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

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ABSTRACT

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

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

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BACKGROUND

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

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

An established behavioral theory is important to current food safety literature and can help provide practical guidance to education and training, thus helping with overall practices. A well-defined and properly adapted behavioral theory can help discern personal experiences and identify the cause of behavioral actions (Fishbein & Ajzen, 2011). For example, understanding the individuals’ attitudes and behavioral conformities related to food safety practices can help...
explain barriers and controls related to necessary food safety practices. The psychological approach of using the attitude and behavioral conformity construct as an adjudication before the practice can help test the individual cognitive process (Fishbein & Ajzen, 2011, Paulhus & Trapnell, 2008). Thus, the process can help disintegrate information related to food safety, test theoretical boundaries, and adapt to the specifically defined food safety practices (Paulhus, 2002; Paulhus & Trapnell, 2008). The specific focus of this study aimed to explore evidence-based behavioral constructs that influence employees’ food safety practices. The research used an adaptation of the current behavioral theory and was tested on exploration and behavioral conformity, thus providing contributions to the current understanding of food safety behaviors.

**Theoretical Framework – Theory of Planned Behavior (TPB)**

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

**Behavioral expectations**

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

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

**OBJECTIVES**

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

- **H$_1$.** There is a significant positive relationship between employees’ attitudes towards food safety practices and behavioral expectations about food safety practices.
- **H$_2$.** There is a significant positive relationship between employees’ subjective norms towards food safety practices and behavioral expectations about food safety practices.
- **H$_3$.** There is a significant positive relationship between employees’ self-efficacy towards food safety practices and behavioral expectations about food safety practices.
- **H$_4$.** There is a significant positive relationship between employees’ behavioral expectations towards food safety practices and self-reported food safety practices.

**METHODS**

For this study, a market company was paid to reach out to potential qualifying members within an existing company panel. Survey data were collected during a five-month period, allowing for waves of sampling collection to avoid common method biases.
Sample and Procedures
Before data collection, the Institutional Review Board at the university approved the research protocol for the study. Participants were recruited online from an existing marketing company panel (http://prime-research.com), with geographic IP verification to ensure that the individual foodservice workers were currently working in the continental United States. Participants went through a set of pre-screening validation to ensure that they possessed appropriate qualifications. The recruitment process contained multiple phases of distribution in different months of 2018 to control for common method variance (Podsakoff et al., 2012).

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

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

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

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

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

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

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

Table 1. Characteristics of Participants (n = 447)

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

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

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

CONCLUSIONS AND APPLICATIONS

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

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

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

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

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

Limitations

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

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

| Table 2. Multiple Regression Model for Predicting Behavioral Expectations |
|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Model                      | Sum of Squares              | df                          | Mean Square                 | F              | Sig. |
| Regression                 | 754.87                      | 3                           | 251.63                      | 77.09          | 0.00 |
| Residual                   | 1370.89                     | 420                         | 3.26                        |                |      |
| Total                      | 2125.77                     | 423                         |                             |                |      |

<table>
<thead>
<tr>
<th>Standardized Coefficients</th>
<th>Beta</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td></td>
<td></td>
<td>3.80</td>
</tr>
<tr>
<td>Attitude</td>
<td>0.73</td>
<td>5.8</td>
<td>0.000</td>
</tr>
<tr>
<td>Subjective norm</td>
<td>0.28</td>
<td>3.16</td>
<td>0.002</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>0.51</td>
<td>6.83</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Note: Dependent Variable, Behavioral Intention; df = degree of freedom; F = F-statistic; Sig = Significance; T = T-statistic
APPENDIX 1. QUESTIONNAIRE

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

Section 2: Behavioral expectation
Please answer each of the following questions by clicking the option to the statement. Please read each question carefully.

  3. I expect to follow food safety practices at work in this week.
    _Strongly disagree
    _Disagree
    _Somewhat disagree
    _Neither
    _Somewhat agree
    _Agree
    _Strongly agree

  4. I will follow food safety practices at work in this week.
    _Strongly disagree
    _Disagree
    _Somewhat disagree
    _Neither
    _Somewhat agree
    _Agree
    _Strongly agree

  5. I am likely to follow food safety practices at work in this week.
    _Strongly disagree
    _Disagree
    _Somewhat disagree
    _Neither
    _Somewhat agree
    _Agree
    _Strongly agree

  6. I am going to follow food safety practices at work in this week.
    _Strongly disagree
    _Disagree
    _Somewhat disagree
    _Neither
    _Somewhat agree
    _Agree
    _Strongly agree

Section 3: Planned attitude
Please answer each of the following questions by clicking the option to the statement. Please read each question carefully.

  7. I think that following food safety practices at work over the next 12 weeks would be ...
    _extremely harmful
    _harmful
    _somewhat harmful
    _neither
    _somewhat beneficial
    _beneficial
    _extremely beneficial

  8. I think that following food safety practices at work over the next 12 weeks would be ...
    _extremely worthless
    _worthless
    _somewhat worthless
    _neither
    _somewhat valuable
    _valuable
    _extremely valuable

  9. I think that following food safety practices at work over the next 12 weeks would be ...
    _extremely bad
    _bad
    _somewhat bad
    _neither
    _somewhat good
    _good
    _extremely good
Section 4: Subjective norm
Please answer each of the following questions by clicking the option to the statement. Please read each question carefully.

10. Most people who are important to me would: approve me if I follow food safety practices at work regularly over the next 12 weeks.
   - Strongly disagree
   - Disagree
   - Somewhat disagree
   - Neither
   - Somewhat agree
   - Agree
   - Strongly agree

11. Most people who are important to me would: encourage me if I follow food safety practices at work regularly over the next 12 weeks.
   - Strongly disagree
   - Disagree
   - Somewhat disagree
   - Neither
   - Somewhat agree
   - Agree
   - Strongly agree

12. Most people who are important to me would: support me if I follow food safety practices at work over the next 12 weeks.
   - Strongly disagree
   - Disagree
   - Somewhat disagree
   - Neither
   - Somewhat agree
   - Agree
   - Strongly agree

Section 5: Self-efficacy control

13. If it were entirely up to me, I am confident that I would be able to follow food safety practices at work on most days of the week.
   - Strongly disagree
   - Disagree
   - Somewhat disagree
   - Neither
   - Somewhat agree
   - Agree
   - Strongly agree

14. How confident are you that you will be able to follow food safety practices at work on most days of the week?
   - very unsure
   - unsure
   - somewhat unsure
   - neither
   - somewhat sure
   - sure
   - very sure

15. I believe I have the ability to follow food safety practices at work on most days in this week.
   - I definitely do not
   - I do not
   - slightly do not
   - neither
   - slightly do
   - I do
   - I definitely do

16. To what extent do you see yourself as being capable of following food safety practices at work on most days in this week?
   - very unlikely
   - unlikely
   - somewhat unlikely
   - neither
   - somewhat likely
   - likely
   - very likely
Section 6: Self-reported behavior
In the course of the past month, how often have you followed food safety practices at work

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

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

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

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