

# Employed in the foodservice industry: likelihood of intervention with food safety threats

Intervention  
with food  
safety threats

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Robin B. DiPietro

*School of Hotel, Restaurant and Tourism Management, University of South Carolina,  
Columbia, South Carolina, USA*

Kimberly Harris

*Dedman School of Hospitality Management, Florida State University, Tallahassee,  
Florida, USA, and*

Dan Jin

*School of Hotel, Restaurant and Tourism Management, University of South Carolina,  
Columbia, South Carolina, USA*

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## Abstract

**Purpose** – The purpose of this study was to investigate restaurant employee behaviors and their likelihood of intervening when witnessing food safety threats.

**Design/methodology/approach** – A mixed method was used for this study with the focus group interview and survey questionnaire. A total of eight focus groups ranging in number of participants from 6 to 12 were asked to respond to presented scenarios that depicted restaurant employees committing food safety risk behaviors and threats in the restaurant environment that would present food safety risks such as out-of-stock bathroom supplies, dirty tables in the restaurant dining area, employee personal hygiene issues and unclean production equipment. These participants were also asked to complete a draft of the survey that would later be edited and distributed to the sample population.

**Findings** – Results suggest that social norms and perceived severity of threats impact the likelihood that restaurant employees will intervene. Implications for academics and practitioners are discussed.

**Originality/value** – This study was special as it provides a synthetic viewpoint that considers how service organizations can work to do a better job of interviewing employees before starting their jobs about their beliefs and personal practices of food safety at home, their previous work in the restaurant industry and food safety culture that they may have worked in before, as well as increasing the communication in restaurants to build a food safety culture. These practices can help to lower risks to the public regarding food safety and can help to build relationship trust in the brands that we all love to indulge in when dining out.

**Keywords** Restaurant employee, Food safety, Social norms, Perceived severity of the risk

**Paper type** Research paper

## Introduction

Food safety and the importance of adherence to sanitation guidelines are the responsibility of entities that produce, store, transport, package and distribute food products to the public. From production to consumption, those who handle food are important contributors to either the safety of or the contamination of food. Of interest in this study are the employees of restaurants who are required to be trained by local health officials and/or the restaurants for which they work for in efforts to protect themselves and consumers from food safety risks. Restaurant



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management staff and owners are ultimately responsible for providing a safe and sanitary food production and service environment through the steps in the flow of food (Sufiyan *et al.*, 2019; Mullan *et al.*, 2016). At each stage in the flow of food in restaurants, the food handler must be trained to treat edibles as potentially hazardous products; all of which must be kept in controlled conditions. Skilled restaurant employees are responsible for handling food items according to time and temperature control guidelines, storing products in specifically designed areas, ensuring equipment is safe and sanitary for production, maintaining personal hygiene and frequent washing of hands and keeping production areas clean and sanitary. Failure during any of the steps in the flow of food can negatively impact the safety of the food product (Al-Kandari *et al.*, 2019; Feng and Bruhn, 2019; Tsai and Lin, 2019).

Academic, government and epidemiological research indicates that most foodborne illnesses come from improper food handling occurring in the home, which is a habit that is often transferred to the work environment (de Andrade *et al.*, 2019; Mullan *et al.*, 2015). Additionally, serious food safety threats in restaurants are often caused by employees failing to mitigate unacceptable conditions, damaged food products or incidents that occur in the restaurant environment (Rossi *et al.*, 2017). Estimates reported prior to the COVID-19 pandemic projected that approximately 15.6m people were working in the United States (US) in the restaurant industry with expected growth to reach over 16m in 2026 (National Restaurant Association, 2020; Statista, 2019a). Besides, sales were anticipated to reach over \$899bn (NRA, 2020). Regardless of the impact of the COVID-19 pandemic, the restaurant industry is responsible for ensuring that employees have the required training and motivation to intervene when potential food safety concerns are present (Erdem *et al.*, 2012; Harris *et al.*, 2014; White, 2018).

York *et al.* (2009) discovered that training alone was not enough for food handlers to enact safe food handling behaviors. This study suggested that employees do not practice proper food safety behavior unless reminded to do so repeatedly by management. Harris *et al.* (2017b) suggested that despite food safety training and certification, employees practice proper food safety behavior and express interest in the subject only when they value their health, health of others and understand the importance of preventing threats to food safety. The purpose of the current study is to investigate the likelihood of people employed in the restaurant industry of different positions, length of tenure and training levels, to intervene when noticing a food safety threat. The study will assess the perceived severity of the threat and the impact of social norms, such as the influence of peers, social groups or cultural influences, that may influence employees' responsibility to safely monitor the production environment from production to consumption (White, 2018; de Andrade *et al.*, 2019).

## Literature review

### *Theoretical framework: protection motivation and social norm theories*

To better understand the behaviors of people employed in the restaurant industry and their assessment of risk and the overall threat to both the diner and themselves, components of both the protection motivation theory (PMT) (Rogers, 1975) and social norm theory (SNT) (Berkowitz, 2004) were used as the framework for this study. Of particular interest was the opinion of employees as to how they would react to threatening events regarding food safety in the workplace and the impact of their social groups on their decisions.

SNT suggests that despite risk assessment and the deduction that a threat is present and perceived to be severe, the impact of social group assumptions, behaviors, beliefs more potentially influence a person to act or not (Berkowitz, 2004). This theory is divided into two constructs, descriptive norms and injunctive norms. *Descriptive norms* are those beliefs of an individual about the usual, or normal, reactive behavior of their social group. *Injunctive norms* are those that an individual believes are expected of them, even if the individual

believes internally, that they should behave differently (Berkowitz, 2004). Fugas *et al.* (2012) found that proactive safety behaviors were influenced by attitudes and expectations of social groups, compliance standards and the safety climate of their organization. Despite rules, regulations and organizational expectations, employee attitudes and situations in which employees are placed were mediated by descriptive and injunctive norms as significant predictors toward safety behaviors (NCBI, 2010). Thus, in the current study, both descriptive and injunctive social norms are assessed as a potential mediator between the various groups of employees and their intentions to intervene in possible food safety risks. PMT was developed by Rogers (1975) to explain how people are motivated to use self-protection when they perceive a threat to their health or safety. In addition, PMT suggests that the first stage of risk management an individual uses before deciding how to react to a threat is based on his/her assessment of the *perceived severity* of the threat. Typically, this will alter the individual's ability to manage the threat based on his/her belief in personal health, fortitude and knowledge/experience (Rogers, 1975). Thus, in the current study, the perceived severity of the risk is also assessed as a mediator between the various groups of employees and their intentions to act.

