Appreciation of Food Safety Practices Based on Level of Experience

Laura A. Brannon, Valerie K. Pilling, Kevin R. Roberts, Carol W. Shanklin, Amber D. Howells

Appreciation of Food Safety Practices Based on Level of Experience

Appreciation of Food Safety Practices Based on Level of Experience

Laura A. Brannon

Valerie K. Pilling

Kevin R. Roberts

Carol W. Shanklin

Amber D. Howells

Abstract

This study sought to determine if *no experience*, *basic experience*, or *well-informed experience* (defined as basic experience and formal food safety training) in a foodservice operation would influence attitudes, subjective norms, and perceived behavioral control toward three important behaviors that can help prevent foodborne illness (handwashing, using thermometers, and sanitizing work surfaces). Results suggest that formal training increases respondents' appreciation of the importance of these food safety practices. Those with formal food safety training identified more attitude, subjective norm, and perceived behavioral control constructs than participants with basic experience or no experience in foodservice. Factors that help and impede employees in following proper food safety practices were identified. Foodservice operators and sanitarians can utilize these results to employ strategies to address the barriers preventing employees from applying food safety practices and to increase compliance with food safety regulations during individual inspections within operations, respectively.

Keywords: food safety, handwashing, thermometers, work surfaces, employee experience, theory of planned behavior, attitude, subjective norms, perceived behavioral control

Introductory note: Laura A. Brannon, Ph.D., Associate Professor of Psychology, Kansas State University, lbrannon@ksu.edu, 492 Bluemont Hall, Kansas State University, 66506; Valerie K. Pilling, M.S., Ph.D. Candidate in Psychology, Kansas State University, vpilling@ksu.edu, 492 Bluemont Hall, Kansas State University, 66506; Kevin R. Roberts, M.S., Ph.D. Candidate in Hotel, Restaurant, Institution Management & Dietetics, Kansas State University, roberts@humec.ksu.edu, 104 Justin Hall, Kansas State University, 66506; Carol W. Shanklin, Ph.D., R.D., Associate Dean of the Graduate School, Kansas State University, shanklin@ksu.edu, 103 Fairchild Hall, Kansas State University, 66506; Amber D. Howells, Graduate Student in Hotel, Restaurant, Institution Management & Dietetics, Kansas State University, amberkstate@yahoo.com, 104 Justin Hall, Kansas State University, 66506.

Appreciation of Food Safety Practices Based on Level of Experience

Introduction

Food safety is a significant concern for consumers and foodservice operators in the United

States. Foodborne illness and disease cost society an estimated $6.5 to $34.9 billion annually

(Buzby, Roberts, Jordan-Lin, & MacDonald, 1996). The majority of foodborne illnesses can be

traced back to public eating establishments (Bean & Griffith, 1990; CDC, 2000; Collins, 1997).

Estimates show that 50% of outbreaks reported from 1993 to 1997 were traced back to food

consumed in restaurants and other commercial food establishments (CDC, 2000). From 1973 to

1987, of the 7,219 cases of reported foodborne illness, 79% were linked to a commercial or

institutional kitchen (Bean & Griffith, 1990). Likewise, Collins (1997) reported that 80% of

foodborne illness outbreaks are associated with food establishments, while 20% occur from food

prepared at home. The three most common factors that lead to foodborne illnesses in reported

cases were time/temperature abuse (improper holding), poor personal hygiene of the food

preparer, and cross contamination (Collins, 1997; FDA, 2004; National Restaurant Association

Educational Foundation, 2004). These factors are directly related to the food safety practices of

foodservice employees and are preventable if proper practices are followed. With a projected

12.5 million individuals employed in the foodservice industry in 2006, the potential for

foodborne illness outbreaks is significant (National Restaurant Association, 2005). Thus,

foodservice managers and employees play an important role in protecting the general public

from foodborne illness and disease.

In 2000, the Food and Drug Administration (FDA) released the *Report of the FDA Retail*

Food Program Database of Foodborne Illness Risk Factors (FDA, 2000). The report noted the

percentage of out-of-compliance scores for full-service and fast food restaurants were higher

than their counterparts in hospitals, nursing homes, and elementary schools. Full-service and fast

food restaurants were found to be 40% and 26%, respectively, out-of-compliance for major risk

factors, which included inadequate cooking, improper holding temperatures, contaminated

equipment, poor personal hygiene, and obtaining food from unsafe sources. The follow-up report

(FDA, 2004) noted that full-service restaurants were out-of-compliance for holding time and

temperature (64%), personal hygiene standards (43%), and ensuring sanitary equipment/general

protection from contamination (37%). The percentages of fast-food restaurants out-of-

compliance with these risk factors were lower at 2%, 31%, and 22%, respectively.

Previous research has suggested that food safety training is an effective way to assure

proper food safety practices are followed in restaurants. However, research relating knowledge to

behavior change has been inconsistent. Studies have found that food safety training is effective

in increasing overall sanitation inspection scores (Cotterchio, Gunn, Coffill, Tormey, & Barry,

1998; Kneller & Bierma, 1990), the microbiological quality of food (Cohen, Reichel, &

Schwartz, 2001), and self-reported changes in food safety practices (McElroy & Cutter, 2004).

However, Howes, McEwan, Griffith, and Harris (1996) reported that even when foodservice

employees are trained and have the knowledge to perform proper food safety practices, the

knowledge does not always transfer to actual behavior. Thus, factors other than knowledge

contribute to the lack of properly performed food safety practices among employees. However,

there is a paucity of research available that has investigated why increased knowledge is not

translated into behavioral intentions and ultimately behavior within the foodservice operation.

The Theory of Planned Behavior

Although formulated outside the food safety domain, the Theory of Planned Behavior

(TpB) has been used extensively in health beliefs and health behaviors research. The TpB is one

of the most widely used psychological models that examine the factors influencing behavior (Ajzen, 1991). TpB states that the best predictor of a person's behavior in any situation is his or her intention to perform the behavior. Food safety training educates restaurant employees about the relationship between food handling practices and foodborne illness, with the goal of changing the employee's attitude and behavior. However, a person's behavior is influenced by more than just his or her attitude toward the behavior. A person's behavioral intention is based upon three antecedents: his or her attitudes, subjective norms, and perceived behavioral control (See Figure 1) (Ajzen 1988, 1991).

