct from food intolerance which involves the digestive system and not the immune system (AAAAI, 2018). Symptoms of a food allergy reaction can range from mild, such as cramps, vomiting, hives, shortness of breath, or wheezing; to severe, such as difficulty swallowing or breathing; to death (Sicherer & Sampson, 2018). There is currently no cure for food allergies and medical professionals advise careful avoidance of the allergen to prevent serious health complications (Sicherer & Sampson, 2018).

Strict avoidance of an allergen can be problematic. Over one-third of individuals with food allergies have reported multiple (three or more) reactions as a result of food purchased from restaurants (Wanich, Weiss, Furlong, & Sicherer, 2008). Reactions frequently occur after consuming foods that had been considered safe (Ajala et al., 2010; Bailey et al., 2011; Common et al., 2013) and have been attributed to cross-contact during food preparation, communication issues, mislabeling, and a lack of food allergy and allergen knowledge among foodservice professionals (Kwon & Lee, 2012; Wen & Kwon, 2016; Vierk, Koehler, Fein, & Street, 2007).

Asian restaurants have been identified as a frequent site for food allergy reactions. For incidences relating to seafood allergies, Asian restaurants were found to be the second most common restaurant type (*N* = 186, 18%) as a result of cross-contact and poor communication between staff and customers (Furlong, Maloney, & Sicherer, 2006). For peanut and tree nut allergy related incidences (*N* = 156), 13% occurred in Asian restaurants (Furlong, DeSimone, & Sicherer, 2001).

In particular, Chinese restaurants have been identified as high risk places for a food allergy reaction. Individuals with food allergies report perceiving Chinese restaurants as particularly risky places for dining out, citing the heavy reliance on peanuts and tree nuts in the cuisine and communication issues with staff (Leftwich et al., 2011). Previous literature also suggests the risks may be related to the cuisine's unfamiliar ingredients and premade sauces (Kwon & Lee, 2012; Leftwich et al., 2011). Given the prevalence and severity of food allergies, the frequency with which food away from home is responsible for an allergic reaction, and the popularity of Chinese restaurants in the United States (National Restaurant Association [NRA], 2015) supporting efforts that help Chinese restaurants provide food allergen safe meals for consumers is not just critical for these businesses but vital for public safety.

Research of food allergy accommodations in foodservice recommends training to address knowledge gaps can enhance safe food allergen handling practices, but acknowledges that current food allergy training options for the foodservice industry are limited and are in need of further development (National Academies of Sciences, Engineering, and Medicine [NASEM] et al., 2016; Sicherer et al., 2012). The paucity of food allergy training options may be limiting the reach of food allergy knowledge given the diverse demographics of the foodservice industry's workforce—as seen in food safety training research where differing attitudes, levels of English literacy, language, and inadequate resources are barriers of food safety training (Mauer et al., 2006; Niode, Bruhn, & Simonne, 2011; Park, Kwak, & Chang, 2010; Roberts, Kwon, Shanklin, Liu, & Yen, 2011; Rudder, 2006).

To better help address the paucity of food allergy training options available and to provide greater insight into the food allergy training needs of foodservice employees in Chinese restaurants, it is important to understand the food allergy knowledge and training levels of these employees. Therefore, the purpose of this study was to assess food allergy knowledge, attitudes, and practices foodservice employees employ in Chinese restaurants as well as to explore their preferred training content and formats.

## METHODS

### Population

The target population for this study was employees of Chinese restaurants in Chicago, Illinois. The state was selected because food allergy-related legislation (State of Illinois HB 2510 Law) required the completion of approved food allergen awareness training by restaurant-employed foodservice sanitation managers by July 1, 2018 (Food Handling Regulation Enforcement Act Amendment of 2017). Therefore, the target population was likely to have either recently completed or was searching for food allergy training programs and could provide timely feedback regarding food allergy training programs.

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Participants were recruited from a list of 428 Chinese restaurants in Chicago, compiled from the Chinatown Chamber of Commerce food directory of Chinatown (Chicago Chinatown Chamber of Commerce, 2017), as well as a search of Chinese restaurants on Yelp.com, and a search of business licenses in the City of Chicago Business Affairs and Consumer Protection database (City of Chicago, 2018).

In addition to full-time employees, part-time employees were included in the study given the foodservice industry's reliance on part-time employees as nearly half of all foodservice employees (in food preparation and serving) are considered part-time employees (U.S. Department of Labor, Bureau of Labor Statistics, 2019).

### Questionnaire

The questionnaire was adapted, with permission, from a previous study by Choi and Rajagopal (2013), which was used to explore food allergy knowledge, attitudes, practices, and training of foodservice employees in college and university foodservice operations. The adapted questionnaire was pilot-tested and reviewed by a panel of how many experts; revisions were made based on the feedback received.

The final questionnaire was comprised of six sections. The first section investigated participant attitudes towards food allergies and customers, training, and practices. The second section evaluated knowledge of food allergies and accommodation practices. Section three recorded the self-reported frequency of performing safe food allergen handling practices. Section four explored past food allergy training, when applicable. Section five examined participants' preferences for future food allergy training content and formats. Section six collected demographic information.

In order to address the possible language needs of the study's target population the questionnaire was translated into Chinese (simplified and traditional characters). Also, as over a quarter of restaurant and foodservice employees identify as Hispanic or Latino (U.S. Bureau of Labor Statistics, 2019) and previous research has found that 17% of Hispanic workers live in limited English-speaking households (Bucknor, 2016), the questionnaire was also translated into Spanish to include the many employees in Chinese restaurants who felt more comfortable communicating in Spanish. The questionnaire was back-translated from both Chinese and Spanish for translation verification.

### Recruitment and data collection

Given the varying legal work status of employees in the leisure and hospitality industry where unauthorized immigrants account for an estimated 18% of the industry's national workforce (Passel & Cohn, 2016), participants were not required to self-identify and sign informed consent forms to avoid any undue legal risks. In lieu of the consent document, participants were given a cover letter containing the elements of a consent document.

Previous research found recruitment and retention of minority participants was improved through face-to-face recruitment by culturally-matched researchers and materials in the appropriate language (George, Duran, & Norris, 2014), therefore recruitment and data collection were conducted in-person by an ethnically Chinese researcher fluent in Mandarin and Cantonese.

Of the 428 restaurants identified, 42 restaurants were closed or incorrectly listed, leaving a total of 386 restaurants that were visited for participant recruitment and data collection. Restaurants were visited between lunch and dinner service hours (2pm-5:30pm) and the first staff member that extended a greeting was approached about the purpose of the visit. Potential participants were informed of the study's purpose, the time and effort requested, and confidentially provisions. All staff members present at the time of visit were invited to participate in the study. Participants were invited to choose a questionnaire from the languages offered (English, Traditional or Simplified Chinese, or Spanish). No incentives or compensation was offered to participants in the study. Institutional Review Board approval was obtained for the study prior to data collection.

### Data Analysis

Questionnaire data were analyzed using SPSS 25.0. Descriptive statistics were calculated. Negatively worded items in the attitude and practices section were reverse-coded prior to data analysis. Cronbach's alphas were calculated for attitude and practice factors to assess reliability, resulting in alphas of 0.89 and 0.88, respectively. One-way analysis of variance (ANOVA) and independent t-tests were conducted to compare the differences in means of food allergy knowledge, attitudes, and practices based on the respondents' demographic characteristics. Multiple linear regression analyses were used to determine which variables had the greatest effect on knowledge and practice. Post-hoc tests (Tukey) were conducted to further examine within group differences. The significance level was set at 0.05 for the study.

The written responses to the three open-ended questions were translated into English, as needed, and analyzed following the data procedures detailed by Creswell (2014) for coding data and developing themes from the data. A second researcher coded the responses independently before the two researchers agreed upon final themes.

## RESULTS & DISCUSSION

### Participant and Restaurant Profile

In total, 101 questionnaires were collected from 98 of the 386 restaurants visited. Three questionnaires were deemed unusable for data analysis. Ultimately, 98 questionnaires from 98 restaurants were used for data analysis (25.4% response rate).

Respondents were predominantly female (*n* = 52, 53%), 34-41 years old (*n* = 25, 26%), and possessed high school diplomas or GEDs (*n* = 42, 43%). Most (*n* = 82, 84%) respondents were born outside the U.S. and most commonly preferred communicating in Mandarin (*n* = 43, 44%) or Cantonese (*n* = 35, 36%), describing their English fluency as "average" (*n* = 40, 42%) (Table 1). No participants requested a questionnaire in Spanish.

Participants frequently worked at casual full-service operations (*n* = 35, 36%) or takeout and delivery establishments (*n = 30,* 31%). Respondents were predominately (*n* = 64, 65%) full-time (40+ hours per week at work) and typically had over eight years of experience in foodservice (*n* = 49, 50%) and Chinese restaurants (*n* = 45, 46%). Most participants (*n* = 68, 70%) reported having received food safety training but only one-third (*n* = 32, 33%) received food allergy specific training.

### Food Allergy Knowledge

The mean food allergy knowledge score was 7.5 ± 2.8 (out of a possible 12 points) resulting in a score of 62.5% (Table 2). Respondents were able to demonstrate basic food allergy knowledge—correctly identifying fruit as not a major allergen (*n* = 80, 82%), the symptoms and onset timeline of a food allergy reaction (*n* = 61, 64% and *n* = 79, 81%; respectively), and the amount of a food allergen safe for consumption by individuals with food allergy ("none", *n* = 66, 69%).

| Table 1: Participant Demographics (*n* = 98) | | |
|---|---|---|
| **Category** | ***n*** | **%** |
| Gender | | |
| Female | 52 | 53 |
| Male | 42 | 43 |
| Prefer not to Answer | 4 | 4 |
| Age (*n* = 97) | | |
| 18-25 years old | 14 | 14 |
| 26-33 years old | 24 | 25 |
| 34-41 years old | 25 | 26 |
| 42-49 years old | 16 | 16 |
| Over 50 years old | 18 | 19 |
| Place of Birth | | |
| United States | 16 | 16 |
| International/Outside the United States | 82 | 84 |
| Preferred Language | | |
| Mandarin | 43 | 44 |
| Cantonese | 35 | 36 |
| English | 18 | 18 |
| Arabic | 2 | 2 |
| English Fluency (*n* = 96) | | |
| I don't know any English | 9 | 9 |
| Poor | 10 | 10 |
| Average | 40 | 42 |
| Good | 19 | 20 |
| Excellent | 18 | 19 |
| Highest Level of Education Completed | | |
| Some high school | 13 | 13 |
| High school/GED | 42 | 43 |
| Associate degree | 13 | 13 |
| Bachelor's degree | 26 | 27 |
| Master's degree | 4 | 4 |
| Years of experience in foodservice | | |
| Less than 1 year | 7 | 7 |
| 1-3 years | 3 | 3 |
| 4-6 years | 28 | 29 |
| 6-8 years | 11 | 11 |
| More than 8 years | 49 | 50 |
| Years of experience in Chinese restaurants (*n* = 97) | | |
| Less than 1 year | 7 | 7 |
| 1-3 years | 13 | 13 |
| 4-6 years | 20 | 21 |
| 6-8 years | 12 | 12 |
| More than 8 years | 45 | 46 |
| Hours worked per week | | |
| Less than 20 hours | 4 | 4 |
| 20-40 hours | 30 | 31 |
| Over 40 hours | 64 | 65 |
| Type of foodservice operation (*n* = 97) | | |
| Fast food | 6 | 6 |
| Takeout and delivery | 30 | 31 |
| Casual full-service | 35 | 36 |
| Fine dining full-service | 26 | 27 |
| Received food safety certification (*n* = 97) | | |
| Yes | 68 | 70 |
| No | 29 | 30 |
| Received food allergy training | | |
| Yes | 32 | 33 |
| No | 66 | 67 |
| Type of food allergy training | | |
| ServSafe® Allergen | 6 | 19 |
| Part of food safety training | 11 | 34 |
| On the job | 7 | 22 |
| Previous workplace | 3 | 9 |
| Other | 3 | 9 |
| Not reported | 2 | 6 |

*Note.* Categories with fewer than 98 participants due to non-responses are noted.