Overall, the purpose of this study is to investigate the likelihood of restaurant employees with different positions, years of experience and different training to intervene when noticing a food safety infraction. The mediating variables in the current study are subjective and injunctive norms, as well as the perceived severity of the food safety threat. The following section discusses the literature on food safety risks in restaurants.

#### *Food safety risks in restaurants*

The relationship between increases in restaurant dining behaviors and the increases in foodborne illnesses is not surprising. Hall *et al.* (2012) reported in the Center for disease Control's (CDC's) *Morbidity and Mortality Weekly Report* that, "despite ongoing food safety measures in the US, the foodborne illness continues to be a substantial burden" (p. 1566). This statement begs the question of why employees fail to intervene when they notice threats, or more poignantly, why do not restaurant employees "*see something, say something*" to proactively terminate a food safety threat? Foodborne illness outbreaks in restaurants such as Chipotle, McDonald's, Taco Bell along with popular food outlets such as Trader Joes, Walgreens, and Kroger have been reported due to one or more of the following reasons: systemically contaminated products purchased from purveyors, employees reporting to work ill, failure to cook food to proper temperatures to kill harmful foodborne pathogens and time and temperature abuse of products in the holding, reheating and storage stages (Bartsch *et al.*, 2018; Farber, 2018). Other reasons have been reported such as poor employee hygiene, improper food handlings such as failure to wash food items that undergo no cooking or freezing, unsanitary production equipment and time and temperature abuse during cooling and thawing. These are all potential issues found in the restaurant industry, impacting at-risk groups such as the young, elderly and those with immune-compromised systems (Feinstein *et al.*, 2007; Ismail *et al.*, 2019; Watson and Gong, 2018).

While the majority of foodborne illnesses are attributed to biological hazards, the remaining categories of chemical and physical hazards pose yet more risk for restaurant patrons. These hazards can appear as cleaning chemicals, glass shards, metal can shavings and bandages found in food served to customers. Hazards of all categories can ultimately lead to significant financial losses and tarnished reputations of restaurant organizations; some of which are unrecoverable (Berry and Wells, 2010; Hoffman *et al.*, 2003; Manning *et al.*, 2006). According to Harris *et al.* (2018), 60% of foodborne illnesses are predominantly attributed to sit-down restaurants and those restaurants with lower food inspection scores. Angelo *et al.* (2017) specifically reported that in 2017, 79% of most foodborne illness outbreaks occurred in sit-down restaurants. Ebel *et al.* (2017) reported that the surveillance system used by food

safety agencies responsible for the inspection and evaluation of restaurants reports that only a small number of foodborne illnesses are reported. Data regarding the true estimate of the number of foodborne illness cases and the source of those cases is slightly uncertain. This indicates that, although consumers are concerned about food safety, many do not report incidents of risk, threat and the onset of illness. Restaurant patrons report that they are concerned about restaurant food safety and the inspection system used for foods and restaurants (Brewer and Rojas, 2008; Choi *et al.*, 2013; Harris *et al.*, 2017a; Kim *et al.*, 2017) and that they expect those working in restaurants to protect them from food safety risks (Powell *et al.*, 2011).

Considering the number of Americans frequenting restaurants as well as consumers preparing food at home, the risk of obtaining a foodborne illness of some degree of seriousness is likely (Angulo and Jones, 2006; Kadariya *et al.*, 2014; WHO, 2019). Mullan *et al.* (2015) discovered that the most significant predictor in how food is handled at home as well as in the work environment. Their study examined the influence that social norms and mores had on behaviors when handling food. Results indicated that food safety risks increased when habits in the home were transferred to the workplace. Values and habits associated with how food is to be prepared, served and consumed overruled the expectations of workplace directives. Habit strength, as it was referred to in the study, was an important predictor in the significance of protection motivation and social norm constructs, suggesting that these behaviors could override organizational expectations (Mullan *et al.*, 2015). The National Restaurant Association (NRA) reports that employees who practice unsafe food handling in the home are likely to transfer the habits into the work environment, and therefore, they believe it is necessary to promote training, certification in food safety and continual follow-up on food safety. They believe that this is important to the overall success of a restaurant's food safety culture (Powell *et al.*, 2011). Cates *et al.* (2009) and Murphy *et al.* (2011) discovered that certified foodservice managers help to improve food safety in restaurants; however, training and certification are not enough. Follow-up training, food safety cultures that are practiced and considered part of the value system of the foodservice organization and regular reiteration of the importance of food safety by employees at every position level in the restaurant are activities that significantly reduce the likelihood of critical and noncritical violations in restaurants that may lead to foodborne illness outbreaks.

Hall *et al.* (2012) published research funded by the CDC positing that food production workers reporting to work ill caused the majority of foodborne illnesses in restaurants. The USDA in conjunction with the FDA produced a report titled, *FDA Report on the Occurrence of Foodborne Illness Risk Factors in Fast Food and Full Service Restaurants 2013–2014* (2018), indicating that issues with improper food handling and underreporting of foodborne illness continue to be national problems in the restaurant industry. According to this report, restaurants with trained managers have control over several activities that could reduce or eliminate foodborne illness risk factors in their restaurants. These include adequate cooking and cooling, ensuring no bare-hand contact with ready to eat foods, cooking raw foods to required temperatures and holding cold foods in required refrigeration. These activities were cited as easily controllable, yet responsible for posing a significant food safety risk to consumers. The researchers further suggested that better controls over these risk factors, as well as expectations for improved employee hygiene, would have a significant impact on the reduction of risk to the consumer in both fast- and full-service restaurants in the United States (Hall *et al.*, 2012). If these factors are easy to control, what must be done to encourage employees to do them? To answer this question, the current study seeks to understand how restaurant employees respond to risks posed by their peer employees or other threats witnessed in the restaurant work environment and how likely they are based on their position, years of employment, training level, the perceived severity of the incident and their perception of social norms to intervene.

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*Employee position, years of experience and food safety training*

Evidence suggests that depending on the role of the food handler or employee in the restaurant where employed, the position is an important behavioral driver when deciding to respond to food safety threats in the workplace (Grover *et al.*, 2016). Hyde *et al.* (2016) argued that years of experience itself could not lead to adequate food safety interventions and showed that the effectiveness of food safety interventions should rely more on knowledge-based and behavior-based training, including active weekly feedback and monetary reinforcement (Kunadu *et al.*, 2016).