TpB: Attitudes. Attitude can be defined as "the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question" (Ajzen, 1991, p. 188). The TpB posits that attitudes toward specific behaviors are based upon expectations about the likelihood of various outcomes of the behavior, or behavioral beliefs (Figure 1).

A behavioral belief refers to an individual's idea that the behavior will lead to a certain outcome. If a person holds a negative belief toward a behavior, he/she will be more likely to refrain from that behavior compared to someone who has a positive belief toward the behavior (Ajzen & Fishbein, 1980). On one hand, employees may, despite the efforts of a training program, believe there is a low likelihood that their food handling practices would result in negative consequences to customers (e.g., "I'm not sick, so not washing my hands will not make anyone else sick"). On the other hand, they may see negative consequences for themselves associated with the advocated behavior (e.g., I'm not going to wash my hands because frequent washing results in dry skin"). According to the TpB, it is not only important to try to change workers' attitudes toward the recommended food safety practices, but also to address any negative outcomes they believe to be associated with these practices (Ajzen & Fishbein, 1980).

Attitudes toward food safety programs have been well researched (e.g., Cochran-Yantis, Belo, Giampaoli, McProud, Everly, & Gans, 1996; Hwang, Almanza, & Nelson, 2001; Roberts & Sneed, 2003). Cochran-Yantis, Belo, Giampaoli, McProud, Everly, and Gans (1996) reported that restaurant managers who had a favorable attitude toward food safety were more likely to score higher on inspection reports, while the converse holds true for those who do not have a favorable attitude. Hwang, Almanza, and Nelson (2001) extended this idea into school foodservice and found knowledge, training, and practice were all factors that led managers to be more favorable toward implementing Hazard Analysis Critical Control Point (HACCP), a food safety program. Roberts and Sneed (2003) explored managers' attitudes related to HACCP in commercial foodservice operations. Managers indicated that they would be more interested in a food safety program if employees were more motivated and more money and time were available to them. However, while manager attitudes about food safety programs have been researched, employees' attitudes have not yet received attention. An employee's attitude toward a behavior significantly influences his or her intentions to perform that behavior. According to the TpB, intentions are also influenced by other people's attitudes toward the behavior.

TpB: Subjective Norms. The subjective norm summarizes the beliefs of other people in relation to how the individual should behave in a situation and how motivated the individual is to comply with those other individuals (Figure 1) (Ajzen, 1991). For example, if as a result of a training program an employee develops a positive attitude toward thorough and frequent handwashing, but co-workers do not engage in this behavior, there may be subtle pressure to conform to the behavior of the other employees.

Even with pressure from co-workers not to comply with certain food safety practices, the employee may be more motivated to comply with the manager's instructions than with his or her

peers. Conversely, some employees may be more concerned with the opinions of their co-workers than with their manager's instructions, which would cause them to comply with the beliefs of the other employees. Not having the needed resources or ability to perform proper food safety practices would also influence whether or not an employee chooses to follow recommended practices.

TpB: Perceived Behavioral Control. Employees' perceptions of their actual or perceived ability to perform the behavior will influence behaviors directly, as well as through behavioral intentions (Figure 1). Obviously, employees will not engage in behaviors that they do not believe they can perform. Also, people may intend to perform a behavior that they are actually incapable of implementing (Ajzen, 1991). For example, an employee may intend to take end-point cooking temperatures; however, upon attempting to do so, he or she discovers that thermometers are unavailable and therefore will be unable to take the temperature. Several factors may influence perceived behavioral control, for example, lack of resources, time pressures, or competing job demands. No research has investigated employees' perceived behavioral control over performing food safety behaviors in the commercial foodservice operations.

Attitudes, subjective norms, and perceived control are not entirely independent of one another (Figure 1). For example, disapproval of co-workers (subjective norm) can eventually influence an employee's own attitude and his or her behavior (Ajzen, 1991). Identifying foodservice employees' attitudes, subjective norms, and perceived behavioral control for practicing food safety behaviors will assist in increasing compliance with these behaviors.

Experience of Employees. Past research has shown that attitudes based on direct (or personal) experience rather than indirect (or vicarious) experience (Fazio & Zanna, 1981) and attitudes based on a great deal of information rather than little information (Davidson, Yantis,

Norwood, & Montano, 1985) are more predictive of behavior. Further, job experience has been noted to influence how employees (such as nurses) think about on-the-job behaviors that have potentially serious health consequences for clients/customers (Brannon & Carson, 2003). Experience may influence employees' attitudes, subjective norms, and perceived behavioral control for performing proper food safety practices. This study investigates the difference in the antecedents of behavioral intentions based on the type of experience and previous food safety training the participant has. Participants were classified as having either *no experience* in foodservice, *basic experience* in foodservice (i.e., they had experience working in a restaurant doing food preparation tasks), or *well-informed experience* in foodservice (i.e., they had experience working in a restaurant doing food preparation tasks plus they had taken a formal food safety training course).

The overall purpose of this study was to determine if basic or well-informed experience in a foodservice operation would influence participants' attitudes, subjective norms, and perceived behavioral controls toward the three most common factors contributing to foodborne disease: cross contamination, time/temperature abuse, and poor personal hygiene (handwashing) (Ajzen, 1988; Collins, 1997; FDA, 2004; National Restaurant Association Educational Foundation, 2004). Specific objectives were to determine if basic experience influences the propensity of participants to recognize barriers (perceived behavioral control) and the people who care about restaurant employees performing proper food safety behaviors (subjective norms). Another objective was to determine if participants with well-informed experience would identify more advantages and disadvantages of performing proper food safety practices (attitudes) than those with basic experience. The researchers hypothesized that formal training

will lead to recognition of more positive and negative outcomes of performing proper food safety practices.

