Self-reported Food Safety Behaviors in Independent Ethnic Restaurants: An Application of the Social Cognitive Theory

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Introduction

- Ethnic restaurants were defined as those that serve food from countries other than the traditional cuisine of the host country (Church, Gilbert, & Khokhar, 2006).

- Ethnic restaurants, especially Chinese, Italian, and Mexican restaurants have gained popularity and have become mainstream in the diet of most Americans (Agarwal & Dahm, 2015; Lee, Niode, Simonne, & Bruhn, 2012; Liu & Jang, 2013).

- The increased interest in ethnic food has been reinforced by the growing number of immigrants who seek their traditional food and young people who like to try new and different foods (Niode, Bruhn, & Simonne, 2011; Roseman, Kim & Zhang, 2013).

Introduction

- Several researchers have noted that ethnic restaurants have been associated with foodborne illnesses outbreaks (Kwon, Roberts, Shanklin, Liu, & Yen, 2010; Lee, Hwang, & Azlin, 2014; Liu & Lee, 2017).

- 8.7% of foodborne outbreaks from 1990 to 2008 were linked to ethnic foods, with 60% of these originating in ethnic restaurants (Matheus, Franco, Hsu, Marshall, & Simonne, 2016).

- Independent ethnic restaurants were found to have more critical food safety violations than chain ethnic restaurants (Kwon et al., 2010; Liu & Lee, 2017; Murphy, DiPietro, Kock, & Lee, 2011).

Introduction

- The link between ethnic restaurants and foodborne outbreaks has been attributed to
  - the complex food preparation utilized in most ethnic restaurants (Mauer et al., 2006; The Centers for Disease Control and Prevention, 2011),
  - improper food handling and malfunctioning equipment (Fusco et al., 2015),
  - use of raw or undercooked ingredients (Lee et al., 2014),
  - language barriers (Rudder, 2006; Panchal, Liu, & Dworkin, 2012),
  - and a culture of food preparation that doesn't connect well with the recommended food safety practices in the United States (Green et al. 2007; Lee et al. 2012).

Introduction

Statement of Problem

- Several previous studies based on the Theory of Reasoned Action and Theory of Planned Behavior have successfully identified numerous factors that affect food safety behaviors.
  - However, they have been inadequate in fully explaining the behaviors (Ko, 2013; Sniehotta, Presseau, & Araújo-Soares, 2014).

- The Social Cognitive Theory (SCT) by Bandura (1986) has been used to explain and predict a diverse set of health behaviors.
  - Very little research has been done using the constructs of the SCT to predict self-reported food safety behaviors, especially in independent ethnic restaurants.

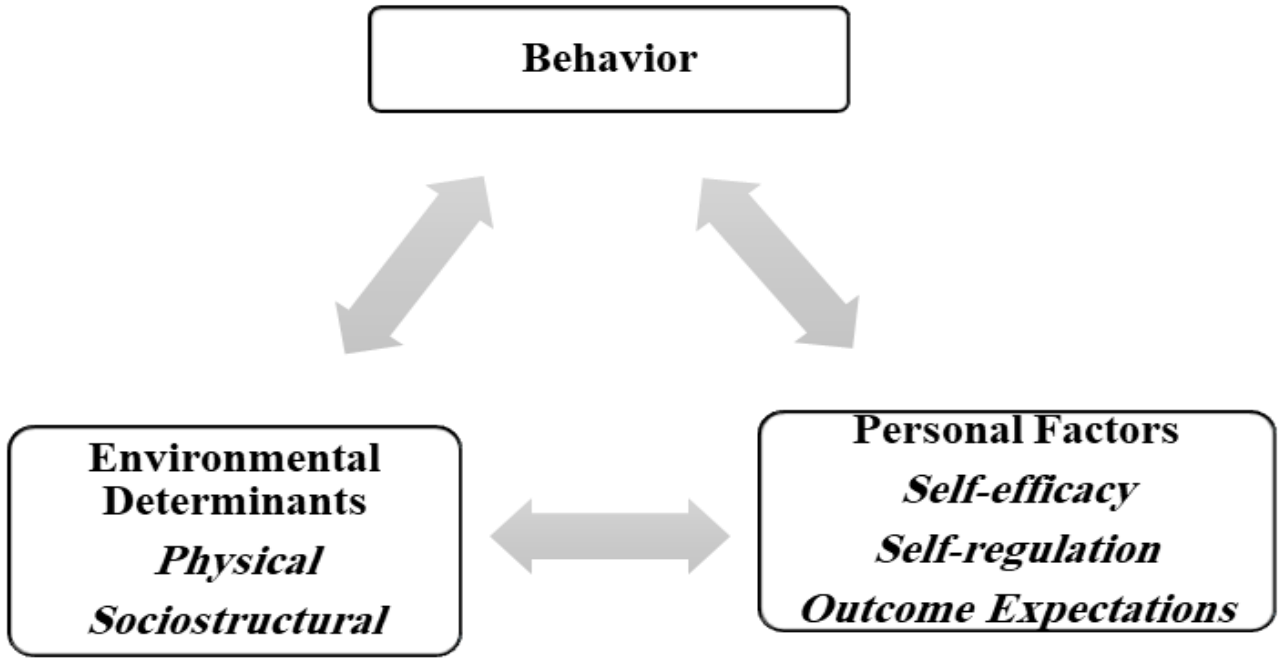
Introduction

A Summary of some Studies Used the Social Cognitive Theory to Understand Various Behaviors