**Hypotheses development and proposed model**

Employees or owners/operators that are considered part of the administrative level are often those who shape the culture and social norms in a particular business (Wang, 2016). Depending on employees' roles played in a restaurant, social norms might be differently viewed across positions, which may further influence their active interventions in a restaurant. To investigate the impact that the restaurant position has on intervention, the following hypotheses are proposed:

- H1.* When considering the relationships of employee position, descriptive social norms and intervention of restaurant food safety issues.
  - H1a.* When considering the relationships of employee position, descriptive social norms, and intervention of restaurant food safety issues, employee position has a significant direct effect on intervention in restaurant food safety issues.
  - H1b.* When considering the relationships of employee position, descriptive social norms, and intervention of restaurant food safety issues, descriptive social norms have a significant direct effect on intervention in restaurant food safety issues.
  - H1c.* When considering the relationships of employee position, descriptive social norms, and intervention of restaurant food safety issues, descriptive social norms have a significant indirect effect on the relationship between employee position and intervention in restaurant food safety issues.
- H2.* When considering the relationships of employee position, injunctive social norms and intervention of restaurant food safety issues;
  - H2a.* When considering the relationships of employee position, injunctive social norms, and intervention of restaurant food safety issues, employee position has a significant direct effect on intervention in restaurant food safety issues.
  - H2b.* When considering the relationships of employee position, injunctive social norms, and intervention of restaurant food safety issues, injunctive social norms have a significant direct effect on intervention in restaurant food safety issues.
  - H2c.* When considering the relationships of employee position, injunctive social norms, and intervention of restaurant food safety issues, injunctive social norms have a significant indirect effect on the relationship between employee position and intervention in restaurant food safety issues.

PMT suggests that individual employees assess the perceived severity of risk before deciding how to react to a potential threat (Rogers, 1975). Employees then decide whether they should actively intervene or passively report the issues to higher management or whether they should not intervene at all. Thus, in the current study, the perceived severity of the risk is assessed as a mediator between the various groups of employees and their intentions to act. Additionally, an employee's perceived severity of the risk has also been shown to influence

restaurant employees' active intervention (Rossi *et al.*, 2017). For example, employees with higher risk perception of foodborne illness are more willing to actively intervene. It is further proposed that those who are in top management positions will have a higher perceived responsibility to intervene in food safety issues. Additionally, we posit that when greater severity of risk is perceived, subsequent greater intentions to intervene will be formed (Lake *et al.*, 2010). As follows, the following hypotheses are proposed:

- H3. When considering the relationships of employee position, perceived severity of food safety issue and intervention of restaurant food safety issues.
  - H3a. When considering the relationships of employee position, perceived severity of food safety issue, and intervention of restaurant food safety issues, employee position has a significant direct effect on intervention in restaurant food safety issues.
  - H3b. When considering the relationships of employee position, perceived severity of food safety issue, and intervention of restaurant food safety issues, perceived severity of food safety issue has a significant direct effect on intervention in restaurant food safety issues.
  - H3c. When considering the relationships of employee position, injunctive social norms, and intervention of restaurant food safety issues, perceived severity of food safety issue has a significant indirect effect on the relationship between employee position and intervention in restaurant food safety issues.

Studies have shown that knowledge about food safety intervention practice can be developed from the employees' years of experience (York *et al.*, 2009). For example, the longer time an employee has worked in the restaurant industry, the more opportunity the employee will have to expose him/herself to view sanitation grades and personal observations about food safety issues that can influence the person to have active intervention (York *et al.*, 2009). An additional study also concluded that employees who worked in the restaurant industry for relatively longer years pay more attention to their food safety inspection scores (McIntyre *et al.*, 2013). Further, as studies reported that the longer an employee stayed with a restaurant, the higher intentions the employee will have to follow-up with the social norms they built in the restaurant (Arendt *et al.*, 2014). The current study also proposes that years of experience will be mediated by the social norms from the restaurant and it will affect employees' intention to actively intervene. Accordingly, it is proposed:

- H4. When considering the relationships of employee years of experience, descriptive social norms and intervention of restaurant food safety issues.
  - H4a. When considering the relationships of employee years of experience, descriptive social norms, and intervention of restaurant food safety issues, employee years of experience has a significant direct effect on intervention in restaurant food safety issues.
  - H4b. When considering the relationships of employee years of experience, descriptive social norms, and intervention of restaurant food safety issues, descriptive social norms have a significant direct effect on intervention in restaurant food safety issues.
  - H4c. When considering the relationships of employee years of experience, descriptive social norms, and intervention of restaurant food safety issues, descriptive social norms have a significant indirect effect on the relationship between employee years of experience and intervention in restaurant food safety issues.



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- H5.* When considering the relationships of employee years of experience, injunctive social norms and intervention of restaurant food safety issues.
- H5a.* When considering the relationships of employee years of experience, injunctive social norms, and intervention of restaurant food safety issues, employee years of experience has a significant direct effect on intervention in restaurant food safety issues.
- H5b.* When considering the relationships of employee years of experience, injunctive social norms, and intervention of restaurant food safety issues, injunctive social norms have a significant direct effect on intervention in restaurant food safety issues.
- H5c.* When considering the relationships of employee years of experience, injunctive social norms, and intervention of restaurant food safety issues, injunctive social norms have a significant indirect effect on the relationship between employee years of experience and intervention in restaurant food safety issues.

[Arendt et al. \(2013\)](#) suggest that employees' perceptions of the risk assessment could be enhanced as years of experience increase. In other words, the reactions to food safety threats are most likely the result of working in a restaurant for a longer period. [York et al. \(2009\)](#) further suggest a similar opinion, suggesting that people working in the same type of business for a significant amount of time are likely to be culturally educated with the issue associative threats and thus perceive higher severity of risks. As follows, the additional hypotheses are proposed:

- H6.* When considering the relationships of employee years of experience, perceived severity of food safety issue and intervention of restaurant food safety issues.
- H6a.* When considering the relationships of employee years of experience, perceived severity of food safety issue, and intervention of restaurant food safety issues, employee years of experience has a significant direct effect in intervention of restaurant food safety issues.
- H6b.* When considering the relationships of employee years of experience, perceived severity of food safety issue, and intervention of restaurant food safety issues, perceived severity of food safety issue has a significant direct effect on intervention in restaurant food safety issues.
- H6c.* When considering the relationships of employee years of experience, injunctive social norms, and intervention of restaurant food safety issues, perceived severity of food safety issue has a significant indirect effect on the relationship between employee years of experience and intervention in restaurant food safety issues.