Areas where knowledge was lacking among participants included cross-contact practices, hidden allergens, food ingredient labels, and appropriate responses to food allergy reactions. While most (*n* = 74, 78%) participants were able to identify cross-contact practices that could compromise food allergy safety fewer (*n* = 60, 70%) were able to explain how cross-contact occurs. When asked which foods posed the greatest potential hazard for customers with a food allergy, only half (*n* = 47, 51%) correctly selected "All of the above" from the multiple-choice responses. Participant responses to where allergen information of an ingredient could be found were divided between the ingredient label (*n* = 44, 46%) and relying on the customer to know ingredients hazardous to them (*n* = 43, 45%).

Fewer than one-third of participants (*n* = 21, 30%) were able to accurately identify the medication used for a severe food allergy reaction ("epinephrine"). Fewer than two-thirds (*n* = 63, 66%) correctly identified the best first response to a food allergy reaction in the restaurant. Concerningly, roughly one-third of respondents did not select an answer (only 69 responses were collected) for a question regarding the best treatment for controlling a severe food allergy reaction. Participants remarked during data collection the question was left blank because they did not know the answer; of the participants that responded 57% (*n* = 39) incorrectly selected "Benadryl™".

### Food Allergy Attitudes

Participants had a mean attitude score of 3.6 ± 0.5 (1 = *strongly disagree*; 5 = *strongly agree*) with a range of 2.7 to 4.0 (Table 3). Attitude scores towards providing customers food allergen information were high ("It is important to me that accurate information about food ingredients is provided to customers", 4.1 ± 0.8; "I believe that providing customers with food allergy information will decrease the likelihood of a food allergy reaction", 4.0 ± 0.8) as were attitudes towards changing food handling behaviors relating to food allergens (4.0 ± 0.8), and personal responsibilities regarding preventing food allergy reactions on the job (4.0 ± 0.9). Attitude scores towards food allergy training were lower than attitude scores regarding food allergy reaction prevention and customers with food allergies with statements about food allergy training being "not a good use of time" (3.8 ± 0.9), being of personal importance ("learning about food allergy is important to me", 3.7 ± 0.9) or usefulness ("food allergy training is not useful to me", 3.6 ± 1.0), or about a general willingness to attend training courses or workshops (3.7 ± 0.8) had attitude scores closer to the sample's mean score of 3.6 ± 0.5.

### Food Allergy Self-Reported Practices

During data collection, participants noted that their roles frequently crossed multiple areas of the restaurant, from kitchen work to service work and occasionally management, in the absence of a formal manager. Therefore, participants were told to complete the questionnaire for any applicable areas which resulted in varying sample size numbers for the categories of restaurant employees. The mean practice scores for kitchen staff (*n* = 65-72, 4.3 ± 0.6, mean range = 4.1 to 4.5) and service staff and managers (*n* = 67-79, 4.3 ± 0.7, mean range = 4.1 to 4.6) were high, with an overall mean practice score of 4.3 ± 0.6 (Table 4).

**Kitchen staff.** Respondents' self-reported practice scores surrounding communication of food allergy needs between staff members ("I communicate with other staff members to ensure an allergy safe meal is prepared", *n* = 68, 4.5 ± 0.8) and how to handle customers with food allergies ("When a customer with a food allergy comes in, I know exactly what to do", *n* = 70, 4.5 ± 0.8) received the highest practice scores. The lowest self-reported practice scores were associated with reading ingredient labels for allergens ("I read labels of ingredients

**Table 2: Food Allergy Knowledge Results**

| Knowledge Items | *n* | % |
|---|---|---|
| *Which of the following is not considered a major food allergen?* (*n* = 98) | | |
| **Fruit** | **80** | **82** |
| Wheat | 10 | 10 |
| Soy | 4 | 4 |
| Shellfish | 3 | 3 |
| *Which body system can be affected by a food allergy reaction?* (n = 96) | | |
| Gastrointestinal tract | 16 | 17 |
| Respiratory system | 12 | 13 |
| Skin | 7 | 7 |
| **All of the above** | **61** | **64** |
| *How soon does a food allergy reaction occur after the food is consumed?* (n = 97) | | |
| **Immediately or within a few hours after the food is consumed.** | **79** | **81** |
| Twenty-four hours after the food is consumed. | 16 | 16 |
| Thirty-six hours after the food is consumed. | 1 | 1 |
| Forty-eight hours after the food is consumed. | 1 | 1 |
| *Which of the following is the best treatment for controlling a severe food allergy reaction?* (n = 69) | | |
| Benadryl™ | 39 | 57 |
| Pseudoephedrine | 2 | 3 |
| **Epinephrine** | **21** | **30** |
| Aspirin | 7 | 10 |
| *When preparing or serving a meal for a person with a food allergy, it is important to: (n = 97)* | | |
| Discuss the meal with the customer with food allergy. | 19 | 20 |
| Check ingredient labels of foods used to make the meal. | 9 | 9 |
| Deliver the food allergens safe meal to the customer separately. | 9 | 9 |
| **All of the above.** | **60** | **62** |
| *Which of the following practices could cause cross-contact?* (n = 95) | | |
| Using the same cooking surfaces to prepare allergen-free foods as allergen-containing foods. | 6 | 6 |
| Cooking allergen-free food in the same cooking equipment as allergen-containing foods. | 5 | 5 |
| Not washing hands before handling the allergen-free food. | 10 | 11 |
| **All of the above.** | **74** | **78** |
| *How much of a food allergen is safe for a person with food allergy to eat?* (n = 96) | | |
| Small amounts are safe. | 7 | 7 |
| **None.** | **66** | **69** |
| Varies with the food. | 14 | 15 |
| Depends on how the food was prepared. | 9 | 9 |
| *If a customer is experiencing a food allergy reaction, what is the best first response? (n = 96)* | | |
| Determine what caused the reaction. | 20 | 21 |
| **Call for medical help.** | **63** | **66** |
| Find the customer's epinephrine and administer the medication. | 13 | 14 |
| Fire the person responsible for making the food that caused the reaction. | 0 | 0 |
| *Why can fried foods be dangerous for individuals with food allergy?* (n = 86) | | |
| The high fat content in fried foods makes food allergy reactions worse. | 11 | 13 |
| Frying changes the chemical structure of foods. | 13 | 15 |
| **Cross-contact with food allergens can occur if the oil was used to cook allergen containing foods.** | **60** | **70** |
| The high starch content makes food allergy reactions worse. | 2 | 2 |
| *Which of the following items are risky for customers with food allergy?* (n = 92) | | |
| Menu items with many ingredients. | 24 | 26 |
| Desserts. | 5 | 5 |
| Sauce-covered foods. | 16 | 17 |
| **All of the above.** | **47** | **51** |
| *What are some of the symptoms of a food allergy reaction?* (n = 93) | | |
| Sneezing, dizziness, muscle pain, headache. | 6 | 6 |
| **Wheezing, facial swelling, abdominal cramps, vomiting.** | **80** | **86** |
| Constipation, bloating, gas, heartburn. | 7 | 8 |
| Lack of energy, backache, depression, anxiety. | 0 | 0 |
| *Where can you find whether an ingredient you are using contains an allergen?* (n = 95) | | |
| Looking on the manufacturer's website. | 1 | 1 |
| By asking a manager. | 7 | 7 |
| **Reading the ingredient label.** | **44** | **46** |
| The customer should know what foods they cannot eat. | 43 | 45 |

*Note.* Bolded items are the correct answers.

**Table 3: Participants' Attitude Scores**

| Attitude Statement (α = 0.89) | *M ± SD*[a] | *n(%)* Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| **Individual's Role in Food Allergy Safety** | | | | | | |
| I cannot guarantee a food allergen safe meal.[b] (*n* = 95) | 3.3 ± 0.9 | 3(3) | 11(12) | 41(43) | 33(35) | 7(7) |
| It is important to me that accurate information about food ingredients is provided to customers. (*n* = 97) | 4.1 ± 0.8 | 1(1) | 1(1) | 15(15) | 47(48) | 33(34) |
| I believe that providing customers with food allergy information will decrease the likelihood of a food allergic reaction. (*n* = 98) | 4.0 ± 0.8 | 1(1) | 2(2) | 18(18) | 51(52) | 26(27) |
| I am willing to change my food handling behaviors related to handling food allergens. (*n* = 98) | 4.0 ± 0.8 | 1(1) | 4(4) | 15(15) | 47(48) | 33(34) |
| I think preventing food allergy reaction is an important part of my job responsibilities. (*n* = 98) | 4.0 ± 0.9 | 1(1) | 4(4) | 27(28) | 32(33) | 34(35) |
| **Restaurant's Role in Food Allergy Safety** | | | | | | |
| I think my workplace is responsible for educating me about food allergy and allergen handling. (n = 98) | 3.6 ± 0.8 | 1(1) | 4(4) | 42(43) | 41(42) | 10(10) |
| My workplace should refuse to serve people with food allergy.[b] (n = 98) | 3.9 ± 0.9 | 1(1) | 7(7) | 19(19) | 45(46) | 26(27) |
| **Individuals with Food Allergies** | | | | | | |
| I believe it is entirely the customers' responsibility to avoid food allergens.[b] (n = 97) | 2.7 ± 1.0 | 13(13) | 28(29) | 36(37) | 15(15) | 5(5) |
| Serving a customer with food allergy is not worth the potential liability.[b] (n = 98) | 3.8 ± 0.8 | 1(1) | 4(4) | 25(25) | 49(50) | 20(20) |
| A person with food allergy should not be eating in restaurants.[b] (n = 97) | 3.8 ± 0.8 | 0(0) | 8(8) | 20(21) | 50(52) | 19(20) |
| Food allergy customers are just picky eaters.[b] (n = 98) | 3.8 ± 1.0 | 4(4) | 6(6) | 22(22) | 41(42) | 25(26) |
| **Food Allergy Safety & Training** | | | | | | |
| Food allergy training is not a good use of my time.[b] (n = 98) | 3.8 ± 0.9 | 1(1) | 4(4) | 30(31) | 43(44) | 20(20) |
| Learning about food allergy is important to me. (n = 97) | 3.7 ± 0.9 | 1(1) | 9(9) | 23(24) | 47(48) | 17(18) |
| Food allergy is a serious health issue. (n = 98) | 3.7 ± 0.9 | 1(1) | 5(5) | 33(34) | 42(43) | 17(17) |
| I am willing to attend training courses/workshops to learn more about food allergy. (n = 98) | 3.7 ± 0.8 | 0(0) | 4(4) | 38(39) | 44(45) | 12(12) |
| Food allergy training is not useful to me.[b] (n = 98) | 3.6 ± 1.0 | 3(3) | 8(8) | 29(30) | 40(41) | 18(18) |