Methods

Two hundred seventy undergraduates enrolled in a general psychology or hospitality class at a large Midwestern university individually completed the questionnaire. Participants were recruited in classes, participation was voluntary, and participants received class credit for their participation in the study. All responses were anonymous, and participants were told they could withdraw from the study at any time without penalty. The questionnaire was administered in a few sessions in a classroom setting, participants had approximately one hour to complete it, and participants were asked not to discuss the study with other students. A researcher was available during the administration to answer any questions. The University Institutional Review Board approved the research protocol.

The hospitality students, who all had experience working with food preparation tasks in a restaurant, completed the questionnaire at the end of a formal food certification class, and were considered to be the "well-informed" experience group. The psychology students were recruited through a sign-up sheet describing the research as related to food safety practices in restaurants, and they were encouraged to participate whether or not they had ever worked in a restaurant. Those participants who signed up to participate were considered to be interested in this topic given that there were many other studies they could have signed up for. These students were considered part of the "basic experience" group if they had ever worked with food preparation tasks but never had completed a formal food safety training course, or part of the "no experience" group if they had neither worked in a restaurant or completed a formal food safety course. A couple of psychology students reported having completed a formal food safety course,

and they were excluded from the study in an attempt to avoid repeat participants in the three

group (e.g., a student could have taken the food safety course and general psychology at the

same time and already have completed the questionnaire).

The five-part questionnaire was designed according to the guidelines recommended by

Ajzen (1991). Parts I through III contained several open-ended questions, which elicited

participants' beliefs regarding each of the three separate food safety practices. For each of the

sections, researchers provided participants with a detailed definition of the food safety behavior

of interest. Table 1 includes the definitions of the three food safety behaviors explored.

Insert Table 1 about here.

For each food safety behavior in parts I through III, researchers presented four open-

ended questions (Appendix A). Questions one and two assessed participants' beliefs about the

advantages (positive outcomes) and disadvantages (negative outcomes) that could result from

performing the behavior (attitudes). Questions three and four assessed factors that would make it

easier or more difficult to perform the behaviors (perceived behavioral control). All four

questions were asked for each of the three food safety behaviors, and the questions were

presented in random orders to avoid order effects.

Part IV included an open-ended item asking participants to list people who care about

them performing the behaviors (subjective norms) for all three of the food safety behaviors.

Participants were asked to list the people or groups who care about whether or not they perform

the three food safety practices (i.e., their subjective norms) in just one question. The question

was asked only once, rather than for each behavior separately, because it was not expected that

participants would perceive different groups caring about them performing different food safety

behaviors to different degrees (for example, care about some food safety behaviors but not others). In other words, it was expected that if the participant perceived a person or group as caring about one food safety behavior, that they would also perceive that person or group caring about another food safety behavior.

Part V included nine demographic questions relating to the participant's gender, age, prior experience working in foodservice, position in foodservice, and formal food safety training experience. Participants' answers to some of these items allowed the researchers to classify them into one of the three experience groups. First, if participants indicated that they had never worked in a restaurant before, they were in the "No Experience" group. If the participant had worked in a restaurant in a position in which they directly prepared food, but they had never taken a food safety course, they were in the "Basic Experience" Group. If the participant had worked in a restaurant in a position in which they directly prepared food and they had taken a food safety course, they were in the "Well-Informed Experience" group.

The researchers developed a coding scheme based on themes emerging from responses to the questionnaire. For each open-ended question, the researchers made a list of all responses and placed similar responses into a single category, while responses that were made by very few participants were coded into an "other" category. After the coding scheme was developed, two trained researchers coded the data independently. The coders attempted to fit each participant response into a category in the coding scheme. The coders compared their results, and disagreements were resolved through discussion. Initially, an inter-rater reliability of 87% agreement was achieved, but discussion improved inter-rater reliability to 100%.

The primary dependent variable of interest was the number of items listed in each category. For each participant, the researchers calculated the number of advantages,

disadvantages, things that make it easier, things that make it more difficult, and people who care

about the participant performing the listed behaviors. Attitude and perceived behavioral control

beliefs were identified for each of the food safety practices separately, while subjective norms

beliefs were identified for all three behaviors simultaneously. Again, subjective norms were

assessed just once because it was expected that they would be consistent across various specific

food safety behaviors. Each belief response offered by the participants was considered valid

unless it was clear that they misunderstood the question. No attempt to distinguish between

conceptual levels of responses was attempted, and all responses were given equal weight,

because the aim of the study was to elicit participants' salient beliefs. It was thought that all

participants' salient beliefs should be considered equally important.

Results

Participant Characteristics. Participants were undergraduates at a large Midwestern

university. The majority of participants were female (68.5%). Participants' ages ranged between

18 and 49 years of age; the average participant age was 20.65 ($SD = 4.13$). Additionally, 25.2%

of participants were classified by the researchers as having no experience in foodservice, 30.4%

had basic experience, and 44.4% had well-informed experience. The minimum duration of

employment reported by any participant who had experience working in a restaurant was one

month. It is thought that this is a sufficient amount of time to become familiar with the working

environment, thus be considered having "basic experience". Further, both groups with restaurant

experience had a median of 2 years experience, so the groups did not differ in the amount of

work experience they had.

Overall Number of Constructs as a Function of Experience. In this first section, the

results related to the overall number of participant responses will be discussed. These results

reflect data based on combining participant responses for all three of the food safety practices. The subsequent sections will then describe results relating to participant responses for each specific food safety behavior in turn.

When the overall number of attitude beliefs combined for all three food safety behaviors were examined, participants with well-informed experience listed significantly more attitude beliefs (i.e., advantages and disadvantages combined) of performing proper food safety behaviors than those with basic experience or no experience, $F(2,269) = 13.28$, $p < .001$ (Table 2).

Insert Table 2 about here.