Study	Topic
Ahlstrom (2009)	College students' fruit and vegetable intake
Anderson-Bill, Winett, and Wojcik (2011)	Nutrition and physical activity
Castellanos, Keller, and Majchrzak (2016)	Dietary intake of fruit and vegetable
Zhou (2015)	Nutrition, handwashing, oral Hygiene, sun protection, face mask use, and physical activity
Ellis, Brown, Ramsay, and Falk (2016)	Nutrition and physical activity
Haider, Manoj, and Amy (2012)	Predicting exercise behavior
Lin and Hsu (2015)	Consumer's green behavior
Lubans et al. (2012)	Dietary intake of adolescent girls
Ojeda, Flores, and Navarro (2011)	Students' academic and life satisfaction
Sener and Cimete (2016)	Maternal self-efficacy and child behavior
Yazdanpanah, Feyzabad, Forouzani, Mohammadzadeh, and Burton (2015)	Farmers' water conservation behavior

Introduction

A Scheme of the Reciprocal Causation Relationship Between the Three Determinants of the SCT



Literature Review

Self-efficacy

- Individuals with greater perceptions about their own abilities are more likely to perform challenging behaviors compared to those with low self-efficacy (Bandura 1977, 1986).

- Self-efficacy was found to predict cross-contamination behaviors of novice cooks (Bearth, Cousin, & Siegrist, 2014).

Literature Review

Outcome Expectations

- Outcome expectations take several forms, including physical, social, and self-evaluative outcome expectations (Bandura, 2004).

- Educating food handlers on the consequences of improper practices can improve their attitude towards food safety (Howells et al., 2008).

Literature Review

Self-regulation

- Self-regulation was found associated with change in several behaviors including exercise behavior (Ahn, Jeon, & Kwon, 2016), diet behavior (Anderson, Winett, Wojcik, & Williams, 2010), and physical activity in cancer patients (Ungar, Sieverding, Weidner, Ulrich, & Wiskemann, 2015).

- Adding the self-regulation construct may improve the predictive power of the Theory of Planned Behavior (Mullan & Wong, 2009).

- Repetitive health behaviors that are easy to self-control are a function of both past behaviors represented in habits and self-regulation (Hall & Fong, 2007)

Literature Review

Environmental Factors

- Behavior change will not occur unless the social and physical environment uphold the new behaviors (Bandura, 2002).

- Lack of resources has been frequently cited as some of the barriers to ensure safe food handling practices (Howells et al. 2008; York, Brannon, Roberts, Shanklin, & Howells, 2009).


Dirty
Dining
Dirty
Dining

Literature Review

Behavioral Intentions

- Bandura (1986) argued that most behaviors are mediated or guided by behavioral goals or intentions.

- Intentions can mediate the relationship between self-efficacy, outcome expectations, environmental factors e.g. barriers/impediments and the health behavior (Bandura, 2004).

- A specific behavior is most likely to be performed if a person has a strong intention, sufficient knowledge and skill to do it in a constraints-free environment (Montaño & Kasprzyk, 2008).

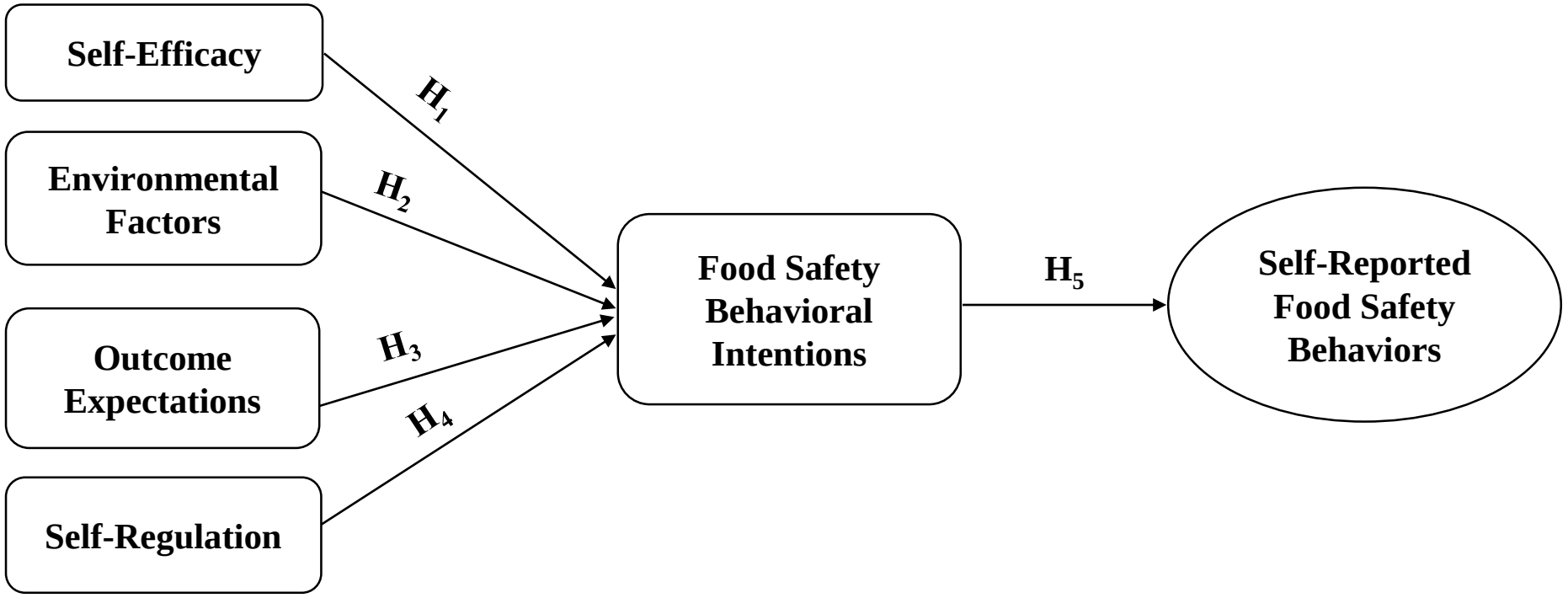
Literature Review

- Accordingly, the following hypotheses were proposed:
  - H_1: Self-efficacy is predictive of food safety behavioral intentions.
  - H_2: Environmental factors are predictive of food safety behavioral intentions.
  - H_3: Outcome expectations are predictive of food safety behavioral intentions.
  - H_4: Self-regulation is predictive of food safety behavioral intentions.
  - H_5: Self-reported food safety behaviors are mediated by food safety behavioral intentions.