[a]5-point Likert scale used (1 = *Strongly disagree*; 5 = *Strongly agree*)
[b]Items were reverse coded

when preparing food for a customer with a food allergy", *n* = 72, 4.1 ± 1.2) and workplace policies and training ("My workplace has told me what I should do when someone tells me they have a food allergy", *n* = 65, 4.1 ± 1.2).

**Service staff and managers.** Mean self-reported practice scores for service staff and managers were also high. The statement "I wash my hands before serving customers with food allergy their food" had the lowest mean score of 4.1 ± 1.1 (*n* = 77), followed by "my workplace has told me what I should do when someone tells me they have a food allergy" which received a mean score of 4.2 ± 1.2 (*n* = 67), similar to the results found for kitchen staff on the same statement. Statements regarding food allergy communication received the highest self-reported scores ("I communicate with other staff members to ensure an allergy safe meal is prepared", *n* = 67, 4.6 ± 0.8; "I provide accurate information to customers regarding a dish's ingredients", *n* = 79, 4.5 ± 0.8).

**Food Allergy Training and Perceived Needs**

Of the respondents that had received food allergy training (*n* = 32), over 90% reported having received training regarding identifying major food allergens (94%), reading food labels (91%), avoiding cross-contact (94%), and communicating allergen information to customers (94%). Fewer respondents (72%) recalled receiving training on how to handle food allergy reaction and was the only area that saw a result lower than 90% (Table 5).

Participants' responses to the perceived need of food allergy training were high for most items on a scale ranging from 1 = *very unnecessary* to 5 = *very necessary.* The mean score for perceived need of training was over 4.5 regarding major food allergens, reading food labels, avoiding cross-contact, and communicating food allergy information to customers (Table 6). These results mirrored the responses regarding training received. The lowest mean score for perceived need related to how to handle a food allergy reactions (4.4

**Table 4: Participants' Self-Reported Practice Scores**

| Practice Statement (α = 0.88) | *M ± SD*[a] | *n*(%) | | | | |
|---|---|---|---|---|---|---|
| | | Never | Rarely | Sometimes | Often | Always |
| **Practice Total** | 4.3 ± 0.6 | | | | | |
| **Kitchen Staff (*n* = 65-72)** | **4.3** ± 0.7 | | | | | |
| I prepare allergen-containing and allergen-free dishes separately. (*n* = 70) | 4.1 ± 1.2 | 3(4) | 5(7) | 10(14) | 13(19) | 39(56) |
| I told staff members a dish did not contain any allergens when I was unsure.[b] (*n* = 70) | 4.3 ± 1.3 | 5(7) | 4(6) | 6(9) | 8(11) | 47(67) |
| I use clean and sanitized cooking equipment to prevent cross-contact. (*n* = 71) | 4.4 ± 1.0 | 2(3) | 3(4) | 6(9) | 16(23) | 44(62) |
| I read labels of ingredients when preparing food for a customer with a food allergy. (*n* = 72) | 4.1 ± 1.2 | 3(4) | 6(8) | 7(10) | 20(28) | 36(50) |
| When a customer with a food allergy comes in, I know exactly what to do. (*n* = 70) | 4.5 ± 0.8 | 1(1) | 0(0) | 7(10) | 18(26) | 44(63) |
| My workplace has told me what I should do when someone tells me they have a food allergy. (*n* = 65) | 4.1 ± 1.2 | 4(6) | 5(8) | 5(8) | 16(25) | 35(54) |
| I communicate with other staff members to ensure an allergy safe meal is prepared. (*n* = 68) | 4.5 ± 0.8 | 1(2) | 1(2) | 6(9) | 15(22) | 45(66) |
| **Service Staff and Managers (*n* = 67-79)** | **4.3** ± 0.7 | | | | | |
| I serve allergen-containing and allergen-free plates separately. (*n* = 75) | 4.4 ± 1.0 | 1(1) | 4(5) | 8(11) | 13(17) | 49(65) |
| I told customers a dish did not contain any allergens when I was unsure.[b] (*n* = 78) | 4.2 ± 1.3 | 8(10) | 1(1) | 11(14) | 3(4) | 55(71) |
| I wash my hands before serving customers with food allergy their food. (*n* = 77) | 4.1 ± 1.1 | 3(4) | 4(5) | 12(16) | 18(23) | 40(52) |
| I provide accurate information to customers regarding a dish's ingredients. (*n* = 79) | 4.5 ± 0.8 | 0(0) | 4(5) | 5(6) | 17(22) | 53(67) |
| When a customer with a food allergy comes in, I know exactly what to do. (*n* = 76) | 4.4 ± 0.9 | 2(3) | 0(0) | 9(12) | 22(29) | 43(57) |
| My workplace has told me what I should do when someone tells me they have a food allergy. (*n* = 67) | 4.2 ± 1.2 | 4(6) | 2(3) | 9(13) | 12(18) | 40(60) |
| I communicate with other staff members to ensure an allergy safe meal is prepared. (*n* = 76) | 4.6 ± 0.8 | 0(0) | 3(4) | 4(5) | 13(17) | 56(74) |

*Note.* Participants that identified as kitchen staff and service staff completed both sections, resulting in varying sample size numbers.
[a]5-point Likert scale used (1 = *Strongly disagree*; 5 = *Strongly agree*)
[b]Items were reverse coded.

± 1.3). Training on avoiding cross-contact between foods during preparation or service had the highest perceived training need (4.6 ± 1.0).

### Knowledge, Attitudes & Practices by Food Allergy Training and Food Safety Certification

Independent-samples t-tests were conducted to compare the knowledge, attitude, and practice scores of participants that had and had not received food allergy training. For participants that had completed food allergy training, a significant difference was found in mean scores for food allergy knowledge, $t(96) = 3.646$, $p<0.001$), attitudes, $t(96) = 2.676$, $p=0.009$, and self-reported practices, $t(81) = 3.904$, $p<0.001$. Participants with food safety certification also saw significantly different mean scores than those that did not have food safety certification for food allergy knowledge ($t(95) = 4.136$, $p<0.001$), attitudes ($t(95) = 2.316$, $p=0.023$), and practices ($t(37) = 3.497$, $p<0.001$).

### Differences in Knowledge, Attitudes, Practices, Based on Demographic Characteristics

The knowledge, attitude and practice score means of participants' with and without food allergy and food safety training was also compared (Table 7). Independent *t*-tests and ANOVA with Tukey's post hoc analyses were used to compare mean in knowledge, attitude, and practice scores and demographic characteristic. The results showed a significant difference for knowledge scores between age groups ($F_{(4, 90)} = 2.674$, $p=0.037$) with scores for 18-25-year-olds (9.2 ± 2.5) found to be significantly different ($p=0.016$) than those of the 42-49-year-olds (6.0 ± 2.5); no significant difference was found for other age groups. Education levels also resulted in significantly different knowledge scores ($F_{(4, 91)} = 2.561$, $p=0.044$).

Preferred language of communication ($F_{(3, 92)} = 5.204$, $p=0.002$) and English fluency($F_{(4, 89)} = 4.035$, $p=0.005$) had significant impacts on knowledge scores. Mean knowledge scores for those with preferences for Mandarin (7.4 ± 2.8, $p=0.017$) and Cantonese (6.7 ± 2.7, $p=0.001$) had significantly different mean scores than participants with a preference in communicating in English (9.1 ± 2.2). Mean English fluency knowledge scores for those with "Excellent" English fluency (9.1 ± 2.7) was significantly different than those that had "Poor" English fluency (5.2 ± 1.6). Place of birth saw significant differences in knowledge ($t(96) = 3.025$, $p=0.003$) and practice scores ($t(94) = 2.286$, $p=0.025$) scores but not attitude scores. Mean knowledge scores for U.S.-born participants (9.4 ± 2.5) were significantly different ($F_{(1, 96)} = 9.151$, $p=0.003$) from scores for those born outside the U.S. (7.2 ± 2.7).

Correlation and multiple regression analysis were used to test if attitude, knowledge, previous food allergy training, or food safety certification significantly predicted participants' safe food allergy handling practices (Table 8). Each of the predictors were positively and significantly correlated with the self-reported practice scores. Attitude scores and knowledge scores were also positively and significantly correlated ($r = 0.360$, $p<0.001$) and food allergy attitude

**Table 5: Participants' Reported Food Allergy Training Items Received (n = 32)**

| Training Items | *n*(%) Yes | No |
|---|---|---|
| I have received training to identify the major food allergens. | 30(94) | 2(6) |
| I have received training on how to read food labels for food allergen identification. | 29(91) | 3(9) |
| I have received training on how to avoid cross -contact between foods during food preparation or service. | 30(94) | 2(6) |
| I have received training on how to communicate allergen information to customers. | 30(94) | 2(6) |
| I have received training on how to handle a food allergy reaction. | 23(72) | 9(28) |

scores also had significant positive correlations with food safety certification ($r$ = 0.226, $p$=0.014) and food allergy training ($r$ = 0.254, $p$=0.007). Food allergy knowledge scores were significantly and positively correlated with food safety certification ($r$ = 0.383, $p$<0.001) and food allergy training ($r$ = 0.347, $p$<0.001).