When the components of the attitude beliefs were examined separately, the same relationship was found for advantages, $F(2,269) = 17.05$, $p < .001$. However, participants with well-informed experience listed more disadvantages than those with basic experience, but no more than those with no experience, $F(2,269) = 4.18$, $p < .016$. Researchers noted two types of disadvantages identified by participants: those relating to things that make a person not want to perform the behavior (e.g., they take too much time) and things associated with doing the behavior incorrectly (e.g., possible cross contamination). Participants with well-informed experience ($M = 0.91$, $SD = 0.93$) listed more disadvantages associated with performing behaviors incorrectly than did those with basic experience ($M = 0.65$, $SD = 0.73$; $p < .002$) or no experience ($M = 0.51$, $SD = 0.66$; $p < .025$), $F(2, 269) = 5.73$, $p < .004$. There were no differences between the groups' lists of disadvantages which just made them not want to perform the behavior.

Also, for the overall responses combined for all three food safety behaviors, participants with well-informed experience listed more overall perceived control beliefs (i.e., things that

make it easier or more difficult to perform) than did those with basic or no experience, $F(2,269)$ = 22.86, $p < .001$ (Table 2). When the components of perceived control were examined separately, the same relationship was also found concerning things that both make proper food safety practices easier, $F(2,269) = 27.79$, $p < .001$, and more difficult, $F(2,269) = 8.55$, $p < .001$, to perform.

Individuals Contributing to Subjective Norms. Participants were asked to list the people or groups who care about whether or not they perform the three food safety practices (i.e., their subjective norms) in just one question. The question was asked only once, rather than for each behavior separately, because it was not expected that participants would perceive different groups caring about them performing different food safety behaviors. Participants with well-informed experience identified significantly more people who cared about them performing proper food safety practices than those with basic experience or no experience, $F(2,269)=15.80$, $p < .001$ (Table 2). Table 3 presents the most frequently listed constituent groups among participants.

Insert Table 3 about here.

Behavior-Specific Beliefs as a Function of Experience

Handwashing. When only the responses relating to handwashing were examined, participants' type of experience was found to influence their responses for these items (Table 4). Participants with well-informed experience listed more attitude beliefs (advantages and disadvantages combined) about handwashing than did those participants with basic experience, but did not list more than those without any foodservice experience, $F(2,269) = 3.04$, $p < .049$. When the components of these attitude beliefs were examined separately, the same relationship

was also found for advantages to handwashing, $F(2,269) = 4.03$, $p < .019$, but type of experience made no difference in how many disadvantages of handwashing were listed.

Insert Table 4 about here.

Tables 5 and 6 present data relating to the most frequently listed attitudes about handwashing among participants. The top three advantages among all experience groups were assuring good personal hygiene, reducing cross contamination, and providing safe food (food safety). Among all three groups, the two most frequent disadvantages listed were that handwashing takes time and hands become dry.

Insert Tables 5 and 6 about here.

Participants with well-informed experience also listed more perceived control beliefs (a combination of things that make it easier or more difficult) for handwashing than those with either basic experience or those without experience in foodservice, $F(2,269) = 11.33$, $p < .001$. When examined separately, the same relationship was also found for things that make handwashing easier, $F(2,269) = 9.72$, $p < .001$, and things that make handwashing more difficult, $F(2,269) = 5.53$, $p < .004$ (Table 4).

Tables 7 and 8 summarize the most frequently listed control beliefs about handwashing. Participants listed having sinks in convenient locations and having sinks available as the top two items that would make handwashing easier. Among all three experience groups, time constraint was the most frequently identified control belief that would make handwashing more difficult.

Insert Tables 7 and 8 about here.

Using Thermometers. When responses only to the items relating to using thermometers were examined, participants with well-informed experience listed more attitude beliefs (advantages and disadvantages) of using thermometers than did those participants with basic experience and those with no experience, $F(2,269) = 9.76$, $p < .001$ (Table 9).

Insert Table 9 about here.

The same relationship was also found for advantages of using thermometers when the components of attitude were examined separately, $F(2,269) = 8.80$, $p < .001$. However, those with well-informed experience listed more disadvantages to using a thermometer than did those with basic experience, but no more than those without experience, $F(2,269) = 4.44$, $p < .013$. The researchers noted two types of disadvantages identified by participants: those relating to things that make a person not want to perform the behavior and things associated with doing the behavior incorrectly. Participants with well-informed experience ($M = 0.65$, $SD = 0.69$) listed more disadvantages associated with performing the behavior incorrectly than did those with no experience ($M = 0.38$, $SD = 0.52$; $p < .004$), but did not list any more than those with basic experience ($M = 0.51$, $SD = 0.55$; $p < .117$). There were no significant differences between the groups' lists of disadvantages that made them not want to perform the behavior.

Tables 5 and 6 summarize the most frequently listed attitudes concerning using a thermometer. Food safety, food quality, and ensuring correct temperatures were the most frequently identified advantages by all three groups. Cross contamination and the time required were identified most frequently by all three groups as disadvantages to using thermometers. Twenty-five percent of the well-informed group also stated that you get a false sense of security if it is done wrong as another disadvantage.

Participants with well-informed experience listed more perceived control beliefs (a combination of things that make it easier or more difficult) of using thermometers than those with either basic experience or those without experience in foodservice, $F(2,269) = 15.12$, $p < .001$ (Table 9). When the components of these perceived control beliefs were examined separately, the same relationship existed for things that make using a thermometer easier, $F(2,269) = 19.10$, $p < .001$. However, for things that make using a thermometer more difficult, those with well-informed experience listed more things than did those without food service experience, but no more than those with basic experience, $F(2,269) = 3.36$, $p < .036$.

Tables 7 and 8 summarize the most frequently listed control beliefs for using a thermometer. In all groups, having thermometers available as well as conveniently located were the two most frequently identified things that would make using a thermometer easier. Among all three groups, time constraint was the only common thing that was identified that makes using a thermometer more difficult.

Properly Handling Food and Work Surfaces. When only responses about handling food and work surfaces were examined, participants with well-informed experience listed more attitude beliefs (advantages and disadvantages combined) of properly handling food and work surfaces than did participants with basic experience and those with no experience, $F(2,269) = 13.99$, $p < .001$ (Table 10).

Insert Table 10 about here.