Food safety training has been the most common practice in trying to address this public safety issue in restaurants ([Egan et al., 2007](#)). Proper food safety training considers the most significant practices associated with foodborne illness outbreaks in foodservice, which include improper holding temperatures, inadequate cooking, cross-contamination and poor personal hygiene ([Lewis and Salsbury, 2001](#)). For example, if an employee is well trained in these food safety practices, their confidence level in participating in food safety interventions is likely to increase. Furthermore, some suggest rethinking the research framework for food safety training through further application of active intervention affected by the service culture and social norms from the restaurants might better examine employee perceptions of intervention to reduce threats ([Hamilton et al., 2003](#); [Mitchell et al., 2007](#)). This indicates the possibility that even though employees have received a training opportunity and have been

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informed of best practices, the social norm of not intervening, or the discouragement of intervention, may ensue. Thus, we argue that social norms can influence employees' active intervention on restaurant food safety issues despite the fact that they are well trained in food safety. The following hypotheses are further proposed:

- H7.* When considering the relationships of employee training, descriptive social norms and intervention of restaurant food safety issues.
- H7a.* When considering the relationships of employee training, descriptive social norms, and intervention of restaurant food safety issues, employee training has a significant direct effect on intervention in restaurant food safety issues.
- H7b.* When considering the relationships of employee training, descriptive social norms, and intervention of restaurant food safety issues, descriptive social norms have a significant direct effect on intervention in restaurant food safety issues.
- H7c.* When considering the relationships of employee training, descriptive social norms, and intervention of restaurant food safety issues, descriptive social norms have a significant indirect effect on the relationship between employee training and intervention in restaurant food safety issues.
- H8.* When considering the relationships of employee training, injunctive social norms and intervention of restaurant food safety issues
- H8a.* When considering the relationships of employee training, injunctive social norms, and intervention of restaurant food safety issues, employee training has a significant direct effect on intervention in restaurant food safety issues.
- H8b.* When considering the relationships of employee training, injunctive social norms, and intervention of restaurant food safety issues, injunctive social norms have a significant direct effect on intervention in restaurant food safety issues.
- H8c.* When considering the relationships of employee training, injunctive social norms, and intervention of restaurant food safety issues, injunctive social norms have a significant indirect effect on the relationship between employee training and intervention in restaurant food safety issues.

Prior training experience with foodborne illness has also been suggested to influence food safety risk perceptions and attitudes (Parra *et al.*, 2014). In this regard, researchers also have suggested that those employees who received training with food safety and foodborne illness are more likely to feel greater concern for food safety and may behave more actively regarding food safety violations. Therefore, the perceived severity of food safety issues will be higher for those employees who received the training, and as a result, they may actively intervene in restaurant food safety issues. Accordingly, the final hypotheses are proposed:

- H9.* When considering the relationships of employee training, perceived severity of food safety issue and intervention of restaurant food safety issues.
- H9a.* When considering the relationships of employee training, perceived severity of food safety issue, and intervention of restaurant food safety issues, employee training has a significant direct effect on intervention in restaurant food safety issues.
- H9b.* When considering the relationships of employee training, perceived severity of food safety issue, and intervention of restaurant food safety issues, perceived severity of food safety issue has a significant direct effect on intervention in restaurant food safety issues.



*H9c.* When considering the relationships of employee training, injunctive social norms, and intervention of restaurant food safety issues, perceived severity of food safety issue has a significant indirect effect on the relationship between employee training and intervention in restaurant food safety issues.

See [Figures 1](#) and [2](#) for proposed hypotheses in this study.

## Methodology

The goal of the study was to investigate the role of perceived severity and social norms on the intervention behavior of restaurant employees based on their position, years of experience and food safety training. The theories of protection motivation and social norms were used as theoretical foundations upon which the assessment of risk and the influence of social groups would impact the intervention of food safety threats. Scale items used for survey development were gleaned from previous research. The dependent variable used in this study is the intervention, based on the identified problem of the likelihood of restaurant employees to say something when they see something that poses a threat to food safety. A total of eight focus groups ranging in the number from 6 to 12 participants were asked to respond to presented scenarios depicting restaurant employees committing food safety risk behaviors and threats in the restaurant environment. Such scenarios included several threatening situations including employees noticing the bathroom was out of stock of supplies, tables in the service area were dirty, peer employees reported to work in soiled uniforms, presented personal hygiene issues and so on.

Based on the verbal and oral feedback to the pilot survey, the instrument, developed using Qualtrics as the survey platform, was edited several times with improvements to verbiage, grammar and punctuation. Several volunteer researchers in the hospitality and restaurant fields also reviewed the revised instrument and further improvements were made. Once the instrument was perfected, the survey was launched using Amazon Mechanical Turk (MTurk) as the marketing service that identifies and provides qualified participants for survey completion. It is reported that MTurk is an acceptable service for data gathering in academia as it provides diversified populations (when compared to studying college students, the local community and other online sampling techniques) and is considered reliable in terms of gathering data for consumer decision-making research ([Buhrmester et al., 2011](#)). Attention check questions were inserted throughout the survey to further ensure reliability.