Multiple regression analyses were conducted to examine the relationship between safe food allergy handling practices and food allergy knowledge, attitude, food allergy training, and food safety certification. There was linearity as assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 1.473. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1.

The analysis found a significant result with the food allergy attitude, knowledge, food allergy training and food safety certification predictors and safe food allergy handling practices. The results of the regression indicated that the predictors explained 25% (adjusted $R^2$ = 0.252) of the variance ($R^2$ = 0.284, $F$(4, 90) = 8.903, $p$<0.001) with a small effect size. The significant findings were examined further with the coefficients of the regression model computed for further analysis. It was found that food allergy attitudes (β=0.385, $p$=0.005) and food safety certification (β=0.348, $p$=0.016) significantly predicted safe food allergy handling practice scores. The regression summary can be found in Table 9.

**Food Allergy Training Preferences**

Participants were asked to complete open-ended questions regarding food allergy training preferences, specifically, what should be included in food allergy trainings, what should be excluded in food allergy trainings, and their preferred formats for food allergy training. The first question ("If you were to design a food allergy training program for your workplace, what would you include?") received 17 responses with the most frequent response ($n$ = 16) requesting information to help with understanding what food allergens are and knowing how to identify and recognize food allergens. Five respondents commented training should provide information on allergens in sauces, foods, or dishes/meals and help employees identify dishes where food allergens were not present. Four participants requested training on how to read food labels for allergens, mentioning training should "make sure kitchen staff knows the name of [food allergens] in English" as well as in Chinese, and that it was important for employees to know "how [allergens] can hide [in] different dishes."

Respondents ($n$ = 8) also wanted food allergy training specific to safely preparing foods for kitchen staff and safely serving foods for service staff, such as how to communicate food allergy information with customers and why relaying accurate information was important for customer safety, saying servers needed to "be honest to customers" by "telling the truth if you do not know for sure you can [provide a safe meal to a customer with a food allergy]." Three respondents deemed information regarding the potential health consequences of ingesting a food allergen for those with food allergy were important to include and two respondents wanted information on how to handle food allergy reactions.

Ten participants responded to the second question, "if you were to design a food allergy training program for your workplace, what would you exclude?" Responses to this question focused primarily on attitudes of potential trainees rather than content, as was the case with the first open-ended question, saying that staff should not be included in the training if "they are not serious about it" or "do not want to learn" about food allergies. Similarly, training should exclude anything that reinforced negative stereotypes about people with food allergies and avoid presenting food allergy customers as "just being difficult" or "picky" eaters.

The third question asked participants to identify their preferred format for future food allergy training (Table 10). Nearly half of respondents ($n$ = 24, 41%) indicated a preference for booklets/ posters/flyers as the format for a training program, liking that they

**Table 6: Participants' Perceived Need of Food Allergy Training Items (n = 32)**

| Training Item | *M* ± *SD*[a] | *n*(%) Very unnecessary | Somewhat unnecessary | Neither necessary or unnecessary | Somewhat necessary | Very Necessary |
|---|---|---|---|---|---|---|
| Training about food allergy. | 4.5 ± ***1.2*** | 3(9) | 3(9) | 0(0) | 0(0) | 26(81) |
| Training to identify major food allergens. | 4.5 ± ***1.2*** | 3(9) | 0(0) | 0(0) | 4(13) | 25(78) |
| Training on how to read ingredient labels for food allergen. | 4.5 ± ***1.2*** | 3(9) | 0(0) | 0(0) | 4(13) | 25(78) |
| Training on how to avoid cross-contact between foods during food preparation/service. | 4.6 ± ***1.0*** | 0(0) | 3(9) | 1(3) | 3(9) | 25(78) |
| Training on how to communicate with customers about allergens. | 4.5 ± ***0.9*** | 0(0) | 3(9) | 0(0) | 6(19) | 23(72) |
| Training on how to handle a food allergy reaction. | 4.4 ± ***1.3*** | 3(9) | 1(3) | 0(0) | 4(13) | 24(75) |

[a]5-point Likert scale used (1 = *very unnecessary*; 5 = *very necessary*)

**Table 7: Participant Mean Knowledge, Attitude, and Practice Scores with and without Food Allergy Training or Food Safety Certification**

| Food Allergy Training (*n* = 98) | Food Safety Certification (*n* = 95) | *M ± SD*[a] Knowledge | Attitude | Practices |
|---|---|---|---|---|
| No (n=x) | No (n=x) | 5.8 ± 2.9 | 3.4 ± 0.5 | 3.8 ± 0.8 |
| | Yes (n=x) | 7.6 ± 2.6 | 3.6 ± 0.4 | 4.3 ± 0.5 |
| Yes (n=x) | No (n=x) | 7.0 ± 4.2 | 3.8 ± 1.0 | 4.7 ± 0.3 |
| | Yes (n=x) | 9.0 ± 2.1 | 3.8 ± 0.5 | 4.6 ± 0.5 |

could "go over it on [their] own time" and that they could "always refer back to it" later. Many (*n* = 16, 29%) also requested a program in a traditional classroom-style setting with a lecture that presented the important material. One respondent liked the classroom-style lecture format "so everyone can take notes" but thought the class should also include a "booklet and posters for extra help" in understanding the information. Eleven participants were interested in an online class format for the training but another respondent made it clear that computer literacy levels varied significantly and that it may not be a good option for everyone. One participant remarked that any printed materials should understand the varying literacy levels within foodservice employees and that the examinations should come in multiple choice and true/false question formats.

Some respondents noted other training program considerations, including a need for programs to be offered in multiple languages (*n* = 2), to include visuals (*n* = 1), and to create programs that emphasized a personal perspective to make the experience of having food allergies or a food allergy reaction "more relatable."

**DISCUSSION**

This study examined the food allergy knowledge, attitudes, practices, training experiences, and future training preferences of employees in Chinese restaurants. The results found that while participants were able to identify major food allergens, food allergy reaction onset and symptoms, as well as some allergen-safe kitchen and service practices, areas of knowledge where improvement was needed were found. Participants' knowledge scores were high regarding practices to prevent cross-contact, but scores dropped when participants were asked how cross-contact occurs and how it could be hazardous for individuals with food allergies. This gap in scores suggests respondents may be conflating safe food handling practices learned from food safety that prevent foodborne illness and those that prevent food allergy reactions. This finding is consistent with previous research that found foodservice managers would use the terms "cross-contamination" and "cross-contact" interchangeably and were unaware of the difference between the terms (Wen & Kwon, 2016). Namely, "cross-contact" refers to the transfer of an allergen from an allergen-containing food to an allergen free food, whereas "cross-contamination" refers to the transfer of microorganisms from across food and/or equipment (Food Allergy Research & Education [FARE], 2018). Following safe food handling practices is important in the reduction of foodborne illness outbreak, however it does not lessen the risk of an food allergy reaction due to cross-contact (FARE, 2018) which customers believe to be one of the major causes of food allergy reactions in restaurants (Kwon & Lee, 2012). Training focusing on the severity of allergy and the importance of cross-contact—and how it differs from cross-contamination—has been suggested by medical professionals in the past (Sicherer & Sampson, 2018). To potentially help address this confusion for foodservice professionals, future training programs may wish to consider providing a glossary of food safety and food allergy terms and offer examples that help illustrate the concepts. Additionally, providing information to help foodservice professionals understand food allergies is an immunological disorder with potentially life-threatening reaction consequences could provide context for safe food allergen handling practices may also be useful for future trainings. Information regarding the difference between a food allergy and a food intolerance may also be helpful for foodservice professionals to understand the differences in reaction and potential for fatalities.

Food allergy reactions in restaurants are frequently attributed to the unknown consumption of an unidentified or hidden allergen (Anibarro, Seoane, & Mugica, 2007; Vierk et al., 2007). Hidden allergens have been identified as particularly problematic in Chinese restaurants due to the use of premade sauces and dishes (Kwon & Lee, 2012). Thus, it is recommended for individuals with food allergies and anyone involved in the purchasing, preparing, or serving of food

**Table 8: Correlations of Food Allergy Knowledge, Attitude, Practice, Certifications, Trainings (n = 95)**

| | | Practice Score | Knowledge Score | Attitude Score | Food Allergy Training | Food Safety Certification |
|---|---|---|---|---|---|---|
| Practice Score | Correlation | 1 | 0.316* | 0.398* | 0.344* | 0.393* |
| | Sig. | | 0.001 | <0.001 | <0.001 | <0.001 |
| Knowledge Score | Correlation | 0.316* | 1 | 0.360* | 0.347* | 0.383* |
| | Sig. | 0.001 | | <0.001 | <0.001 | <0.001 |
| Attitude Score | Correlation | 0.398* | 0.360* | 1 | 0.254* | 0.226* |
| | Sig. | <0.001 | <0.001 | | 0.007 | 0.014 |
| Food Allergy Training | Correlation | 0.344* | 0.347* | 0.254* | 1 | 0.363* |
| | Sig. | <0.001 | <0.001 | 0.007 | | <0.001 |
| Food Safety Certification | Correlation | 0.393* | 0.383* | 0.226* | 0.363* | 1 |
| | Sig. | <0.001 | <0.001 | 0.014 | <0.001 | |

*$p < .05$, one-tailed

| Table 9: Regression Analysis Summary (n = 93) | | | | | | |
|---|---|---|---|---|---|---|
| R | $R^2$ | Adjusted $R^2$ | df1 | df2 | F | Sig. |
| 0.53[b] | 0.28 | 0.25 | 4 | 90 | 8.90 | 0.00 |
| | | | Coefficients[a] | | | |
| | | Beta | t | Sig. | VIF | |
| Attitude Total | | 0.324 | 3.486 | 0.001 | 1.056 | |
| FS Certification | | 0.318 | 3.416 | 0.001 | 1.056 | |

[a] Dependent Variable: Practice Score Total
[b] Predictors: (Constant), Knowledge Score Total, Attitude Score Total, Food Allergy Training, Food Safety Certification
*p < .05

to allergic customers to be educated about the careful reading of food labels to reduce accidental exposure to allergens (Sheth et al., 2010). Problematically, as the findings show, participants lack knowledge regarding the use of food labels to reference whether ingredients contained within a sauce or food item contain a food allergen and recorded the lowest self-reported practice score for the reading of food labels for food allergen identification.