When the components of these attitude beliefs were examined separately, the same relationship existed for advantages to properly handling food and work surfaces, $F(2,269) = 13.58$, $p < .001$. However, for disadvantages, those with well-informed experience listed more items than did those with basic experience, but no more than those without experience, $F(2,269)$

= 4.33, $p < .014$. Again, the data analysis revealed two types of disadvantages: those relating to things that make a person not want to perform the behavior and things associated with doing the behavior incorrectly. Participants with well-informed experience ($M = 0.26$, $SD = 0.44$) listed more disadvantages associated with performing the behavior incorrectly than did those with basic experience ($M = 0.13$, $SD = 0.34$; $p < .027$) and those with no experience ($M = 0.13$, $SD = 0.34$; $p < .034$), $F(2, 269) = 3.45$, $p < .033$. However, no differences were observed between the groups' lists of disadvantages that made them not want to perform the behavior.

Tables 5 and 6 summarize the most frequently listed attitude beliefs about proper handling of food and work surfaces. Food safety, a clean environment, and reduced cross contamination were the three most frequently listed advantages of properly handling food and work surfaces in all three experience groups. That it takes time, is a hassle because it has to be done so often, and could lead to contamination of food if done carelessly were identified most frequently as disadvantages in all groups.

Participants with well-informed experience listed more perceived control beliefs (a combination of things that make it easier or more difficult) of properly handling food and work surfaces than those with either basic experience or those with no experience in foodservice, $F(2,269) = 12.65$, $p < .001$ (Table 10). When the components of these perceived control beliefs were examined separately, the same relationship existed for things that make properly handling food and work surfaces easier, $F(2,269) = 14.10$, $p < .001$, as well as things that make it more difficult, $F(2,269) = 4.64$, $p < .01$.

Tables 7 and 8 summarize the most frequently listed control beliefs among the groups for properly handling food and work surfaces. Having managers monitoring the employees' behavior was the only thing that was identified most frequently by all three groups as something

that makes properly handling food and work surfaces easier. Time constraint was the only common barrier identified by all groups that makes it more difficult to properly perform this behavior.

Discussion

These results suggest that a formal food safety training course is beneficial in helping participants appreciate, or become more aware of, the importance of these food safety practices. While training does not consistently improve employee behavior, it does influence important contributors to behavior, which is the first step to improving actual behavior. People who are more aware of the importance of the issue and more strongly hold this belief are more likely to be willing to change their behavior (Petty & Krosnick, 1995).Generally, participants who had experience working in restaurants and had formal food safety training identified more advantages, disadvantages, things that make the behaviors easier to perform, things that make the behaviors more difficult to perform, and people who care about them performing the food safety behaviors than participants with basic restaurant experience or no restaurant experience at all, with a few exceptions.

The first exception is that participants with no restaurant experience listed just as many advantages to handwashing as those participants with well-informed experience, while those with basic experience listed less than these other two groups. Further, experience made no difference in the number of disadvantages listed. This finding may be explained by the fact that handwashing is a more general behavior than taking food temperatures or cleaning and sanitizing work surfaces, which just apply to food preparation. However, handwashing is something everyone does several times daily, so people generally know more about it and its advantages and disadvantages. Perhaps differences would have been found between experience groups if a

more sensitive measure had been used which assessed specific advantages and disadvantages of handwashing in foodservice. Another possible explanation for these results is that those employees with basic experience are influenced by the manager's lack of concern over employees practicing proper handwashing. Those with no restaurant experience would probably be approaching the survey from the perspective of a customer, and thus their desire to be served safe food, and the advantages associated with it would be very salient. Similarly, employees with well-informed experience would be more likely to have more salient advantages to handwashing because they have been presented with information in a food safety course. On the other hand, those with basic experience are less likely to have had anyone to emphasize to them that proper handwashing is critical. This group is more likely to perceive their manager to not care as much about handwashing because they have not prioritized food safety training for the employees. It could be that the manager is sending signals that handwashing is not important, and this may detract from the number of advantages they perceive to result from such a behavior. However, it should be noted that this pattern of results only showed up for the behavior of handwashing. Future research should investigate why these different groups perceive different numbers of advantages associated with handwashing.

Another exception to the data was that participants with no experience listed as many disadvantages to using a thermometer and properly handling food and work surfaces as those with well-informed experience, while those with basic experience listed fewer disadvantages than the other two groups. The results were easier to explain when the disadvantages were broken down into two separate factors: things that just made people not want to perform the behaviors (e.g., takes time) and things that could happen if the behaviors were performed improperly (e.g., contamination of food from chemicals or dirty thermometer). The three groups

did not differ in the number of listed disadvantages related to things that just made them not want to perform these behaviors. However, when looking at the disadvantages related to things that could happen if the behaviors were performed improperly, both groups with restaurant experience listed more disadvantages than those without experience.

Based on the results of this study, it appears as though formal food safety training is beneficial in helping people recognize issues related to performing the three food safety behaviors explored. The importance of offering restaurant employees formal food safety training is evident by the lack of improvement gained through real-world basic restaurant experience alone. Basic restaurant experience does not provide employees with sufficient appreciation of the importance of practicing proper food safety practices within the operation. It is important to realize that formal food safety is not a waste of time just because it does not improve behavior (the end goal). It is very promising that training influences these important contributors of behavior. Training moves people in the right direction, but not far enough.

The main barriers and facilitators across the three food safety behaviors offer implications for designing workplace interventions to improve compliance with food safety behaviors among restaurant employees. The main barriers across all three behaviors are time issues (i.e., lack of time, having competing tasks) and unavailability of necessary resources (e.g., thermometers, sanitizing solution). To some extent, these are issues that managers are able to address by simply providing adequate resources, such as thermometers, proper training, and reminder signs. Managers could also assist employees in using their time more efficiently, so employees do not perceive major time constraints when looking at food safety practices versus other production and operational tasks. In order for employees to be actively engaged in proper food safety practices, managers must recognize their responsibility to demonstrate and

emphasize the importance of following proper food safety practices. If managers could prioritize the employees' daily tasks so that food safety procedures are perceived as part of the daily routine instead of competing tasks and relate this with business goals and customer demands (just as they do with order turnover times), employees would in turn consider these to be a higher priority and would be more likely to engage in following proper food safety practices.