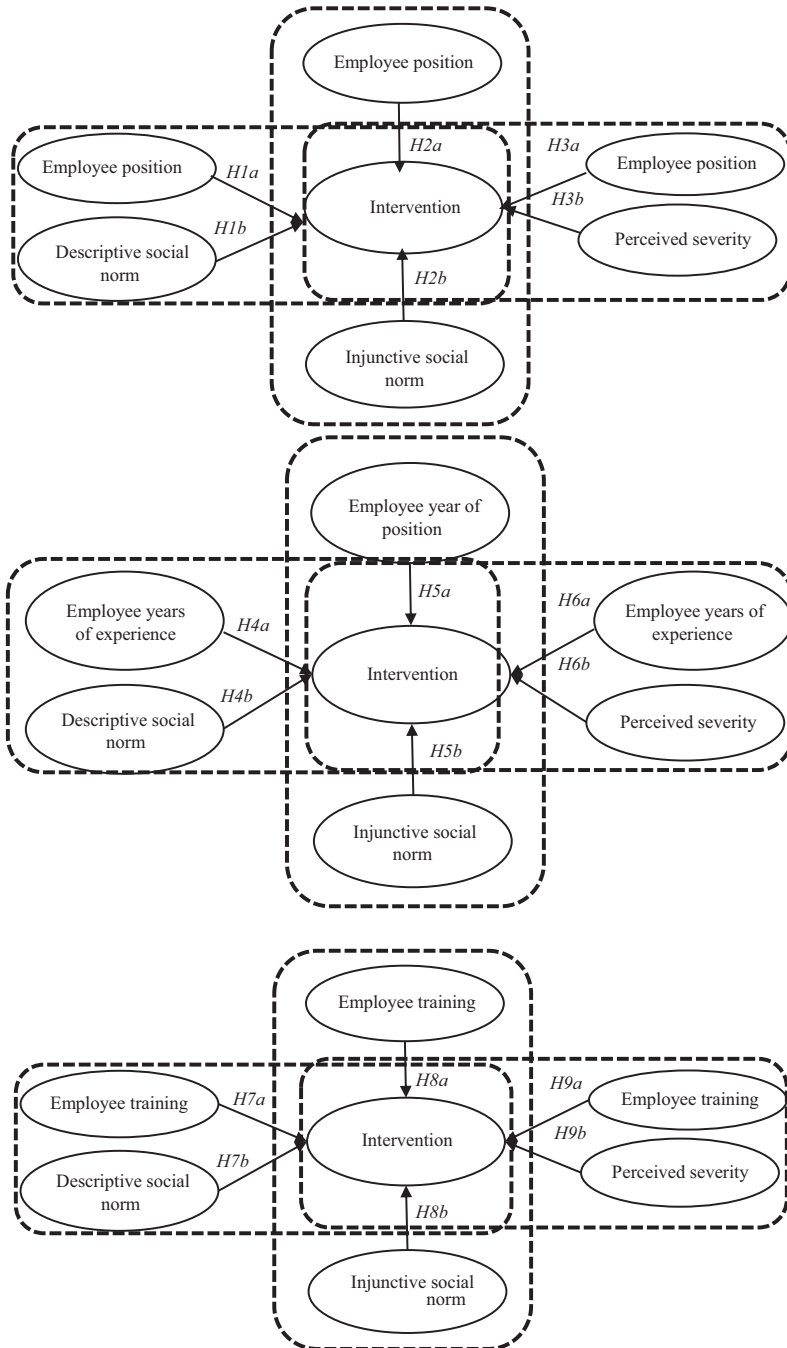
### Measurement

Independent variables included position, years of experience and employee training. While not all demographic variables were selected for the model, each contributed interesting information to this study. The current position was categorized into seven categories as 1 = owner ( $N = 22$ ), 2 = regional or district manager ( $N = 17$ ), 3 = store manager ( $N = 94$ ), 4 = back of house manager ( $N = 31$ ), 5 = hourly back of the house ( $N = 41$ ), 6 = hourly front of the house ( $N = 77$ ), and 7 = other ( $N = 169$ ). Years of experience were measured with five categories 1 = 1–5 years ( $N = 511$ ), 2 = 6–10 years ( $N = 152$ ), 3 = 11–15 years ( $N = 29$ ), 4 = 16–20 years ( $N = 18$ ), 5 = 21 years or more ( $N = 9$ ). And finally, training was measured using four categories of 1 = restaurant training ( $N = 432$ ), 2 = food handler training ( $N = 241$ ), 3 = ServSafe training ( $N = 122$ ), 4 = other certification ( $N = 121$ ).

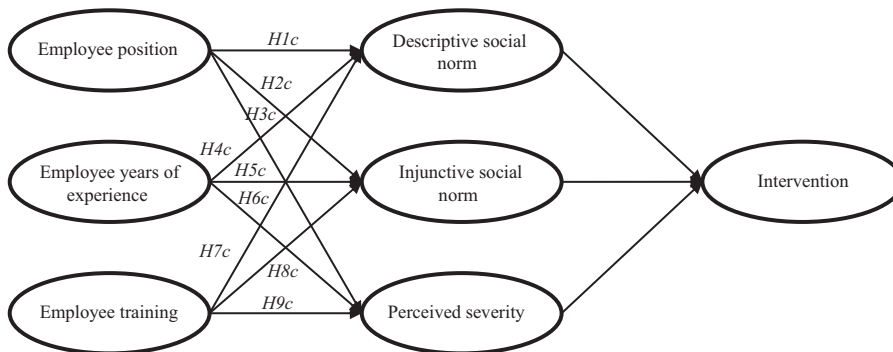
## Results

### Demographic profile

The final survey was distributed to 1,800 recipients; however, 631 responses were eliminated due to failure to meet study criteria. As a result, 1,169 responses were used as the sample



**Figure 1.**  
Proposed direct  
effect model



**Figure 2.**  
Proposed indirect  
effect model

(64.94% response rate). The majority of employees were between the ages of 19 and 38 (62.2%). There were more females ( $N = 689$ ; 58.9%) than males ( $N = 478$ ; 40.9%) and most earn between \$30,000 and \$60,000 per year (36.5%). In terms of education level, 52.2% of the participants had a four-year college degree or more ( $N = 611$ ).

#### Data analysis

First, before running the factor analysis, the assumption of the multicollinearity has been tested to ensure the correlation among the observed variables. Second, factor analysis was conducted with a principal component analysis with varimax rotation to clarify the structure of the scale using the criteria of eigenvalues larger than 1 and factor loading threshold of  $\pm 0.4$  when selecting variables. The result of factor analysis showed that only the perceived severity from the preexisting PMT models was found to be a reliable measure with the scenario-based focus group discussions. Cronbach's alpha was used to test internal consistency, which indicated adequate internal consistency of multiple indicators for each construct in the model (Hair *et al.*, 2009) based on reliabilities exceeding a certain level of 0.6 (Fornell and Larcker, 1981).

Mediators such as descriptive and injunctive social norms were measured using 1–7 Likert scale (1 = strongly disagree; 7 = strongly agree) adopted from previous literature with 5 items for descriptive norms ( $\alpha = 0.875$ ) and 11 items for injunctive norms ( $\alpha = 0.806$ ) (Brewer *et al.*, 1994; Chen, 2008; Cho *et al.*, 2013; Knight *et al.*, 2009). Descriptive norm sample questions included such phrases as, “When I am dining with others and see a food safety infraction or have a problem with my food, I often say nothing for fear of embarrassing someone or myself” and “Reporting the various food safety infractions that I encounter when dining out is not worth my time reporting.” Injunctive norm sample questions “The effort it takes to report food safety issues that I see when dining out is too cumbersome” and “I usually avoid restaurants that have food safety issues and say nothing about it.” Perceived severity was measured with three items ( $\alpha = 0.656$ ) on a 1–7 Likert scale (1 = strongly disagree; 7 = strongly agree) adopted from previous literature (Cho *et al.*, 2013; Chen, 2008; Knight *et al.*, 2009; Fatimah *et al.*, 2011; Mullan *et al.*, 2016). For example, “I believe the likelihood of getting a foodborne illness is high when eating in restaurants.”