To help address the lack of knowledge and practice surrounding allergen identification on food labels, training developers may wish to consider creating programs focused entirely on learning how to use and understand food labels to identify major food allergens on packaged foods. For Chinese restaurants, it may be beneficial for managers to consider providing employees a reference booklet or posters listing allergens in the ingredients frequently used in their operations, as past research suggests visual-based food safety posters have been helpful in food safety training for educating immigrant foodservice workers (Rajagopal, 2013). Managers may also consider providing employees short trainings consistently over time regarding food allergen identification on food labels specific to the ingredients frequently used in their operations. Previous research has found that short, consistent trainings over time have improved food safety behavior among foodservice professionals (Adesokan, Akinseye, & Adesokan, 2015). Managers in Chinese restaurants may find training useful in helping to modify food allergen handling practices in hopes of reducing food allergy incidents.

Based on the findings, respondents' knowledge and training gaps also extended to responding to food allergy reactions as participants struggled with identifying the correct medication used in a severe food allergy reaction and selecting the best first response to a reaction in the restaurant. This study supports previous research reports that foodservice employees felt unsure and untrained on what to do if a customer has a food allergy reaction (Radke et al., 2017) with just over a quarter (n = 9, 28%) of respondents reporting no training on how to handle a food allergy reaction as compared to training on identifying food allergens (n = 2, 6%), reading food labels (n = 3, 9%), cross-contact (n = 2, 6%), and risk communication (n = 2, 6%). Despite the participants' low knowledge scores regarding reaction management and self-reported lack of training regarding reaction management, participants' perceived need of training regarding food allergy reaction was lower than other topics of food allergy training, supporting previous research concluding that foodservice employees had misplaced confidence in their own food allergy knowledge and training needs (Ahuja & Sicherer, 2007; Bailey, Albardiaz, Frew and Smith, 2011; Common et al., 2013). Medical journals and food allergy advocacy groups advise immediate action particularly when handling a severe food allergy reactions (anaphylaxis) to reduce the risk of fatalities (NASEM et al., 2016; Sicherer & Sampson, 2018). Given the importance of a timely, appropriate, and accurate response to a food allergy reaction it is critical in the prevention of a fatality, trainings should not only include, but heavily emphasize, how to appropriately respond to reactions to reduce preventable deaths as foodservice employees are not aware of their own knowledge gaps and training needs.

| Table 10: Participants' Preferred Format for a Food Allergy Training | |
|---|---|
| **Format** | ***n*** |
| Printed Format (booklet/poster/flyer) | 24 |
| In-Person Class (lecture/seminar/class/ presentation) | 16 |
| Online Class | 11 |
| Mobile application | 4 |

Implementation of food allergy accommodation policies or strategies can help reduce incidents of food allergy reactions in restaurants by improving communication between staff and with customers, and by ensuring accurate information is provided to customers (Wen & Kwon, 2016). Previous literature indicates that a lack of formal policies had been common in foodservice (Enriquez, Furlong, Ibrahim, & Twersky-Bumgardener, 2007). More recent research suggests that for many restaurants across the U.S. the trend has changed, and food allergy accommodation strategies are increasingly commonplace (Lee & Barker, 2017). This was not necessarily reflected in the restaurants included in this sample, as seen in the kitchen and service staff's self-reported practice score for policies and training, suggesting that the sample's restaurants likely lacked formal food allergy policies or accommodation procedures. Despite this, the respondents of this study had high attitude scores toward providing customers with accurate food ingredient information and adapting food handling practices to accommodate food allergy customers indicating that employees are willing to participate in practices to help reduce food allergy reactions in restaurants. Given the importance of risk communication in the reduction and prevention of food allergy reactions in restaurants (Wen & Kwon, 2016; Leftwich et al., 2011), and the willingness of employees to communicate accurately with customers regarding food allergies as found in the current study, it may be beneficial for future food allergy resources to provide information specific to managers, about how to develop and implement food allergy policies that capitalize on employee interest in improving their own practices, particularly with regard to risk communication with customers, for their foodservice operations.

Overall, the current study found food allergy knowledge to be poor. In a previous study assessing food allergy knowledge of foodservice professionals using a separate questionnaire, a national sample reported food allergy knowledge scores of 70.5% ($M$ = 19.74 ± 4.61) and 72.2% ($M$ = 20.21 ± 4.64) for Alabama (Lee & Barker, 2017), both higher than the current study's score of 62.5% ($M$ = 7.5 ± 4.61). Although the results of the two studies cannot fairly be compared given the different instrument used in knowledge assessment, the Lee and Barker (2017) study provides some data to contrast these findings

against. Thus, the lacking food allergy knowledge of the study's participants may provide one possible explanation for the higher allergy incidence rate in Chinese restaurants.

Participants with food safety certification were found to have higher knowledge, attitude, and self-reported practice scores than participants that did not, and those with food allergy training resulted in even higher mean scores across all categories. The results show that food safety certification may improve food allergy knowledge, attitude, and practice scores, and that food allergy specific training can result in even greater improvement of food allergy knowledge, attitude, and practice scores. However, only practice scores saw a significant mean difference between those that did and did not receive food allergy training (Table 10). Food safety certification and food allergy trainings were found to significantly correlate with increased knowledge, which in turn saw greater attitude scores, contributing to safer food allergen handling practices. Ensuring the ready availability of food allergy training and resources for foodservice employees of Chinese restaurants to address the gaps in knowledge and the resulting attitude and practice gaps may help reduce incidence of food allergy reaction.

Although past research reports barriers to food allergy training including lack of awareness, knowledge, and training (Kwon & Lee, 2012), as well as lack of employee commitment and interest, scheduling issues, and high employee turnover (Lee & Barker, 2017), this study did not find respondents had a negative attitude toward food allergy training, suggesting alternate barriers to training may be to blame.

Participant knowledge, preferred language, and self-reported English fluency results suggest language as a training barrier, supporting previous findings of food safety training in ethnic restaurants (Choi & Rajagopal, 2013; Liu & Kwon, 2013). Respondents with comfort communicating in English and with high levels of English fluency had greater knowledge scores than those more comfortable communicating in Mandarin or Cantonese, or that reported "poor" fluency levels.

Additionally, differing cultural values have been identified in past research has barriers to the promotion of food safety (Mauer et al., 2006; Liu & Kwon, 2013). Results found the level of knowledge regarding food allergies were lower for foodservice employees born outside the U.S., supporting previous findings that food allergies were relatively unfamiliar to Asians and not yet recognized as a medical condition in the general population within Asia (Lu, Elliot, & Clarke, 2014). Lu, Elliot, and Clarke (2014) found food allergies were unknown to many of the study's participants and allergen terms were not familiar to participants as only 28% of participants were able to say food allergy in Chinese (Mandarin or Cantonese) and none could identify a Chinese term for "anaphylaxis", confirming the need for culturally appropriate food safety resources to improve consumer food safety in ethnic restaurants (Mauer et al., 2006). Thus, for future food allergy trainings, simply translating food allergy training programs in a greater diversity of languages to address language barriers may not be sufficient, as trainings translated into Chinese still may not adequately address whether the programs are appropriately meeting the cultural needs and using the correct terminology to best communicate the varied topics within food allergy as it pertains to the foodservice industry.

Although previous research has found that food safety training can have positive outcomes on food safety knowledge, the literature on training and improved knowledge on improving safe food handling behaviors or practices indicate that transferring knowledge to practice can be inconsistent. Several studies (Koechlin, 2009; Mathias et al., 1994; Mitchell, Fraser & Bearon, 2007) have noted the gaps that exist between training and behavior change, while some have found mixed results or some success (Adesokan, Akinseye, & Adesokan, 2015; Pilling et al., 2008; Roberts et al., 2008). Frash and MacLaurin (2010) concluded that while adequate knowledge was a mandatory prerequisite for positive transfer of training, training alone was insufficient to motivate a behavioral change. The authors noted that employee attitudes and outlooks towards food safety training may help promote safe food handling behaviors. Additional research also suggests that foodservice employees' behaviors are more likely to improve when training is sensitive to other motivating factors, such as managerial commitment, and addressing organizational and individual barriers (Mitchell, Fraser, & Bearon, 2007).

Previous literature found customers' perceived employee attitudes towards individuals with food allergy as a barrier to food allergy accommodation, believing restaurant staff considered accommodation requests as a nuisance (Kwon & Lee, 2012). Attitude score results indicated foodservice employees in Chinese restaurants had predominately positive attitudes towards welcoming customers with food allergies and did not wish to exclude them from the restaurant or perceive them to be difficult diners. This mirrors previous studies about foodservice employees' attitudes and food allergies with the majority of employees having more positive attitudes towards food allergies than are believed or perceived by customers (Choi & Rajagopal, 2013; Leftwich et al., 2010). In light of previous research regarding transfer of knowledge to behavior, future trainings may wish to address motivating factors, such as organizational barriers and managerial commitment. Trainers may consider exploring programs that encourage empathy for individuals with food allergies and emphasize the potential benefits of accommodating individuals with food allergies to help improve attitudes. It may also be useful to explore development of manager-focused training on how to create supportive food allergy safe workplaces, in promotion of managerial support and to support positive work habits for food safety (Arendt, Strohbehn, & Jun, 2015).

**CONCLUSIONS AND APPLICATIONS**

This study assessed food allergy knowledge, attitudes, practices, and food allergy training needs and preferences of employees of Chinese restaurants. Findings showed most employees in Chinese food restaurants did not receive food allergy training, however those that did complete food allergy training were found to have higher knowledge, attitudes, and practice scores. Only one-third of participants reported having receiving food allergy training, however, employees' attitudes and self-reported accommodation practices were high, suggesting employees may be willing to adapt—or may already be incorporating—practices to accommodate individuals with food allergies. Despite a willingness to accommodate customers with food allergy, the gaps in food allergy knowledge, particularly with regards to cross-contact, suggest that practices may have limited efficacy as practices completed without the context of knowledge may not helpful in keeping food safe from allergens.

This study supported past research findings that food safety training for ethnic restaurants should be culturally appropriate and specific to ethnic-foods, to ensure effective communication in the appropriate languages, and be easily accessible to the foodservice industry (Mauer et al., 2006). Training preferences noted by respondents also included an interest in printed materials (poster, flyer, booklet) with information and/or visuals that referenced Chinese cuisine specific dishes in the appropriate Chinese dialect (Mandarin, Cantonese, etc.)

that could be kept as a reference guide in future. Programs should also be further developed to meet the needs of food allergy training identified in this research, placing greater emphasis in preventing food allergy reactions (cross-contact, risk communication) and responding appropriately to incidences when they do occur.

To ensure accessibility, reference resources for employees of Chinese restaurants should be developed and provided to restaurants to ensure food allergy information is reaching foodservice staff other than the managers required to complete ANSI-accredited training. Thus, capitalizing on the willingness of employees to accommodate food allergy customers and provide opportunities to improve food allergy knowledge without necessitating formalized food allergy training. Future trainings should also look towards developing programs specifically targeted at managers to assist in the development and implementation of accommodation policies and strategies to ensure the lessons of food allergy training are continued in the workplace.