Literature Review

Hypotheses

Conceptual Research Model Using the Social Cognitive Theory



Methods

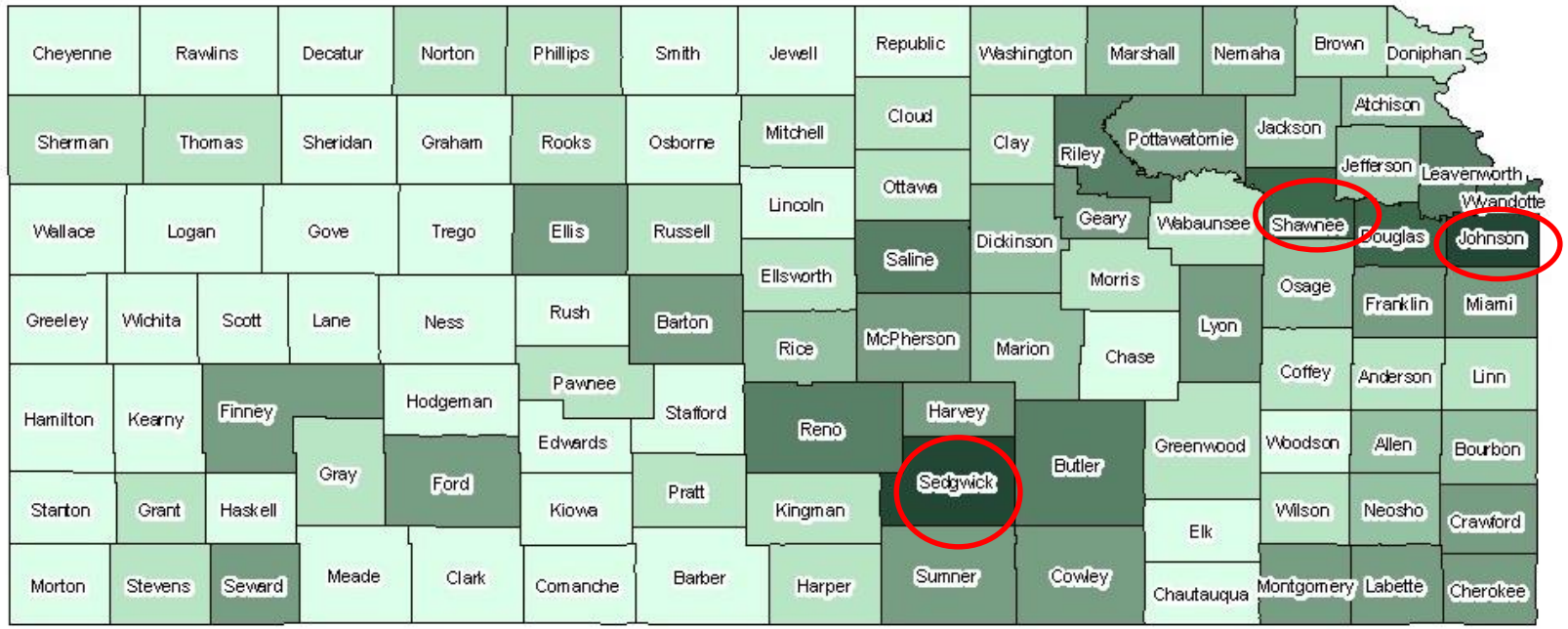
Study Design and Sampling Procedures

- A multi-stage random sampling technique was utilized to collect data for the main study.
  - A cluster sample of independent ethnic restaurants (30 restaurants) was drawn from Johnson, Shawnee, and Sedgwick counties in Kansas.

- The sample estimated to achieve a 95% confidence interval was 138 employees (G*Power, version 3).
  - To allow for dropouts, 150 employees were targeted.
  - To check for the measurement scales validity, the target sample was increased to 250 employees for data collection.

Methods

Kansas Counties



Center for Economic Development and Business Research, W. Frank Barton School of Business, Wichita State University
Data source: U.S. Census Bureau, 2010, PL94-171.

Methods

Focus Group

- One focus group interview was conducted with seven food handlers in non-supervisory positions in an independent Mexican restaurant.

- Four group interviews ranging from two to three participants were conducted with a total of 10 food handlers from independent Mexican and Chinese restaurants.

- Focus group and group interviews followed a questioning route with open-ended questions and other probe questions if required.
  - The questioning route was prepared based on previous research (Abbot, Byrd-Bredbenner, Schaffner, Bruhn, & Blalock, 2009; Bearth et al., 2014; Clayton, Griffith, Price, & Peters, 2002; Howells et al., 2008; Meysenburg, Albrecht, Litchfield, & Ritter-Gooder, 2014; Pilling et al., 2008; York et al., 2009).

Methods

Reliability

- Another experienced researcher independently transcribed and coded the recordings.

- Coding themes were then examined with the main researcher and any disagreement was resolved.