Some of these issues are not as easy to implement for managers, but could be addressed by paying particular attention when designing and building foodservice operations. For example, ensuring that sinks are in convenient locations for production employees to use and that separate stations are available in the production area for different types of food items to alleviate cross contamination.

These results are also helpful in assisting educators and food safety trainers to modify current food safety training programs and educational materials. By identifying specific barriers that make proper food safety practices difficult to perform, educators can modify training to address these specific barriers. Food safety educators can also modify educational materials by providing recommendations on how employees can overcome these barriers within their operation. For example, trainers could add a discussion section to their educational session asking participants about their perceived barriers to proper food safety practices. Educators could then assist employees by dispelling incorrect preconceived notions, for instance, that handwashing and taking end-point cooking temperatures take a great deal of time, when handwashing only takes approximately 30 seconds and taking the temperature of food only takes 20 seconds.

Furthermore, sanitarians play an integral part in assuring the safety of food within the food chain. With their experience conducting inspections, sanitarians are exposed to and

understand the needs of managers, operators, and employees, and they can utilize both the

information from this study and the information gained through their experiences to increase

employee compliance with food safety regulations. Inspectors may be able to help employees

overcome barriers to proper food safety practices by stressing that tasks may not take quite as

long as employees think. Inspectors could also assure that managers and operators have

resources in place so employees can perform proper food safety practices quickly and easily.

References

Ajzen, I. (1985). From intentions to action: A theory of planned behavior. In J. Kuhl & J.

Beckmann (Eds.), *Action control: From cognition to behavior*. New York, NY: Springer.

Ajzen, I. (1988). *Attitudes, personality and behaviour.* Milton Keynes, UK: Open University

Press.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision

Processes*, *50*, 179-211.

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior.* New

Jersey: Prentice Hall.

Bean, N. H., & Griffin, P. M. (1990). Foodborne disease outbreaks in the United States, 1973-

1987: Pathogens, vehicles, and trends. *Journal of Food Protection, 53,* 804-817.

Brannon, L. A., & Carson, K. L. (2003). Nursing expertise and cognitive structure influence

medical decision making. *Applied Nursing Research, 16(4),* 287-290.

Buzby, J. C., Roberts, T., Jordon-Lin, C. T., & MacDonald, J. M. (1996). Bacterial foodborne

disease: Medical costs and productivity losses. *Agricultural Economics Report, 741,* 100.

Centers for Disease Control and Prevention. (2000). Surveillance for foodborne disease

outbreaks—United States, 1993–1997. *Morbidity and Mortality Weekly Report, 49(SS-1),*

22-26.

Cochran-Yantis, D., Belo, P., Giampaoli, J., McProud, L., Everly, V., & Gans, J. (1996).

Attitudes and knowledge of food safety among Santa Clara County, California restaurant

operators. *Journal of Foodservice Systems, 9,* 117-128.

Cohen, E., Reichel, A., & Schwartz, Z. (2001). On the efficacy of an in-house training program: Statistical measurements and practical conclusions. *Journal of Hospitality & Tourism Research, 25(1),* 5-16.

Collins, J. E. (1997). Impact of changing lifestyles on the emergence/reemergence of foodborne pathogens. *Emerging Infectious Diseases, 3,* 471-479.

Cotterchio, M., Gunn, J., Coffill, T., Tormey, P., & Barry, M. A. (1998). Effect of a manager training program on sanitary conditions in restaurants. *Public Health Reports, 113,* 353-358.

Davidson, A. R., Yantis, S., Norwood, M., & Montano, D. E. (1985). Amount of information about the attitude object and attitude-behavior consistency. *Journal of Personality and Social Psychology, 49,* 1184-1198.

Fazio, R. H., & Zanna, M. P. (1981). Direct experience and attitude-behavior consistency. In L. Berkowitz (Ed.), *Advances in experimental social psychology, (Vol. 14).* Academic Press: New York.

Food and Drug Administration. (2000). Report of the FDA retail food program database of foodborne illness risk factors. Retrieved June 21, 2002, from http://vm.cfsan.fda.gov/~dms/retrsk.html.

Food and Drug Administration. (2004). FDA report on the occurrence of foodborne illness risk factors in selected institutional foodservice, restaurant, and retail food store facility types. Retrieved June 25, 2006, from http://www.cfsan.fda.gov/~acrobat/retrsk2.pdf.

Hwang, J. H., Almanza, B. A., & Nelson, D. C. (2001). Factors influencing Indiana school foodservice directors/managers' plans to implement a hazard analysis critical control point (HACCP) program. *Journal of Child Nutrition & Management, 25,* 24-29.

Howes, M., McEwen, S., Griffith, M., & Harris, L. (1996). Food handler certification by home

  study: Measuring changes in knowledge and behavior. *Dairy, Food, & Environmental*

  Sanitation, 16, 737-744.

Kneller, P., & Bierma, T. (1990). Food service certification – Measuring effectiveness of a state

  program. *Journal of Environmental Health, 52(5),* 292-294.

McElroy, D. M., & Cutter, C. N. (2004). Self-reported changes in food safety practices as a

  result of participation in a statewide food safety certification program. *Food Protection*

  Trends, 24, 150-161.

National Restaurant Association Educational Foundation. (2004). ServSafe Coursebook (3rd

  ed.). National Restaurant Association Educational Foundation: Chicago.

National Restaurant Association. (2005). 2006 Restaurant Industry Fact Sheet.

  (http://www.restaurant.org/pdfs/research/2006factsheet.pdf).

Petty, R. E., & Krosnick, J. A. (1995). *Attitude strength: Antecedents and consequences*.

  Lawrence Erlbaum Associates: Mahwah, NJ.

Roberts, K. R., & Sneed, P. J. (2003). An assessment of the status of prerequisite and HACCP

  programs in Iowa Restaurants. *Food Protection Trends, 23,* 808-816.