This study has some limitations. The study used a small sample of employees in Chinese restaurants in Chicago, Illinois, therefore, the results cannot be generalized to other ethnic restaurants or other metropolitan areas and may not be representative of the entire population of employees in Chinese restaurants. The effect size of the study was also small and so the findings and conclusions should be considered carefully before its use and application in future food allergy training programs.

The respondents' higher food allergy attitudes scores may be due to avidity bias among the participants, as those willing to participant in the study had a greater interest in the topic, potentially enhancing the study's overall attitude scores. Additionally, food allergy handling practices were self-reported which may have resulted in higher scores due to social desirability bias, as participants may have selected what they believed to be the desired responses and not responses that reflected their actual practices. While it is not possible to determine the extent to which the participants followed the practices reported by the data, it is very likely that respondents over-reported their adherence to following safe food allergy handlings practices. Future research may wish to use research designs that can explore the actual, observed practices of foodservice employees in Chinese restaurants to help mitigate some of the bias due to self-reporting.

Participants in this study reported their roles included responsibilities spanning the front and back of house which created variation in the sample size for self-reported practices in the data. Future research may wish to modify the questionnaire used to collect greater detail regarding the job roles and categories of the study's participants.

During data collection, several respondents preferred discussing their attitudes and practices to completing the survey, revealing information that was not necessarily reflected by the data collected by the questionnaire. Given that attitudes towards food allergies have been found to be a possible cultural barrier for safe food allergy practices, future studies examining attitudes of Chinese restaurant employees may wish to use a qualitative approach to more fully explore attitudes. Future research exploring the food allergy training needs of employees of other ethnic cuisines that have been identified as high risk for individuals with food allergies could also help provide information for improving food allergy training.

Although the participants in this study indicated a preference for trainings to be presented in printed forms, in-person classes, online classes, or mobile applications, previous research has found foodservice professionals preferred or generally enjoyed video-based learning for food safety training (Lillquist, McCabe, & Church, 2005; Salazar, Ashraf, Tcheng, & Antun, 2005). Future research may wish to further explore the training format preferences of employees of Chinese restaurants or examine the efficacy of the various training delivery methods on food safety knowledge, attitudes and practices for this population.

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Research Contribution

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# PREDICTORS OF DISHONESTY IN COLLEGE STUDENTS: EXPLORING PERCEPTIONS OF A SELF-SERVICE FOOD TRANSACTION SYSTEM

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**ABSTRACT**

This study examined students' perceptions towards a self-service food and drink transaction system that was being considered in an academic building on a university campus. The inquiry was guided by a research question concerning students' perceptions of this type of system built on customer honesty. Several research hypotheses predicted that constructs such as integrity, social phobia, and gender would play a role in whether students would be dishonest in their use of this type of honor system that allowed customers to make their own transactions. Results reveal four major findings: 1) students felt comfortable with the notion of a hypothetical self-service transaction system, 2) men reported they were more likely to be dishonest than women using a self-service transaction system, 3) existing antisocial behaviors among students served as significant predictors of potential cheating in this type of honor system, and 4) a third-person effect emerged, showing that students were inclined to perceive other students would be more likely to commit dishonest behaviors than they would themselves if such a transaction system was implemented for food transactions.

**Keywords:** food honor system, college students, dishonesty, deception, third-person effect

## INTRODUCTION

Dishonesty and deception are a ubiquitous part of human communication – and as such this type of behavior is represented on college and university campuses. Institutions of higher education are *moral communities* that put a great deal of value in truth telling and honesty. However, academic misconduct (Conway, Hard, & Moran, 2006), theft (Allen, 1997), and student-instructor deception (Griffin, Bolkan, & Goodboy, 2015) are examples of potentially unethical behaviors occurring on college campuses. Information and communication technologies may facilitate engagement in deception and ease of employing immoral acts; for example, in the classroom context, cut and paste is a common plagiaristic behavior which is relatively easy for students to use (Bretag, 2015). Students also use their various techniques to try to scam attendance systems, either by using false excuses (lies) or through the use of technology (Kinoshita, Niibori, & Kamada, 2018).

Academic dishonesty and cheating are common to students. The International Center for Academic Integrity reported on their website that 68% of a sample of 71,000 undergraduate students surveyed between 2002 and 2015 admitted to cheating on a written assignment or test. However, acts of dishonesty on campus are not limited to the work students submit for course grades or their academic activity online. There are other contexts where students must enact their own morals and abide by ethical principles. One such example is food purchase systems that rely on customers to document their own transactions via an honor system (self-service transactions). This type of food store was proposed by the Dean of the college where this study took place – thus, providing an ample opportunity to examine dishonesty in an academic context outside of standard cheating and plagiarism practices.

College campuses are unique social settings because they uphold truth-telling and integrity to such an extent that many institutions ask their students to pledge to honor codes and abide by codes of conduct. There are different benefits that may influence college students towards honest behaviors. One example would be students who abide by an honor code may reap the benefits of un-proctored exams (O'Neill & Pfeiffer, 2008). The preservation of moral communities, such as college campuses, can also increase the prevalence of positive moral emotions such as elevation, gratitude, and empathy. Elevation has been studied as a positive moral emotion; described as a warm or glowing feeling that is experienced by individuals when viewing someone making a virtuous choice. It has been found to prompt people to help others (Haidt, 2000).

Opportunities for learning about and practicing ethical behavior and facing difficult decisions are beneficial for college students. Some college campuses have enacted mandatory ethics courses for all students, and have found that the experience increases students' comfort in dealing with ethical issues (Polczynski, Rozmus, & Carlin, 2019). College provides students with many contexts that allow them to practice making difficult decisions and develop personal ethical codes. One such situation that seems to activate one's propensity to engage in honest (or dishonest) behaviors are self-service technology transactions systems (Meuter, Ostrom, Bitner, & Roundtree, 2003) that rely on one's own trust to enact monetary transactions. Such food stores that are located on college campuses not only provide direct and obvious benefits (savings due to not paying employees or easy access to food items not otherwise available), but also provide a space for students to engage in experiences that involve ethical and moral choices.

### Honor Systems

Honor systems and honor codes function as moral guidelines. Honor codes dictate or prescribe certain behaviors that are not allowed in particular contexts/settings (Tatum & Schwartz, 2017). Honor systems in the context of transactional purchases are generally thought of as systems where an exchange is made, but where there is no surveillance or a person to enforce the honest exchange of money for some service (e.g., a newspaper stand with no attendant; Brudermann, Bartel, Fenzl, & Bauer, 2015). In academic settings, honor systems can be somewhat ineffective in that students tend not to report the dishonest behaviors of others (Mathews, 1999). However, McCabe, Trevino, and Butterfield (2001) found that students were more apt to report peer cheating when their school has an honor code and the code reinforces students' responsibility to peer report. Other research has found, however, that the social

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pressure of being ridiculed for reporting dishonesty or theft was shown to be stronger than the desire to uphold personal integrity (Trevino, 1993).

The lack of literature on self-service food transaction honor systems on college campuses and the proposed idea for an actual food honor system in our academic building led to the exploration of this study's guiding research question*: What are students' perceptions towards a hypothetical food honor system?* The study was conducted to investigate students' perceptions toward a self-service food transaction honor system which was proposed as a solution to the lack of food resources in a specific academic building on campus. The inquiry was guided by an interest in establishing whether students felt this type of honor system would work, but also to extend previous research on student deception and dishonesty. This study explored several main factors that may exert influences on students' opinion and behaviors regarding a food transaction system that relies on honor and trust in an academic environment.

Honesty and integrity may not simply be things that people *do*, but these concepts may also be influenced by personality traits and personal dispositions. For example, people who are higher in extraversion and neuroticism have been found to be more likely to cheat on tests, while people who are higher in conscientiousness and agreeableness were less likely to cheat or deceive (Aslam, 2011). External factors such as parental income during childhood and adolescence have also been shown to be a predictor of delinquency and dishonesty. The higher income a family has, the less likely the child behaves in a delinquent manner (Mercer, 2015). Antisocial behavior in adolescents could also be a predictor of delinquency and dishonesty later in life. Pajer (2014) found that antisocial behavior during adolescence increases the likelihood of future criminal behavior. Based on these types of findings and the notion that a person's predispositions and personality traits may influence their (ethical) behaviors surrounding a self-service food honor transaction system, we developed the following research hypothesis:

*Hypothesis 1: Antisocial tendencies will be positively related with the likelihood of dishonesty in a self-service food honor transaction system.*

### Social Anxiety

Social anxiety impacts multiple aspects of people's lives. For example, people who struggle with social anxiety often find it challenging to form and develop relationships. Social phobias, like agoraphobia (the fear of places or situations that might cause embarrassment), usually manifest themselves in adolescence and go untreated, despite evidence of social impairment (Magee, 1996). Social phobias are characterized by high levels of fear of authority figures, talking to strangers, and (maybe most importantly to our study) doing things while strangers are watching (Connor, 2000). Because a self-service transactional food honor system is related to making decisions and exchanges in public, and because of the potential to be thought of as deceptive person (a negative characteristic), we proposed a second hypothesis:

*Hypothesis 2: Higher levels of social anxiety will be negatively related to the use of a self-service transactional food honor system.*

### Sex Differences in Dishonesty

The sex of a person could also contribute to whether they would report dishonest behavior. Studies have found that men are more likely than women to engage in dishonest behaviors such as cheating (Storch, 2001). Also, the frequency in which men use the Internet to plagiarize is almost the same as the frequency in which they use more traditional methods of plagiarism (Dreber & Johannesson, 2008). Furthermore, Dreber and Johannesson (2008) conducted an experiment pertaining to whether individuals would lie to keep more money. While some prior research suggests that women are more likely to lie than men, (De Paulo et al., 1996; Tyler et al., 2006), Dreber and Johannesson found when the potential for a monetary gain is at stake, "women are more altruistic, more risk averse and less competitive than men" (Dreber & Johannesson, 2008; p. 198). Therefore, guided by the research findings on sex differences in cheating behavior we proposed the following hypothesis:

*Hypothesis 3: Compared to women, men will believe they are more likely to be dishonest in a self-service transactional food honor system and thus will self-report higher incidents of dishonest behaviors.*

### Integrity

Youth who avoid acts of delinquency such as vandalism and theft, have been found to score high in the categories of conformity and honesty (Mercer, 2015). Moral equity and relativism (the belief that no point of view is the absolute truth) are also strong indicators of high levels of personal integrity (Manly, 2013). Academic integrity, or the aversion to cheating or plagiarism (Cronan, Mullins, & Douglas, 2018), can also be a valid predictor of personal integrity outside of the context of the classroom. Research in this context inspired the fourth hypothesis of this study:

*Hypothesis 4: Higher levels of integrity will be positively related to reported use of honesty in a hypothetical self-service transactional food honor system.*

### Perspectives and Biases on Views of Others

Research has found that onlookers may project personality traits onto a person that is seen stealing or deceiving. In the context of food purchase thefts, thieves are seen as sneakier and less trustworthy in general, but also are seen as having more self-confidence (Alley & Kooi, 2015). Stealing food is a behavior that is not socially acceptable and most people would not want to be labeled as a thief. People are quick to associate negative, and internal (i.e., personality) attributes with stealing behaviors of others while maintaining rational and external excuses for the same behaviors for themselves. This type of bias is known as the attribution bias (Heider, 1958) or the fundamental attribution error (Jones & Harris, 1967), or more recently dubbed the correspondence bias (Gawronski, 2004). Also, the third person effect (Davison, 1983) has been found to create a distortion of perception in that people believe that others are more heavily influenced by negative events or messages (than they are or would be themselves). These phenomena are likely at play in the beliefs about one's own behavior toward a hypothetical self-service food honor transactional system. These theoretical frames helped to form the basis of the final hypothesis.