Analysis

- The coded data was analyzed using the procedures of NVivo 12 Plus for Windows (Version 12) to identify themes and patterns.

Methods

Survey Instrument Design

Questionnaire

- The questionnaire consisted of six subscales and eleven demographic and operational information items.
  - Four constructs of the SCT,
  - Food safety behavioral intentions,
  - Self-reported food safety behaviors (handwashing, use of thermometer, and proper handling of food and work surfaces (FDA, 2009; Howells et al., 2008; Pilling, Brannon, Shanklin, Howells, & Roberts, 2008; York et al. 2009).
- All variables were measured using a 5-point Likert-type scale.

Methods

Survey Instrument Design

Validity

- A variety of scale types and response formats were used throughout the questionnaire (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).
- Harman's single-factor test was used to diagnose if common method variances exist (Podsakoff & Organ, 1986).
- Confirmatory factor analysis was conducted using AMOS (version 25) to test the constructs' validity in the proposed model.

Methods

Data Collection

Pilot Study and Questionnaire Administration

- The questionnaire was pilot tested with 25 food handlers according to the recommendations of Finn, White, and Walton (2000) to check the wording and clarity of the questions.

- Restaurants owners/managers were contacted in person to request the participation of their employees.

- The questionnaire was administered on-site with the goal of sampling five food handlers from each restaurant.

Methods

Data Analysis

- Cronbach's alpha coefficient was computed to determine the internal consistency/reliability of each scale.
- Descriptive statistics were computed to screen and summarize the data.
- Multiple regression analysis was used to examine the ways in which the constructs act alone and together to influence self-reported food safety behaviors.
- Mediation analysis was performed using the procedures of the PROCESS macro developed for SPSS (Hayes, 2017) including the Sobel test and bootstrap confidence intervals.

Results: Focus Group and Group Interviews

Identified Themes and Sub-Themes

Theme	Response
Self-Efficacy	• I am confident I do it every time before I serve • but for me the main thing is the ability and the intelligence and the will
Self-Regulation • Habit • Goals setting • Self-monitoring • Self-regulation learning strategies	• I can tell you that I always do it because it is a habit • …we have in mind that I have to wash my hands, it's not in our mind, in a hemisphere of our brain

Results: Focus Group and Group Interviews

Identified Themes and Sub-Themes

Theme	Response
Environmental Factors • Physical environmental factors (equipment and resources) • Time constraints • Social environmental factors • Training and access to food safety information • Inspection by officials	• in practice it is 5% that follows it because there is neither time nor the conditions are the most adequate to wash hands • they [managers] have to do this on themselves and then they will monitor others and give them rewards or punishment if needed

Results: Focus Group and Group Interviews

Identified Themes and Sub-Themes

Theme	Response
Outcome Expectations • Reducing risk of foodborne illnesses, avoiding lawsuits, and maintaining good reputation • Time constraints and cost of supplies	• avoid lawsuits, diseases. Quality. So that the client is satisfied • if someone got sick because of eating our food, we are going to lose our job, they are going to shut down, the inspection comes, and everybody will lose job
Behavioral Intentions	• they are told, you are going to do this and this, but it is already dependent on the person

Results: Focus Group and Group Interviews

Identified Themes and Sub-Themes

Theme	Response
Food safety Behaviors	• I only wash my hands when I leave and come back to the work area • what I do, sometimes, is to put the thermometer inside the food to take the temperature
Culture of Food Preparation	• the culture that one brings is to the root because not all we do in the restaurant is what they teach us [public health authorities]

Results: Focus Group and Group Interviews

Identified Themes and Sub-Themes

Theme	Response
Attitude	• first the attitude. After having the tools that we have, if we do not have the attitude we will not do it
Knowledge	• it is important because we know that if the hot food is not more than 135 degrees [fahrenheit] it begins to spoil

Results: Survey

Response Rate and Demographics

- 204 participants from 66 independent Chinese and Mexican restaurants participated. Only 201 responses were usable. The overall response rate was 80.4%.
- 56.2% of the respondents were male and 42.3% were female.
- The majority of respondents were line cooks (34.8%) and prep cooks (28.9%).
- 66.7% of restaurants were Mexican restaurants and 33.3% were Chinese restaurants.
- 64.7% of the respondents indicated they received food safety training and 35.3% indicated they had food safety certification.

Results: Survey

Means, Standard Deviations, and Reliability of the Measurement Scales

Self-Efficacy *(α = 0.85)*

Highest	**Clean and sanitize food contact surfaces before and after preparing food (4.72±0.40).**
Lowest	**Use the thermometer at the completion of reheating food to 165°F. (4.46±0.66).**

Results: Survey

Means, Standard Deviations, and Reliability of the Measurement Scales

Self-regulation ***(α = 0.87)***

Highest	**I have a goal to ensure food has reached a safe temperature for service and consumption (4.67±0.42).**
Lowest	**I evaluate myself when I use a food thermometer (4.40±0.60).**

Results: Survey

Means, Standard Deviations, and Reliability of the Measurement Scales

Environmental Factors *(α = 0.91)*

Highest	**The necessary infrastructure and equipment (e.g., hand washing sinks) are available and accessible to support food safety (4.73±0.34).**
Lowest	**Sufficient financial resources are provided to support hygiene and food safety (4.50±0.54).**

Results: Survey

Means, Standard Deviations, and Reliability of the Measurement Scales

Outcome Expectations ***(α = 0.72)***

Highest	**I will help protect my restaurant from liability for foodborne illnesses (4.75±0.35).**
Lowest	**My manager/supervisor will praise my performance (4.38±0.62).**