Appendix A

Dear Student:

Food safety is an important issue in restaurants today. One in four Americans will suffer from a foodborne illness and 9,000 Americans will die from a foodborne illness this year alone. In order to meet the needs in commercial restaurant operations, we are conducting this assessment to determine current attitudes related to food safety practices. The results of this data will be useful in developing an educational program aimed at helping restaurant employees and managers overcome barriers to food safety implementation.

Below, you will be asked to respond to questions about your beliefs about performing three separate behaviors relating to food safety practices. These behaviors include proper handling of food and work surfaces, handwashing, and using thermometers to check food temperatures. You will be asked to respond to questions about advantages and disadvantages of doing these things, things that make it easier or more difficult to do these things, and other people who approve and disapprove of your doing these things. **If you have had experience working in food production, respond based on your experiences on the job. If you have not had experience working in food production, respond based on your experiences preparing food at home.**

Please carefully read each question and consider all parts of the behavior when making your responses. Do not leave any items blank. By completing this survey, consent to be included in the research is understood. Your participation is voluntary, refusal to participate will involve no penalty and you may discontinue participation at any time without penalty. Individual responses will be completely anonymous. Please be assured that your responses will be confidential and all data will be reported as group data.

Your response is very important to the success of this study and to the quality of future food safety education. Should you have any questions about the study, please contact Kevin Roberts at (785) 532-2213 or Dr. Carol Shanklin at (785) 532-2206. If you have any questions about the rights of individuals in this study or about the way it is conducted, you may contact the University Research Compliance Office at (785) 532-3224. Thank you for your time and assistance**.**

Cordially,

Kevin R. Roberts, MS   **Carol Shanklin, PhD, RD**
Instructor, Dept. of HRIMD   Professor, Dept. of HRIMD
                                                                       Assistant Dean of Graduate School

Betsy Barrett, PhD, RD   **Laura Brannon, PhD**
Associate Professor, Dept. of HRIMD   Associate Professor, Department of
                                                                       Psychology

The following questions relate to the behavior:

PROPER HANDWASHING BY:
- **Washing with soap and hot water for 20 seconds**
- **Drying (with an air dryer or single use paper towels)**
- **Washing hands before work**
- **Washing hands before putting on gloves**
- **Washing hands when food preparation tasks are interrupted or changed**
- **Washing hands whenever they come in contact with something that might have germs (food, the bathroom, coughing, or touching body parts)**

What are some **good things** that could result from proper handwashing through this practice? (What are some reasons why you or other employees would want to do it)?

What are some **bad things** that could result from proper handwashing through this practice? (What are some reasons why you or other employees might not want to do it)?

What **makes (or would make) it easier** for you (or other employees) to properly wash hands through this practice?

What **makes it difficult** for you (or other employees) to properly wash hands through this practice?

The following questions relate to the behavior:

USING A THERMOMETER TO CHECK THE TEMPERATURE OF FOOD:
- **At the completion of cooking (various temperatures)**
- **At the completion of reheating (to 165 degrees)**
- **To ensure that food stored on the hot line is at least 135 degrees**
- **To ensure that food stored on the cold line is 41 degrees or less**

What are some **<u>good things</u>** that could result from using a thermometer to check the temperature of foods through this practice? (What are some reasons why you or other employees would want to do it)?

What are some **<u>bad things</u>** that could result from using a thermometer to check the temperature of foods through this practice? (What are some reasons why you or other employees might not want to do it)?

What **<u>makes (or would make) it easier</u>** for you (or other employees) to use a thermometer to check the temperature of foods through this practice?

What **<u>makes it difficult</u>** for you (or other employees) to use a thermometer to check the temperature of foods through this practice?

The following questions relate to the behavior:

PROPER HANDLING OF FOOD AND WORK SURFACES BY:
- **Not allowing raw food to come into contact with ready-to-eat foods.**
- **Cleaning and sanitizing all food contact surfaces (hands/gloves, countertops, cutting surfaces, equipment, dishes & utensils) between each use.**
- **Cleaning and sanitizing all food contact surfaces when switching from one food preparation task to another.**

What are some **good things** that could result from proper handling of food and work surfaces through this practice? (What are some reasons why you or other employees would want to do it)?

What are some **bad things** that could result from proper handling of food and work surfaces through this practice? (What are some reasons why you or other employees might not want to do it)?

What **makes (or would make) it easier** for you (or other employees) to engage in proper handling of food and work surfaces through this practice?

What **makes it difficult** for you (or other employees) to engage in proper handling of food and work surfaces through this practice?

List all the people that you think care (either approve or disapprove) about whether or not you (or other employees) do these food safety practices (proper handling of food and work surfaces, proper handwashing, and using a thermometer to check the temperature of food).

Please tell us about how long this survey took you to complete: _____ minutes

Demographic Characteristics

Please answer each of the following questions about yourself. This information will be used for research purposes only.

Gender   _____ Male   _____ Female

Age   _____ years

Your educational level (check one):

      _____ High school but did not graduate
      _____ High school diploma
      _____ Currently a college freshman
      _____ Currently a college sophomore
      _____ Currently a college junior
      _____ Currently a college senior
      _____ Associate degree
      _____ Bachelor's degree

Have you worked in a restaurant or in other foodservice operations? (check one)
      _____ Yes   _____ No

If yes, what is/was your position (what did you do)? _____

How long have you worked in the foodservice industry?

      _____ month(s) or _____ year(s)

How long have you been employed at your current position in foodservice?