Descriptive statistics, including bivariate correlations between variables of interest, means and standard deviations are presented in Table 1. The dependent variable of food safety intervention was measured using six items that concern intervention behaviors such as telling the employee about the issue, telling the manager about the issue or leaving the establishment without eating ( $\alpha = 0.774$ ) on a 1–7 Likert scale (1 = strongly disagree; 7 = strongly agree) adopted from Chen (2008) and Mullan *et al.* (2016).

Data analysis followed the PROCESS modeling approach recommended by Hayes (2018) using Statistical Package for the Social Science (SPSS) v. 23. Specifically, a regression-based PROCESS model 4 was used to test the validity of the proposed hypotheses. Process modeling is a bootstrap-based model that provides the total indirect effect along with a bootstrap confidence interval to measure the specific indirect effects. Specifically, PROCESS model 4 allows for multiple mediators between *X* and *Y* operating in parallel (Hayes, 2018).

*Hypotheses results*

The results of the first hypotheses (H1a, b) show that position has a significant positive effect on intervention ( $\beta = -0.1772, p = 0.0166$ ) as well as descriptive norms ( $\beta = 0.0982, p = 0.0079$ ). However, the indirect effect of the mediator of descriptive norms on the relationship between employee position and intervention was nonsignificant ( $\beta = 0.0041, 95\% \text{ CI interval: } -0.0151, 0.0246$ ), thus H1c is not supported. Hypotheses 2a and 2b indicate that the overall employee position does not have a significant effect on intervention ( $\beta = -0.0486, p = 0.5365$ ), but it did have a significant positive effect when measuring the influence of injunctive norms on intervention ( $\beta = 0.1439, p = 0.0000$ ). Thus, H2a is not supported, but H2b is supported. Also, the indirect effect of the mediator of injunctive social norms on the relationship between employee position and intervention was significantly negative ( $\beta = -0.1245, 95\% \text{ CI interval: } -0.2155, -0.0430$ ), thus H2c is supported. The results of the third hypotheses (H3a, b) explain that the overall employee position had a significant positive effect on intervention ( $\beta = -0.1681, p = 0.0241$ ) but had a nonsignificant effect when measuring the influence of perceived severity on intervention ( $\beta = 0.0646, p = 0.2462$ ), supporting H3a but not supporting H3b. The indirect effect from the mediator of the influence of perceived severity on the relationship between employee position and intervention was nonsignificant ( $\beta = -0.0050, 95\% \text{ CI interval: } -0.0207, 0.0059$ ). Thus, H3c is not supported.

While the results of the fourth hypotheses (H4a, b) indicate the overall employee years of experience have a nonsignificant effect on intervention ( $\beta = 0.0082, p = 0.2984$ ), the direct effect from descriptive norms on intervention was significant and positive ( $\beta = 0.0712, p = 0.0000$ ). Thus, H4a is not supported while H4b is supported. Also, the indirect effect from the mediator of descriptive social norms on the relationship between employee years of experience and intervention was nonsignificant ( $\beta = 0.0006, 95\% \text{ CI interval: } -0.0012, 0.0027$ ). Thus, H4c is not supported. Hypotheses H5a and H5b show that when considering the direct effects of years of experience, injunctive norms and intervention, the overall employee years of experience do not have a significant effect on intervention ( $\beta = 0.0104, p = 0.1840$ ) but had a significant positive effect when measuring the influence of injunctive norms on intervention ( $\beta = 0.0808, p = 0.0000$ ). Thus, H5a is not supported, while H5b is supported. Also, the indirect effect from the mediator of injunctive social norms on the relationship between employee years of experience and intervention was nonsignificant ( $\beta = -0.0016, 95\% \text{ CI interval: } -0.0043, 0.0003$ ). Thus, H5c is not supported. Hypotheses H6a and H6b indicate that the overall employee years of experience had a nonsignificant effect on intervention

Variables	1	2	3	4
Perceived severity	–			
Descriptive norm index	0.154**	–		
Injunctive norm index	0.214**	–0.226**	–	
Behavior intervention index	0.214**	0.517**	–0.366**	–
<i>M</i>	3.784	5.578	3.94	5.09
<i>SD</i>	1.249	1.040	0.99	1.11

**Table 1.**  
Correlation matrix

**Note(s):** \*\**p* < 0.001

( $\beta = 0.0102, p = 0.1969$ ) but had a significant positive effect when measuring the influence of perceived severity on intervention ( $\beta = 0.0684, p = 0.0090$ ). Therefore, H6a is not supported, but H6b is supported. The indirect effect from the mediator of the influence of perceived severity on the relationship between employee years of experience and intervention was significantly negative ( $\beta = -0.0014, 95\%$  CI interval:  $-0.0034, -0.0001$ ). Thus, H6c is supported.

Taking into account the direct effects of employee training, descriptive norms and intervention, the seventh hypotheses (H7a, b) suggest that the overall employee training has a nonsignificant effect on intervention ( $\beta = 0.0020, p = 0.8666$ ). However, the direct effect of descriptive norms on intervention was significantly positive ( $\beta = 0.0719, p = 0.0000$ ). Therefore, H7a is not supported, while H7b is supported. Also, the indirect effect from the mediator of descriptive social norms on the relationship between employee training and intervention was significantly negative ( $\beta = -0.0061, 95\%$  CI interval:  $-0.0111, -0.0023$ ). Thus, H7c is supported. Meanwhile, hypotheses H8a and H8b also show that the overall employee training does not have a significant effect on intervention ( $\beta = -0.0011, p = 0.9223$ ), however, had a significant positive effect when measuring the influence of injunctive norms on intervention ( $\beta = 0.1439, p = 0.0000$ ). Therefore, H8a is not supported, but H8b is supported. Also, the indirect effect from the mediator of injunctive social norms on the relationship between employee training and intervention was significantly negative ( $\beta = -0.0030, 95\%$  CI interval:  $-0.0074, -0.0002$ ). Thus, H8c is supported. In addition, when considering the direct effects of employee training, perceived severity and intervention, hypotheses H9a and H9b suggest that the overall employee training had a nonsignificant effect on intervention ( $\beta = 0.0022, p = 0.8531$ ). The direct effect also had a significant positive effect when measuring the influence of perceived severity on intervention ( $\beta = 0.0672, p = 0.0121$ ). Therefore, H9a is not supported, but H9b is supported. The indirect effect from the mediator of the influence of perceived severity on the relationship between employee training and intervention was significantly negative ( $\beta = -0.0064, 95\%$  CI interval:  $-0.0121, -0.0014$ ). Thus, H9c is supported. See Table 2 for more information and Table 3 for breakdown effects for variable categories.