*Hypothesis 5: Students will report that others would be more likely to be dishonest when relying on a hypothetical self-service food honor transactional system.*

Guided by the preceding research question and hypotheses we analyzed students' perspectives about a proposed hypothetical self-service food honor transactional system, and gauged whether or not they felt that they, as individuals, and the campus population at large would be honest with such a system in place.

## METHODS

### Participants

The institutional research board approved this research before any data collection occurred and all standard protocols for ethical research were followed. Through the use of an anonymous paper survey, a total of 181 undergraduate students were recruited from

introductory-level communication courses. Course extra credit was provided to student participants. One respondent did not provide adequate information. Of the 180 usable responses, 119 were female (66.11%) and 61 were male (33.89%). Also, 17 were freshmen (9.44%), 60 were sophomores (33.33%), 68 were juniors (37.78%) and 33 were seniors (18.33%).

**Procedures**

With the permission of instructors, we distributed paper questionnaires during the first 20 minutes of class time at a large university in the southern United States. After hearing a brief explanation of a proposed self-service food honor transaction system in the building where the recruitment took place, students signed a consent statement, participants then completed the questionnaire. The scales used in the study include an integrity scale, social phobia symptom scale, and an antisocial behavior scale. We deleted items that are not applicable to the current study.

**Instrumentation**

To assess integrity, we used the Schlenker (2008) integrity scale, which included 18 items and was measured on a five-point Likert scale ranging from 1 (strongly disagree), to 5 (strongly agree), with higher scores indicating strong endorsement of principled ethics. According to Schlenker (2008), the scale seeks to measure "the inherent value of principled conduct, the steadfast commitment to principles despite temptations or costs, and the unwillingness to rationalize unprincipled behavior" (p. 1084-1085).

Questions related to social phobia came from a scale with eight true/ false items. The social phobia symptom scale belongs to a subsection of the psychiatric diagnostic screening questionnaire developed by Zimmerman (2002). The social phobia symptom scale contains 15 items with eight of the items focused on situation-specific forms of phobia symptoms.

The third section of the survey contained the Schlenker (2008) antisocial behavior scale (e.g., lies, theft, academic cheating, cheating others, broke promises), consisted of five subscales of lying (14 items), stealing (15 items), academic cheating (4 items), broken promises (4 items), aggression (8 items), and infidelity (1 item). In the scale, a five-point Likert answer choice was used for all the questions with responses ranging from 1 (never), to 5(always), with higher scores indicating higher tendencies for antisocial behaviors. The items of each scale and the Cronbach's alphas have been summarized in Table 1.

**RESULTS**

The guiding research question for this study set out to investigate students' perceptions of a hypothetical self-service food honor transaction system. Two measures were used to test students' perceptions of the honor system: the extent of whether they felt comfortable using a transactional system for food purchases where they were the only observer of their own honesty; and the degree to which student's would feel nervous relying on a self-monitored honor system for food purchases. The exact question on the questionnaire to measure comfort was: "I would be comfortable using an honor system to make food purchases." The mean of students' response to the extent of how comfortable using an honor system is 4.1 (M = 4.1 ± 0.64).Using a five-point response choice, a 3.0 (midpoint) was used as the cut point to compare participants 'comfort toward using the hypothetical food honor system. A single-sample *t*-test was used to compare the mean of students' comfortable feeling to the neutral mid-point. A significant difference was found ($t(180) = 15.1$, $p<0.001$). The mean of students' comfortable feeling of 4.1 (M = 4.1 ± 0.64) is significantly greater than the midpoint. In other words, students reported that they would feel comfortable using a hypothetical food honor system (Table 2).

Additionally, the statement "participating in an honor system for food purchases would make me nervous" was included on the survey to investigate whether participants would be nervous using this type of transactional system for food purchases. We employed a reverse coding method to transform the data from this item. That is, the higher the score on this item, the less nervous participants reported they would feel. Again, relying on a 3.0 as a cut point (midpoint score) to compare participants' responses regarding nervousness a single-sample *t*-test was conducted to compare the mean of students' feelings to the neutral mid-point. A significant difference ($t(180) = -8.5$, $p<0.001$) revealed that the mean of students' nervous feelings of 3.75(M = 3.75 ± 1.18) was significantly greater than that of the midpoint showing students were not overly nervous. In other words, students were not overly nervous with the idea of using a hypothetical food honor system.

Further, in order to explore the relationships between students' likelihood of engaging in dishonest activities in the food honor system and other reported antisocial behaviors, two linear regression analyses were conducted. Students' likelihood of engaging in dishonest activities in the food honor system was measured through the item "How likely are you to engage in dishonesty when using a food honor system?" *Hypothesis 1* and *Hypothesis 4* explored the relationship between students' dishonest behaviors and the two predictors: (a) antisocial behavior tendency and (b) integrity. In order to detect any multicolinearity between these two predictors, the variance inflation factor (VIF) was tested. Based on the results, all three factors' VIF value is 1.2, which was close to 1.0, meaning that these two factors are relatively independent and no multicollireaity was found among these two predictors (i.e., constructs).

The predictors were respondents' self-report on the extent of their antisocial behavior and social anxiety and the outcome was their perception towards their predicted behaviors in a hypothetical self-service food honor transaction system. The first hypothesis predicted that antisocial behaviors were positively associated with the likelihood of dishonesty in a self-monitored food purchases. Based on the linear regression analysis, antisocial behavioral tendency was a significant predictor for students' likelihood of engaging in dishonest activities in the food honor system($\beta = 0.86$, $t(0.154) = 4.53$, $p<0.001$). Therefore, students who were more likely to have existing antisocial behavioral tendencies, were more likely to report engaging in dishonest activities when using the food honor system. This finding supported the study's first hypothesis.

The second hypothesis predicted students with high levels of social anxiety would be less likely to use a food honor system. Based on the results, social phobia was not a significant predictor for students' likelihood of using a food honor system ($\beta = 0.041$, $t(0.22)= 1.93$, $p>0.05$).Therefore, the second hypothesis was not supported (Table 3).

The third hypothesis focused on sex differences within dishonesty; the prediction was that men, as compared to women, would engage in more potentially dishonest behaviors in a hypothetical food honor system. An independent sample *t*-test explored this hypothesis, and based on the results; men (M=1.99 ± 1.2) were more likely to engage in dishonest activities than women ($M=1.50 \pm 0.84$,$t(91.71) = 2.81$, $p< 0.05$). Therefore, the third hypothesis is supported, and the data revealed a sex difference in self-reported behaviors associated with dishonesty in the proposed hypothetical food honor system ( Table 4).

The fourth hypothesis examined the relationship between integrity and students' likelihood of engaging in dishonest behavior in food honor purchases. A linear regression investigated this relationship. The predictor variable is students' self reported integrity, and the outcome variable was the likelihood of engaging in dishonest activities in the food honor system. The linear regression analysis revealed that integrity served as a significant predictor for students' likelihood of engaging in dishonest activities in the food honor system ($\beta$ = -0.29, $t$ (0.15)= -1.83, p>0.05).This finding contradicted what was anticipated and therefore, the fourth research hypothesis was not supported (Table 3).

The last hypothesis examined the influence of inherent biases on the perceived dishonest behavior of others with regard to their use of a hypothetical food honor system. Results showed a significant difference between students' perspective toward themselves and toward others in terms of using food honor system ($t$ (360) =18.64, p<0.001). The mean for students who reported that they would be more likely to engage in dishonesty when using a food honor system is 1.67 (M = 1.67 ± 0.99) while the mean for students who believe others would be more likely to engage in dishonesty when using a food honor system is 3.55 (M = 3.55 ± 0.92). In other words, students tended to believe other people are likely to behave dishonestly when using the food honor system, demonstrating a bias in how they see their potential behaviors and those of others using the system. Thus, hypothesis 5 was supported.

**DISCUSSION**

Academic dishonesty is a construct (Popham, 2017; Whitley & Keith-Spiegel, 2001) that describes the many academic behaviors that are prohibited on college campuses. Recent research has found that academic dishonesty may also include deceptive communication that involves interpersonal dynamics (Griffin et al., 2015). The current study adds to the literature on dishonesty in the academic context in a novel way because it explored students' perceptions and expectations of their own behavior and the actions of their peers in a new context—a proposed self-monitored food honor transaction system located in an academic setting. Answers to the research