Results: Survey

Means, Standard Deviations, and Reliability of the Measurement Scales

Behavioral Intentions ***(α = 0.86)***

Highest	**I am willing to separate raw food from ready-to-eat food during preparation (4.79±0.30).**
Lowest	**I intend to use a food thermometer at the completion of cooking (4.45±0.58).**

Results: Survey

Means, Standard Deviations, and Reliability of the Measurement Scales

Self-reported Food Safety Behaviors *(α = 0.88)*

Highest	**I wash my hands after sneezing, coughing, or using a tissue (4.85±0.23).**
Lowest	**I use a thermometer to check the temperature of food at the completion of cooking (4.46±0.61).** **I use a thermometer to check the temperature of food at the completion of reheating (4.42±0.66).**

Results: Survey

Goodness-of-fit Indices for the Hypothesized Model

CFA Results	χ^2/df	CFI[a]	GFI[b]	IFI[c]	RMSEA[d]	NFI[e]
Measurement	**2.24**	**0.83**	**0.73**	**0.83**	**0.07**	**0.73**

Note. **N = 201.**
[a] **CFI = comparative fit index.**
[b] **GFI = goodness of fit index.**
[c] **IFI = incremental fit index.**
[d] **RMSEA = root mean square error of approximation.**
[e] **NFI = normed fit index.**

- Bootstrap confidence intervals of 5,000 samples were computed and the results indicated that the model fit better in 4,548 out of the 5,000 bootstrap samples with $p < 0.05$.

- The Bollen-Stine bootstrapping procedure (Bollen & Stine, 1992) was used to test the null hypothesis that the model is correct. The result showed that the null hypothesis was not rejected ($p = 0.09$).

Results: Survey

Convergent and Discriminat Validity

- One factor did not explain most of the variance (40.8%). Common method variance was not an issue (Podsakoff & Organ, 1986).

- All standardized factor loadings were higher than 0.50.

	SE	SR	EF	BI	OE	SFB
AVE	**48%**	**48%**	**49%**	**50%**	**45%**	**50%**
SE	1.00	**0.46**	**0.27**	**0.32**	**0.30**	**0.45**
SR	0.68	1.00	**0.52**	**0.55**	**0.40**	**0.56**
EF	0.52	0.72	1.00	**0.42**	**0.42**	**0.40**
BI	0.57	0.74	0.65	1.00	**0.36**	**0.49**
OE	0.55	0.63	0.65	0.60	1.00	**0.31**
SFB	0.67	0.75	0.63	0.70	0.56	1.00

Average Variance Extracted (AVE) for BI and SFB met the 50% cut-off value (Hair, Black, Babin, Anderson, & Tatham, 2006).

Results: Survey

Multiple Regression Analysis

- The resulting model was significant (F = 75.24, p = 0.000) in predicting food safety behavioral intentions.

- The significant independent variables were
  - self-regulation (β = 0.467, p = 0.000),
  - environmental factors (β = 0.181, p = 0.011),
  - and outcome expectations (β = 0.152, p = 0.018).
    - They explained about 60.6 % of the variance in food safety behavioral intentions.
  - Self-efficacy did not have a significant effect on food safety behavioral intentions (β = 0.078, p = 0.219).

Results: Survey

Multiple Regression Analysis

Multiple Regression Results between all Predictors and Self-Reported Food Safety Behaviors

- The resulting model was significant (F = 81.58, p = 0.000) in predicting self-reported food safety behaviors.

	Unstandardized Coefficients		Standardized Coefficients		
Model	***b***	***SE B***	***β***	**t**	**Sig.**
Constant	0.764	0.229		3.336	0.001
Self-efficacy	0.240	0.054	0.275	4.468	0.000*
Self-regulation	0.433	0.077	0.422	5.597	0.000*
Environmental Factors	0.123	0.055	0.154	2.250	0.026*
Outcome Expectations	0.046	0.063	0.045	0.728	0.468