## Discussion and implications

The current study has revealed interesting results that have implications for theory and practice. First, *employee position* has a statistically significant effect on food safety intervention. This suggests that if an employee has a higher position in a restaurant such as a manager or an owner, the more likely the employee will intervene when observing food safety threats. This appears to be intuitive, but when assessing further, descriptive norms have a direct positive effect on intervention and the indirect effect is not significant. It is highly possible that an individual's social group behaviors are shaped from their specific culture and can predict the expected behavior of the group and further impact the behaviors that they, as an individual belonging to that group, should enact. Second, the direct effect of injunctive norms on food safety intervention is positive. The indirect effect of injunctive social norms on the relationship between employee position and the food safety intervention is negative. The lower position the employee has in a restaurant, the less likely they will be influenced by the injunctive norms, which have an impact on what behaviors an individual believes are expected of them. Third, when considering the relationship among *employee's years of experience*, descriptive norms and food safety intervention, descriptive social norms and injunctive social norms both have a direct positive effect on the food safety intervention. When an employee works in a restaurant for a longer period, that employee will more positively be affected by the social norms from the restaurant group. Employees with more years of experience are following their specific social norms in the workplace as they know

Hypotheses	Proposed relationship	$\beta$	SE	<i>T</i>	<i>P</i>	LLCI	ULCI	
H1	Direct effect	H1a: Employee position → Intervention	-0.1772	0.0737	-2.4050	0.0166*	-0.3220	-0.0324
		H1b: Descriptive norms → Intervention	0.0982	0.0368	2.6703	0.0079**	0.0259	0.1705
H2	In direct effect	H1c: Employee position → Descriptive norm → Intervention	0.0041	0.0097			-0.0151	0.0246
	Direct effect	H2a: Employee position → Intervention	-0.0486	0.0786	-0.6185	0.5365	-0.2031	0.1059
H3	Indirect effect	H2b: Injunctive norms → Intervention	0.1439	0.0342	4.2053	0.000***	0.0766	0.2111
	Direct effect	H2c: Employee position → Injunctive norm → Intervention	-0.1245	0.0438			-0.2155	-0.0430
H4	Direct effect	H3a: Employee position → Intervention	-0.1681	0.0743	-2.2632	0.0241*	-0.3140	-0.0221
	Indirect effect	H3b: Perceived severity → Intervention	0.0646	0.0556	1.1612	0.2462	-0.0447	0.1739
H5	Direct effect	H3c: Employee position → Perceived severity → Intervention	-0.0050	0.0067			-0.0207	0.0059
	Indirect effect	H4a: Employee years of experience → Intervention	0.0082	0.0078	1.0404	0.2984	-0.0072	0.0235
H6	Direct effect	H4b: Descriptive norms → Intervention	0.0712	0.0175	4.0783	0.000***	0.0369	0.1054
	Indirect effect	H4c: Employee years of experience → Descriptive norm → Intervention	0.0006	0.0010			-0.0012	0.0027
H7	Direct effect	H5a: Employee years of experience → Intervention	0.0104	0.0078	1.3294	0.1840	-0.0050	0.0258
	Indirect effect	H5b: Injunctive norms → Intervention	0.0808	0.0183	4.4091	0.000***	0.0448	0.1167
H8	Direct effect	H5c: Employee years of experience → Injunctive norm → Intervention	-0.0016	0.0012			-0.0043	0.0003
	Indirect effect	H6a: Employee years of experience → Intervention	0.0102	0.0079	1.2911	0.1969	-0.0053	0.0257
H9	Direct effect	H6b: Perceived severity → Intervention	0.0684	0.0262	2.6164	0.0090**	0.0171	0.1197
	Indirect effect	H6c: Employee years of experience → Perceived severity → Intervention	-0.0014	0.0008			-0.0034	-0.0001
H10	Direct effect	H7a: Employee training → Intervention	0.0020	0.0116	0.1680	0.8666	-0.0209	0.0248
	Indirect effect	H7b: Descriptive norms → Intervention	0.0719	0.0176	4.0850	0.000***	0.0374	0.1065
H11	Direct effect	H7c: Employee training → Descriptive norm → Intervention	-0.0061	0.0022			-0.0111	-0.0023
	Indirect effect	H8a: Employee training → Intervention	-0.0011	0.0115	-0.0975	0.9223	-0.0238	0.0215
H12	Direct effect	H8b: Injunctive norms → Intervention	0.0795	0.0183	4.3337	0.000***	0.0435	0.1155
	Indirect effect	H8c: Employee training → Injunctive norm → Intervention	-0.0030	0.0018			-0.0074	-0.0002
H13	Direct effect	H9a: Employee training → Intervention	0.0022	0.0118	0.1852	0.8531	-0.0211	0.0254
	Indirect effect	H9b: Perceived severity → Intervention	0.0672	0.0267	2.5138	0.0121*	0.0147	0.1196
H14	Indirect effect	H9c: Employee training → Perceived severity → Intervention	-0.0064	0.0027			-0.0121	-0.0014

**Table 2.**  
Result of  
hypothesized model

**Note(s):** \* $p < 0.05$  \*\* $p < 0.01$  \*\*\* $p < 0.001$

their expectations from the social group. Thus, it is not surprising that employees with more years of experience are more likely to follow the institutionalized group norms rather than the common social norms when intervening in food safety issues.