**Table 1: Scales and Reliabilities**

| Integrity Scales | Items | Alpha | Mean |
|---|---|---|---|
| (1 is the lowest and 5 is the highest) | It is foolish to tell the truth when big profits can be made by lying.<br>No matter how much money one makes, life is unsatisfactory without a strong sense of duty and character.<br>Regardless of concerns about principles, in today's world you have to be practical, adapt to opportunities, and do what is most advantageous for you.<br>Being inflexible and refusing to compromise are good if it means standing up for what is right.<br>The reason it is important to tell the truth is because of what others will do to you if you don't, not because of any issue of right and wrong.<br>The true test of character is a willingness to stand by one's principles, no matter what price one has to pay.<br>There are no principles worth dying for.<br>It is important to me to feel that I have not compromised my principles.<br>If one believes something is right, one must stand by it, even if it means losing friends or missing out on profitable opportunities.<br>Compromising one's principles is always wrong, regardless of the circumstances or the amount that can be personally gained.<br>Universal ethical principles exist and should be applied under all circumstances, with no exceptions.<br>Lying is sometimes necessary to accomplish important, worthwhile goals.<br>Integrity is more important than financial gain.<br>It is important to fulfill one's obligations at all times, even when nobody will know if one doesn't.<br>If done for the right reasons, even lying or cheating are ok.<br>Some actions are wrong no matter what the consequences or justification.<br>One's principles should not be compromised regardless of the possible gain.<br>Some transgressions are wrong and cannot be legitimately justified or defended regardless of how much one tries. | 0.80 | 3.62 |
| Social Phobia Symptom Scales (15 is the highest and 0 is the lowest) | Did you worry a lot about embarrassing yourself in front of others?<br>Did you worry a lot that you might do something to make people think that you were stupid or foolish?<br>Did you feel very nervous in situations where people might pay attention to you?<br>Were you extremely nervous in social situations?<br>Did you regularly avoid any situations because you were afraid you'd do or say something to embarrass yourself?<br>Did you worry a lot about doing or saying something to embarrass yourself in any of the following situations?<br>Public speaking<br>Eating in front of other people<br>Using public restrooms<br>Wring in front of others<br>Saying something stupid when you were with a group of people<br>Asking a question when in a group of people<br>Business meetings<br>Parties or other social gatherings<br>Did you almost always get very anxious as soon as you were in any of the above situations?<br>Did you avoid any of the above situations because they made you feel anxious or fearful? | 0.83 | 5.09 |

**Table 1: Scales and reliabilities (continued)**

| Integrity Scales | Items | Alpha | Mean |
|---|---|---|---|
| Antisocial Behavioral Scales (1 is the lowest and 5 is the highest) | How often have you lied in order to…?"<br>___1. Protect a friend's feelings<br>___2. Minimize conflict<br>___3. Avoid embarrassing someone<br>___4. Impress friends<br>___5. Impress an employer<br>___6. Avoid personal embarrassment<br>___7. Protect one's reputation<br>___8. Gain a financial reward<br>___9. Gain a reward from an employer<br>___10. Avoid a financial loss<br>___11. Avoid an undesired relationship<br><br>" How often have you stolen something from…?"<br>___ 1. An acquaintance<br>___ 2. A friend<br>___ 3. A family member<br>___ 4. A romantic partner<br>___ 5. An employer<br>___ 6. A stranger<br>___ 7. A store<br><br>" How often have you shoplifted or stolen something from a store…?"<br>___1. Because they treated customers unfairly<br>___2. To impress someone<br>___3. For the thrill of it<br>___4. To get something you wanted<br><br>" How often have you stolen something from another person (e.g., stranger, acquaintance, employer, friend, family member, romantic partner)…?<br>___1. Because that person treated you unfairly<br>___2. To impress someone<br>___3. For the thrill of it<br>___4. To get something you wanted<br><br>Considering YOUR LAST SIX MONTHS WHILE IN COLLEGE, please answer each item by writing in your response on the line next to each question, where<br>___1. Threw something at someone<br>___2. Teased someone in a hurtful way<br>___3. Insulted someone in a hurtful way<br>___4. Got in physical fights<br>___5. Physically attacked people (initiated the attack)<br>___6. Damaged or destroyed things belonging to others<br>___7. Threatened to hurt other people (initiated the threats)<br>___8. Tried to frighten others<br>___9. Cheated on an exam in high school<br>___10. Cheated on a paper in high school<br>___11. Cheated on a paper in college<br>___12. Cheated a stranger<br>___13. Cheated a friend<br>___14. Was unfaithful to a romantic partner (i.e., infidelity)<br>___15. Broke a promise to a romantic partner<br>___16. Broke a promise to a family member<br>___17. Broke a promise to a friend<br>___18. Broke a promise to an employer | 0.93 | 1.56 |

question and examining the predictions set out by the hypotheses in this study began a valuable and interesting discussion about the role personality, experience, sex, and perception/biases play in a potential food honor system.

Our first research question allowed us to ask whether students would be comfortable using an self-service food honor transaction system for purchases – our findings show that they would. One concern about a potential honor system for food purchases could be that it would make people uneasy and uncomfortable when making

| Table 2: Perception and Feelings Toward using Hypothetical Food Honor System | | | | | |
|---|---|---|---|---|---|
| | **Cut point** | **M** | **N** | **Single-sample t test** | **P value** |
| Perception | 3.0 | 4.1 | 180 | 15.1 | 0.001 |
| Feeling (nervous) | 3.0 | 3.75 | 180 | -8.5 | 0.001 |

purchases because people naturally feel nervous under a surveillance camera (Goold, 2003). Perhaps some individuals would feel scrutinized or this type of transaction system might induce feelings of guilt because of the potential for others to suspect theft (Gill, 2005). This did not seem to be the case in our sample– students reported feeling comfortable with the idea of engaging in purchases that asks them to rely on an honor system.

As predicted, the more antisocial behavioral tendencies students possessed in their lives the more likely they would be to report they would potentially engage in dishonest activities when using a food honor transaction system. This study's first hypothesis predicted that students with behaviors that previous research has categorized as antisocial would correlate with dishonesty in a food based honor system. Based on the current data from student responses and statistical analyses this hypothesis was supported. People who steal, and engage in other antisocial behaviors, break social conventions and because a food honor system operates on rules these same people are more likely to report they would be less than honest in this context (Giacalone, 1997; Qualls, 2014). People with antisocial tendencies might be more likely to extend their behaviors to new contexts that mirror the expectations their prior experiences dictated from them.

The data from the students' responses did not support the predictions of the second research hypothesis. Based on the results, social phobia was not a significant predictor for students' likelihood of using a food honor system. Based on prior research about social phobias we predicted that students with these traits would be more likely to avoid a food honor system that relied on them making their own transactions in a public space. We expected that the feeling of projected guilt of the potential to be accused of theft would discourage students high in social anxiety to avoid an honor system. Instead, maybe those with high social phobia might be more likely to use this type of system, because after all – using a self-service honor system of this type means that students can avoid interacting with a food service worker or cashier who might otherwise raise their anxiety or enact their phobias of communicating with other people.

What is difficult to understand from this study's findings is that integrity scores were not a significant predictor for students' likelihood of engaging in dishonest activities in a food honor system. The results from data analyses did not support the predictions of the fourth research hypothesis. Perhaps the contexts that were laid out in other social contexts in the integrity scales did not resemble the behaviors that students feel they would engage in during a self-service monetary transaction for food purchases. Using a food honor system was a novel experience for most people and imagining one's behavior during a food purchase in an academic building may even be more challenging. Future research should measure previous experiences with stealing behaviors as a predictor of dishonesty in a self-service food honor system.

Third person effects are well-documented phenomena (Rosenthal, Detenber, & Rojas, 2018; Scanlon, & Neumann, 2002; Megehee, & Spake, 2008). We predicted that students would see others as being more dishonest and likely to cheat in an honor system. To examine this, we asked students to rate the likelihood of their own behavior as being dishonest and then asked them to think of their peers' behavior in this context. A comparison of group means allowed for a test of the prediction that a bias would be active in this scenario, and as predicted our fifth hypothesis was supported. Many studies have demonstrated that others are often seen as more irrational and driven by internal attributes with the context is negative (as is the case with stealing from a self-service food honor transactional system).

### Ethical perspectives

Moral absolutism was advocated by the philosopher Immanuel Kant; he believed that one should not lie no matter the situation (Knapp, McGlone, Griffin, & Earnest, 2016). Incorporating this perspective into the current findings, most students confirmed that they were unlikely to cheat if using a self-service food honor transactional system regardless of the circumstances, upholding their general ethical and moral beliefs. However, the viewpoint of utilitarianism, favors that lying can be justified if it leads to more good than harm. The perspective of utilitarianism is consistent with the "doctrine of specificity" which prescribes that "honesty and dishonesty are not unified traits but specific functions of life situations, and the consistency across situations is due to what those situations have in common" (Knapp et al., 2016, p. 49). Applying this perspective to the scenario of the current study, if a student were to steal food because of hunger or lack of available money, then this student might justify their behaviors and remove feelings of guilt or shame. There are many nuances and situations that might influence perceptions of honesty and theft in a self-service food honor system; future research should consider the other constructs that might drive anticipated dishonest behaviors in this context.

### Limitations and Future Research

We asked students in several classes in one college within a larger university to self-disclose their perceptions and beliefs regarding a hypothetical self-service food honor transaction system. Using a variety of students across the campus or across several universities would give us a better picture of the sentiments and behaviors of college students in general as it relates to the context of dishonesty. Additionally, constructs such as religiosity (Huelsman & Wasieleski, 2006) might play a significant role in dishonesty in an honor system and a location of a school or type of school (public vs. private) may also drive the likelihood of students' affiliations with certain religious beliefs—and as a consequence behavior in a food honor transaction system (Hudson & Pearson, 2018).

We also used scales to ask about students' previous behaviors. We then used scales to allow participants to predict future/hypothetical

| Table 3: Linear Regression Results | | | | |
|---|---|---|---|---|
| **Predictors** | **Outcome** | ***β*** | **S.E.** | ***Sig*** |
| Antisocial Behaviors | Likelihood of dishonesty | 0.86 | 0.40 | 0.000 |
| Social Phobia | Likelihood of using a food honor system | 0.041 | 0.021 | 0.055 |
| Integrity | Likelihood of engaging in dishonest activities | -0.29 | 0.15 | 0.064 |

**Table 4: Independent Samples t-test Results**

| | | N | M | T | Sig |
|---|---|---|---|---|---|
| Men | Dishonest activities | 61 | 1.99 | 2.81 | 0.006 |
| Women | | 119 | 1.50 | | |
| Self-perception | Dishonest activities | 61 | 1.67 | 18.64 | 0.038 |
| Others-perception | | 119 | 3.55 | | |

behaviors. Reporting on actual past experiences may have been easier for students than reporting on future/hypothetical behaviors. This might be especially true for behaviors taking place in a novel context that they may have never experienced. Also, we must remember that there are social desirability effects when people report on their behavior (Jensen & Hurley, 2005). Participants may have been less likely to be honest about their unethical and negatively viewed behaviors. Guilt, shame, or fear of repercussions for reporting these behaviors could have played a role in the results of this study.

Overall, the results revealed that students were interested in this type of food purchase system and that while they perceived that others would be more likely to cheat on this type of honor context – they reported that their own behavior would be more honest. Moral communities such as a college campuses, are places where people can practice ethics; a self-service food honor transaction system, should one be implemented, would allow college students to practice and think about important parts of everyday life in a safe environment with opportunities for learning and reflection. This exploration extends what we know about honesty, integrity, and deception among students on college campuses. It allows us to extend the idea that dishonesty on college campuses may include behaviors beyond traditional constructs such as cheating, plagiarism, and interpersonal deception (Griffin et al., 2015; Stearns, 2019).

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