Note. *p<0.05

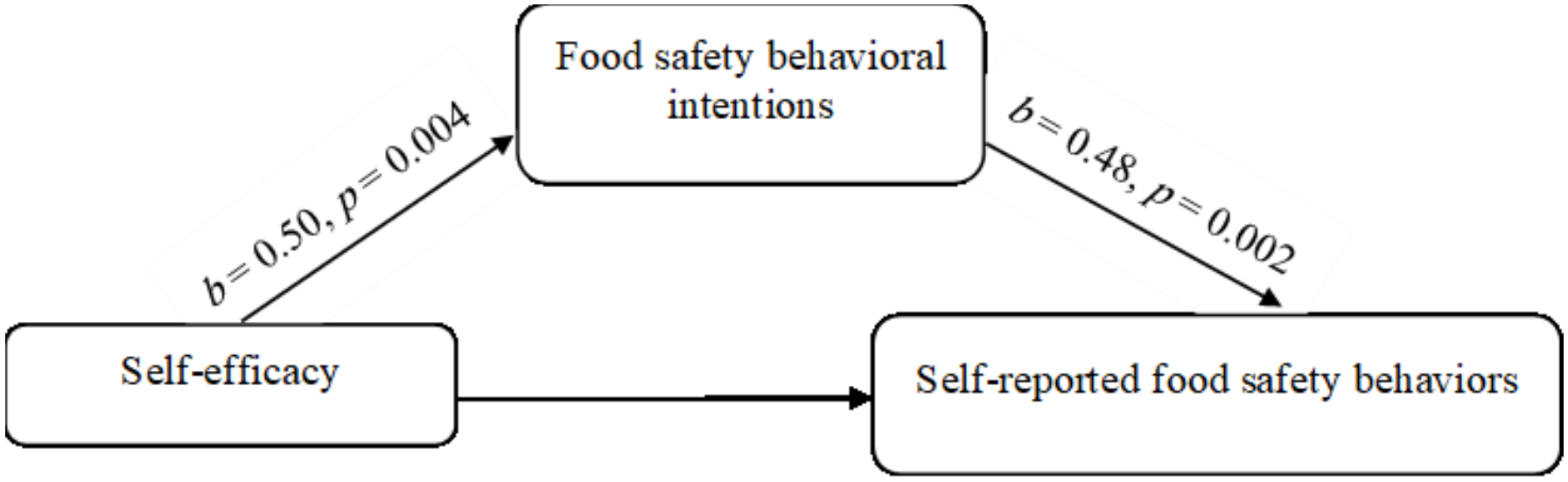
Results: Survey

Mediation Analysis

Model of Self-Efficacy as a Predictor of Self-Reported Food Safety Behaviors, Mediated by Food Safety Behavioral Intentions

Sobel Test
(z = 6.54, p = 0.000)

Bootstrap CI
[0.189, 0.377]



Direct effect, $b = 0.34$, $p = 0.001$

Indirect effect, $b = 0.24$, CI [0.161, 0.336]

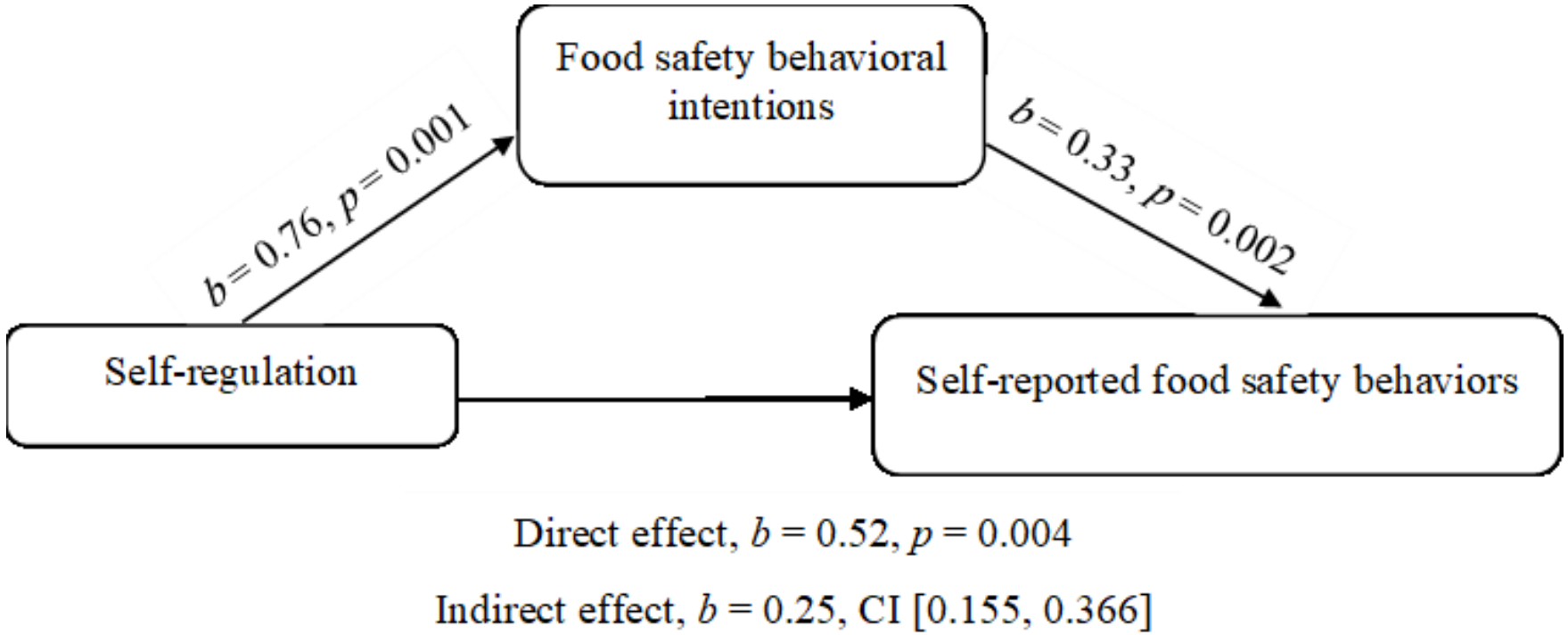
Results: Survey

Mediation Analysis

Model of Self-regulation as a Predictor of Self-Reported Food Safety Behaviors, Mediated by Food Safety Behavioral Intentions

Sobel Test
(z = 4.70, p = 0.000)

Bootstrap CI
[0.152, 0.353]