Results further suggest that perceived severity has a direct positive effect on the intervention; however, this factor has a negative indirect effect on the relationship between employees' years of experience and intervention. Employees with more work experience may



Path relationship	Category	Label	Effect	SE	LLCI	ULCI
Position > descriptive norm > intervention	Owner	X1	0.0046	0.0236	-0.0455	0.0496
	Regional or district manager	X2	0.0024	0.0150	-0.0290	0.0319
	Store manager	X3	-0.0002	0.0185	-0.0379	0.0365
	BOH supervisor	X4	-0.0170	0.0178	-0.0561	0.0144
	Hourly BOH	X5	-0.0025	0.0162	-0.0374	0.0278
	Hourly FOH	X6	0.0133	0.0147	-0.0148	0.0444
	Other	X7	0.0067	0.0138	-0.0213	0.0347
Position > injunctive norm > intervention	Owner	X1	0.0457	0.0328	-0.0051	0.1199
	Regional or district manager	X2	0.0375	0.0255	-0.0001	0.0976
	Store manager	X3	0.0292	0.0254	-0.0093	0.0881
	BOH supervisor	X4	-0.0066	0.0192	-0.0490	0.0293
	Hourly BOH	X5	-0.0092	0.0194	-0.0527	0.0284
	Hourly FOH	X6	-0.0361	0.0233	-0.0893	0.0001
	Other	X7	-0.0309	0.0217	-0.0819	0.0017
Position > severity > intervention	Owner	X1	-0.0219	0.0150	-0.0567	0.0005
	Regional or district manager	X2	-0.0115	0.0095	-0.0342	0.0029
	Store manager	X3	-0.0145	0.0122	-0.0439	0.0034
	BOH supervisor	X4	-0.0193	0.0124	-0.0475	0.0002
	Hourly BOH	X5	-0.0121	0.0099	-0.0351	0.0033
	Hourly FOH	X6	-0.0167	0.0111	-0.0418	0.0002
	Other	X7	-0.0273	0.0149	-0.0589	-0.0011
Experience > descriptive norm > intervention	1-5 years	X1	-0.0037	0.0070	-0.0182	0.0097
	6-10 years	X2	0.0022	0.0162	-0.0303	0.0359
	11-15 years	X3	0.0022	0.0219	-0.0442	0.0459
	16-20 years	X4	0.0261	0.0240	-0.0204	0.0760
	21 years or more	X5	0.0022	0.0050	-0.0072	0.0129
Experience > injunctive norm > intervention	1-5 years	X1	0.0260	0.0124	0.0052	0.0536
	6-10 years	X2	0.0222	0.0212	-0.0113	0.0723
	11-15 years	X3	0.0089	0.0225	-0.0327	0.0587
	16-20 years	X4	0.0362	0.0352	-0.0229	0.1163
	21 years or more	X5	-0.0048	0.0056	-0.0181	0.0049
Experience > severity > intervention	1-5 years	X1	-0.0026	0.0050	-0.0139	0.0068
	6-10 years	X2	0.0005	0.0091	-0.0160	0.0215
	11-15 years	X3	0.0223	0.0177	-0.0050	0.0645
	16-20 years	X4	0.0094	0.0233	-0.0371	0.0592
	21 years or more	X5	-0.0078	0.0044	-0.0178	-0.0007
Training > descriptive norm > intervention	Restaurant training	X1	-0.0118	0.0077	-0.0279	0.0021
	Food handler training	X2	0.0510	0.0162	0.0217	0.0861
	ServSafe training	X3	0.0124	0.0098	-0.0056	0.0333
	Other certification	X4	-0.0474	0.0150	-0.0790	-0.0212
Training > injunctive norm > intervention	Restaurant training	X1	0.0273	0.0127	0.0063	0.0557
	Food handler training	X2	-0.0206	0.0126	-0.0497	-0.0005
	ServSafe training	X3	-0.0224	0.0116	-0.0488	-0.0035
	Other certification	X4	-0.0037	0.0076	-0.0200	0.010
Training > severity > intervention	Restaurant training	X1	-0.0003	0.0024	-0.0056	0.0049
	Food handler training	X2	0.0035	0.0043	-0.0032	0.0144
	ServSafe training	X3	-0.0042	0.0041	-0.0140	0.0019
	Other certification	X4	-0.0167	0.0116	-0.0401	0.0047

Intervention with food safety threats

**Table 3.** Breakdown result of indirect effects

view the same observed food safety threats as less severe than those with less work experience as they are more likely to be exposed to similar safety threats than those less-experienced employees are. Therefore, for those experienced employees, some of the food safety threats are not serious enough to intervene. A plausible reason for this result is that those employees with more work experience might pose more effective resolutions to food safety issues and view food safety issues as less severe than employees with less work experience. Therefore, employees with more experience may be desensitized to threats and

thus may minimize the severity of threats. Lastly, when considering the relationship between *employee training*, descriptive norms, injunctive norms and perceived severity, only *food handler training* has a significant positive effect on food safety intervention. This shows that when considering the effect of descriptive social norms on food safety intervention, food handler training is preferred.

Meanwhile, results suggest that restaurant training has a significant positive effect on intervention, while food handler training and ServSafe training have significant negative effects on food safety intervention. These findings somewhat suggest that social expectations of restaurant training are not consistent with the food handler training as injunctive social norms have a significant impact on intervention, regardless of food safety knowledge and training. Although training programs and food safety culture within restaurant companies are marginally effective, the most effective intervention behavior originates from an internal value system that places importance on food safety. These findings are congruent with previous research suggesting that employees who fear the loss of their jobs for missing work due to illness is one of the top reasons employees may transfer home habits and mores (beliefs) into the work environment (York *et al.*, 2009). Therefore, the responsibility of restaurant employees to protect peers and consumers cannot be ignored. In sum, restaurant employees should have the internal fortitude to protect themselves and others against food safety infractions and take the internal social responsibility to not only practice proper food handling but also promote food safety behaviors among peer employees.

### Limitations and future study

This study is not without limitations. The survey used included several theories and associated scales, which may have contributed to survey fatigue. Some scale items were similar in verbiage yet contained slight differences based on the theory, which may have appeared to be repetitive to respondents and thus contributed to lowered strength in scale association, despite using scaled items from published research. Reducing the number of scale items and providing headings to the sections of the survey would have proven helpful and possibly reduced both fatigue and confusion throughout. Another limitation was the use of an online survey panel instead of using the survey in specific restaurants to investigate food safety culture in specific restaurants. Future studies on food safety intervention should include fear of reactions from managers or owners, retaliation of peer employees and personal return on investment (ROI). Unassociated with financial gain, the ROI in this instance would assess the value of intervention to the organization of the employees.

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### Corresponding author

Dan Jin can be contacted at: [djin@email.sc.edu](mailto:djin@email.sc.edu)