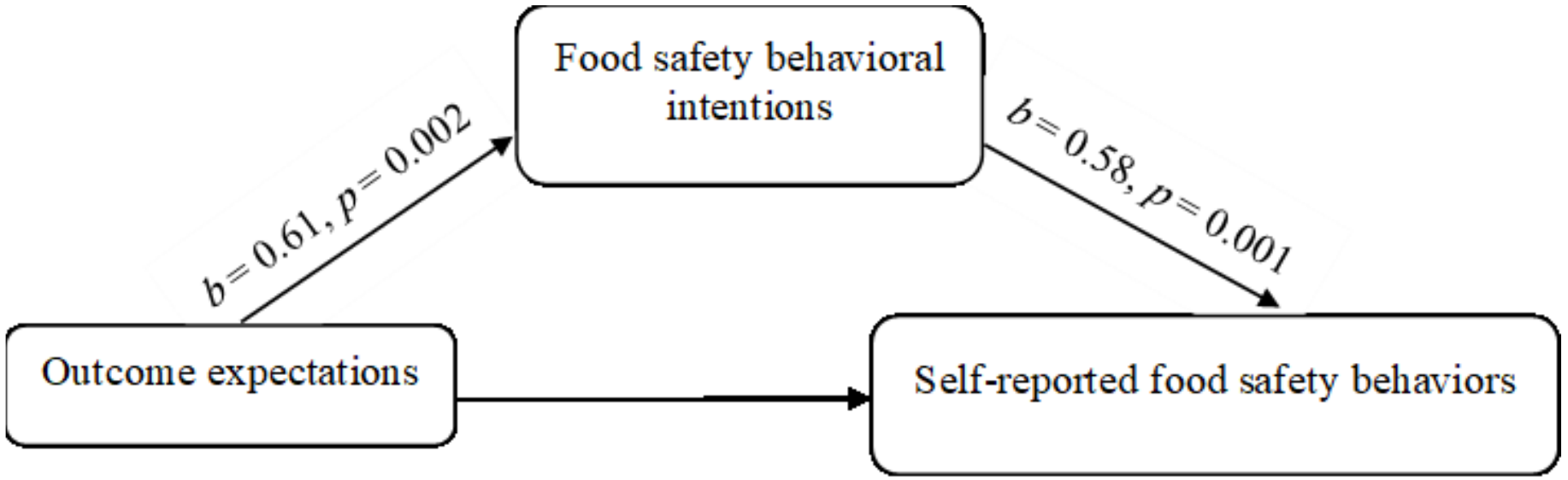
Results: Survey

Mediation Analysis

Model of Outcome Expectations as a Predictor of Self-Reported Food Safety Behaviors, Mediated by Food Safety Behavioral Intentions

Sobel Test
(z = 7.05, p = 0.000)

Bootstrap CI
[0.250, 0.451]



Direct effect, b = 0.22, p = 0.003

Indirect effect, b = 0.36, CI [0.247, 0.469]

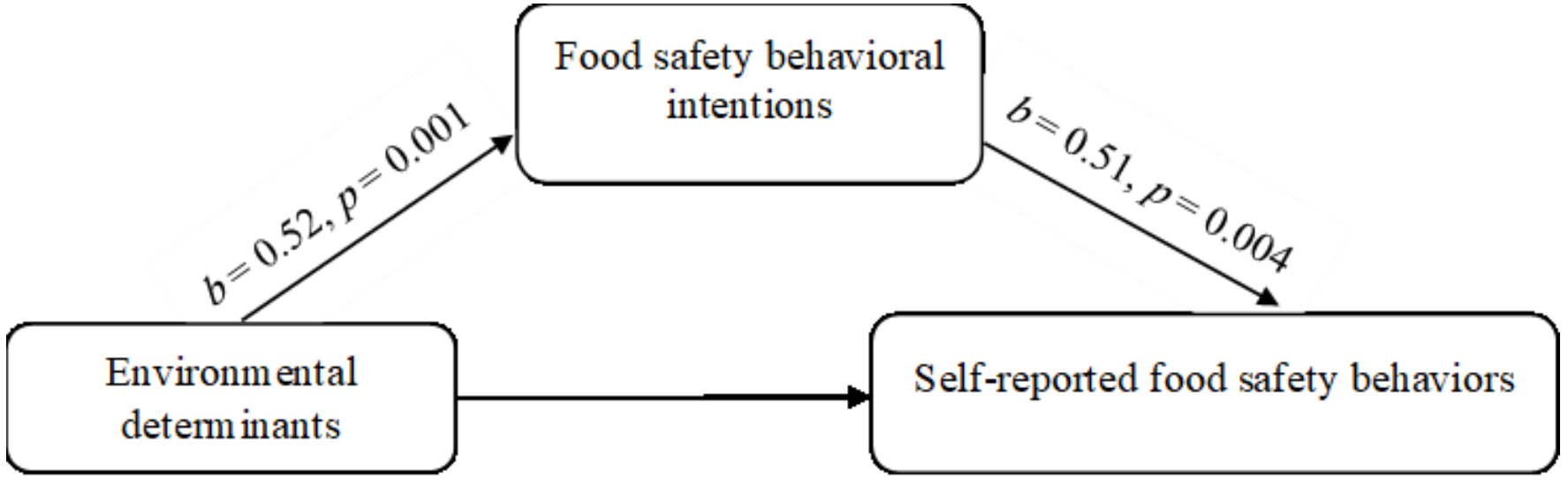
Results: Survey

Mediation Analysis

Model of Environmental Factors as a Predictor of Self-Reported Food Safety Behaviors, Mediated by Food Safety Behavioral Intentions

Sobel Test
(z = 6.72, p = 0.000)

Bootstrap CI
[0.231, 0.453]



Direct effect, b = 0.24, p = 0.002

Indirect effect, b = 0.27, CI [0.172, 0.393]

Discussion

Discussion of Descriptive Statistics of the Model Constructs

- The self-efficacy scale mean score was 4.59 ± 0.41.
  - The item *"use the thermometer at the completion of reheating food to 165°F"* had the lowest mean score (4.46 ± 0.66).
  - Similar to the results of Frash and MacLaurin (2010). (5.75 ± 1.49).

- The composite mean score for the construct of self-regulation was high (4.56 ± 0.35).
  - The item *"I evaluate myself when I use a food thermometer"* had the lowest mean score (4.40 ± 0.60).

- This is consistent with Li (2015).

Discussion

Discussion of Descriptive Statistics of the Model Constructs

- The environmental factors construct had a composite mean score of 4.65 ± 0.45.
  - The item *"Sufficient financial resources are provided to support hygiene and food safety"* had the lowest mean score (4.50 ± 0.54).
  - lack of financial resources was a barrier to improve food safety in independent ethnic restaurants (Gould, Rosenblum, Nicholas, Phan, & Jones, 2013; Liu, Kwon, Shanklin, Canter, & Webb, 2014; Murphy et al., 2011; Phillips, Elledge, Basara, Lynch, & Boatright, 2006).

- The outcome expectations had a composite mean score of 4.59 ± 0.35.
  - The item *"I will help protect my restaurant from liability for foodborne illnesses"* had the highest mean score (4.75 ± 0.35).
  - This is consistent with McAlister, Perry, and Parcel (2008).

Discussion

Discussion of Descriptive Statistics of the Model Constructs

- The composite mean score of the food safety behavioral intentions was 4.62 ± 0.36.
  - The item *"I intend to use a food thermometer at the completion of cooking"* had the lowest mean score.
  - Similar to Pilling, Brannon, Shanklin, Howells, and Roberts (2008).

Discussion

Discussion of Descriptive Statistics of the Model Constructs

- The composite mean score for self-reported food safety behaviors was 4.62 ± 0.36.
- The lowest mean scores
  - *"I use a thermometer to check the temperature of food at the completion of cooking."* (4.46 ± 0.61)
  - *"I use a thermometer to check the temperature of food at the completion of reheating."* (4.42 ± 0.66)

Discussion

Discussion of the Hypotheses Testing Results

H_1: Self-efficacy is predictive of food safety behavioral intentions **(was not supported)**

- Self-efficacy was not a significant predictor of food safety behavioral intentions ($\beta = 0.078$, $p = 0.219$).
  - Contradictory to Chow and Mullan (2010).

Discussion

Discussion of the Hypotheses Testing Results

- Self-efficacy was a significant predictor of self-reported food safety behaviors ($\beta = 0.275$, $p = 0.000$)
  - Consistent with Beavers, Murphy, & Richards (2015).
  - Individuals' perception of self-efficacy accounts for the level of effort and persistence to perform a specific behavior (Kretzer & Larson ,1998; Mitchell,Fraser, & Bearon, 2007).

Discussion

Discussion of the Hypotheses Testing Results

H_2: Environmental factors are predictive of food safety behavioral intentions

(Supported)

- Environmental factors significantly predict food safety behavioral intentions of the respondents ($\beta = 0.181$, $p = 0.011$).
  - Consistent with York et al. (2009) and Strohbehn et al. (2014).

Discussion

Discussion of the Hypotheses Testing Results

H_3: Outcome expectations are predictive of food safety behavioral intentions

(Supported)

- Outcome expectations significantly influence food safety behavioral intentions ($\beta = 0.152$, $p = 0.018$).
  - Similar to Wen and Kwon (2017).

Discussion

Discussion of the Hypotheses Testing Results

H_4: Self-regulation is predictive of food safety behavioral intentions **(Supported)**

- Self-regulation is significantly predictive of food safety behavioral intentions of the respondents ($\beta = 0.467$, $p = 0.000$).

  - Consistent with the views of Bandura (2005) and Zimmerman (2000).
  - Similar to Allom and Mullan (2012) and Hall, Fong, Epp, and Elias (2008).

    - Self-regulation may create motivational influence on the formation of food handlers' intentions to follow safe food handling behaviors.

Discussion

Discussion of the Hypotheses Testing Results

H_5: Self-reported food safety behaviors are mediated by food safety behavioral intentions **(Supported)**

- Consistent with the view of Bandura (1986), who noted that most behaviors are mediated by behavioral intentions.
- Similar to Yazdanpanah, Feyzabad, Forouzani, Mohammadzadeh, and Burton (2015).

  - Food handlers' intention to perform food safety behaviors can lead to better compliance with the behaviors when self-efficacy, self-regulation, outcome expectations, and environmental factors are favorable to the behaviors.

Conclusions

Theoretical Implications

- The developed scale may encourage future studies to advance the theory and yield theoretical and practical implications to improve food safety behaviors in different settings in the foodservice industry.

- This study followed a sequential mixed-method approach using focus group and group interviews and a survey instrument.

- Unlike previous research in hospitality, this study used a full model using four constructs of the SCT to investigate self-reported food safety behaviors.

- This study investigated psychological and environmental constructs that were not accounted for by other health behavior theories like the Theory of Planned Behavior.

Conclusions

Practical Implications

- Public health officials should consider the influence of cultural background of employees in independent ethnic restaurants when developing training materials.
- Owners, managers, and supervisors should educate their food handlers on the consequences of improper food safety behaviors.
- Operators and managers in independent ethnic restaurants should focus on increasing social pressure among employees.
- Consistent encouragement can reinforce confidence enough to bring about more efforts toward improving food safety behaviors.

Limitations and Directions for Future Research

- This study utilized a self-report survey and therefore, behavior may not be accurately measured given that participants may exhibit recall bias.

- The study was conducted in independent Mexican and Chinese restaurants in three counties in the state of Kansas, so the generalizability of the findings will be limited.

- The role of ethnicity was not examined in this study due to lack of ethnic diversity in the study sample.
  - The majority of respondents were Hispanic or Latino (51.2%) and Asian (37.3%).

Limitations and Directions for Future Research

- The measurement scale in this study showed good reliability and validity, future research should attempt to use a larger sample to verify validity.

- The interaction that exists between the characteristics of a person, their behaviors, and their environment was not explored, and it is still a promising area for future research.

- Future research is encouraged to use different designs for the study (e.g. experimental design) to determine which construct is useful or feasible for each behavior.

Thank you

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