      _____ month(s) or _____ year(s)

How many hours do you work per week? _____

Have you ever taken a formal food safety course?   _____ Yes   _____ No

Have you ever had food safety training on the job? _____ Yes   _____ No

If yes, please describe the nature of the training _____

Figure 1. The Theory of Planned Behavior (Ajzen, 1985)
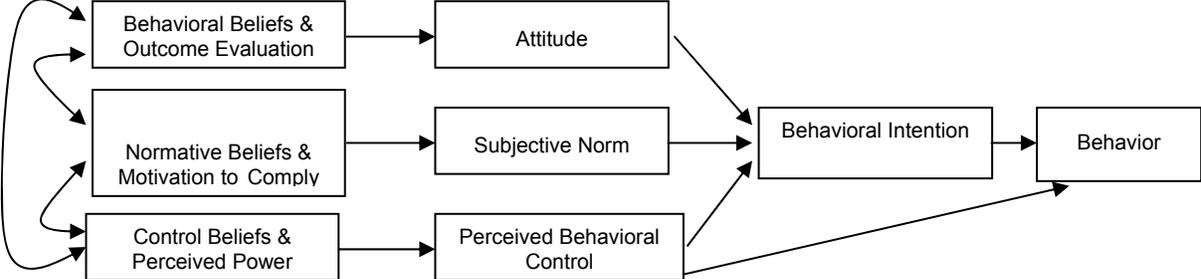
Table 1
Table 1

Food Safety Definitions Presented to Participants

PROPER HANDWASHING:
- Washing with soap and hot water for 20 seconds
- Drying (with an air dryer or single use paper towels)
- Washing hands before work
- Washing hands before putting on gloves
- Washing hands when food preparation tasks are interrupted or changed
- Washing hands whenever they come in contact with something that might have germs (food, the bathroom, coughing, or touching body parts)

USING A THERMOMETER TO CHECK THE TEMPERATURE OF FOOD:
- At the completion of cooking (various temperatures)
- At the completion of reheating (to 165 degrees)
- To ensure that food stored on the hot line is at least 135 degrees
- To ensure that food stored on the cold line is 41 degrees or less

PROPER HANDLING OF FOOD AND WORK SURFACES BY:
- Not allowing raw food to come into contact with ready-to-eat foods.
- Cleaning and sanitizing all food contact surfaces (hands/gloves, countertops, cutting surfaces, equipment, dishes & utensils) between each use.
1. Cleaning and sanitizing all food contact surfaces when switching from one food preparation task to another.

Table 2

Table 2

Overall Number of Responses Across All Three Food Safety Behaviors as a Function

of Experience (N=270)

TpB Component	No Experience Mean ± SD	Basic Experience Mean ± SD	Well-Informed Experience Mean ± SD
Attitude Beliefs			
Advantages	5.54$_b$ *** ± 1.67	5.44$_b$ *** ± 1.60	6.77$_a$ ± 1.98
Disadvantages	3.24$_{a,b}$ ± 2.18	2.94$_b$ ** ± 1.83	3.78$_a$ ± 2.17
Overall Attitude Beliefs (Advantages and Disadvantages)	8.78$_b$ *** ± 3.21	8.38$_b$ *** ± 2.95	10.54$_a$ *** ± 3.30
Control Beliefs			
Easier	4.37$_b$ *** ± 1.80	4.15$_b$ *** ± 1.66	6.07$_a$ ± 2.30
More Difficult	4.37$_b$ ** ± 1.67	4.30$_b$ *** ± 1.52	5.24$_a$ ± 2.02
Overall Perceived Behavioral Control Beliefs (Easier and More Difficult)	8.74$_b$ *** ± 2.86	8.45$_b$ *** ± 2.80	11.31$_a$ ± 3.81
Subjective Norm Beliefs			
Other Important Individuals	2.63$_{b,c}$ *** ± 1.48	3.05$_b$ *** ± 1.47	3.83$_a$ ± 1.50

$^{a, b, c}$ Means in the same row that do not share subscripts are significantly different.

*$p < .05$, **$p < .01$, ***$p < .001$.

Table 3

Subjective Norms (People Who Care about Participants' Food Safety Practices) Across All Three Food Safety Behaviors

and Percentages of Participants Who Listed Them (N=270)

Overall		No Experience		Basic Experience		Well-informed Experience	
Response	Percentage	Response	Percentage	Response	Percentage	Response	Percentage
Customers	84.1%	Customers	77.9%	Customers	78.0%	Customers	91.7%
Managers	70.4%	Managers	50.0%	Managers	65.9%	Managers	85.5%
Employees	**57.8%**	**Customer's Family**	**35.3%**	**Employees**	**53.7%**	**Employees**	**76.7%**

Table 3

Table 4

Table 4

Number of Responses for Handwashing as a Function of Experience (N=270)

TpB Component	No Experience Mean ± SD	Basic Experience Mean ± SD	Well-Informed Experience Mean ± SD
Attitude Beliefs			
Advantages	$1.91_{a,b}$ ± 0.99	1.77_{b}^{**} ± 0.74	2.13_{a} ± 0.93
Disadvantages	1.13_{a} ± 0.99	1.10_{a} ± 0.95_{a}	1.23_{a} ± 1.02
Overall Attitude Beliefs (Advantages and Disadvantages)	$3.04_{a,b}$ ± 1.56	2.87_{b}^{*} ± 1.33	3.36_{a} ± 1.42
Control Beliefs			
Easier	1.46_{b}^{***} ± 0.90	1.44_{b}^{***} ± 0.90	1.96_{a} ± 1.00
More Difficult	1.41_{b}^{*} ± 0.98	1.35_{b}^{**} ± 0.73	1.72_{a} ± 0.81
Overall Perceived Behavioral Control Beliefs (Easier and More Difficult)	2.87_{b}^{***} ± 1.48	2.79_{b}^{***} ± 1.33	3.68_{a} ± 1.53

[a, b] Means in the same row that do not share subscripts are significantly different.

*$p < .05$, **$p < .01$, ***$p < .001$.

Table 5

Table 5

Most Frequently Listed Advantages and Percentages of Participants Who Listed Them for

All Three Food Safety Practices (N=270)

Food Safety Practice	Response	NE[a]	BE[b]	WIE[c]
Handwashing	Good personal hygiene	64.7%	52.4%	50.8%
	Reduces cross contamination	52.9%	56.1%	50.8%
	Food safety	51.5%	47.6%	74.2%
Using a Thermometer	Ensure correct temperature	55.9%	59.8%	67.5%
	Food quality	55.9%	56.1%	35.0%
	Food safety	45.6%	48.8%	77.5%
Properly Handling Food & Work Surfaces	Food safety	66.2%	52.4%	61.7%
	Clean environment	41.2%	34.1%	30.8%
	Reduces cross contamination	38.2%	47.6%	55.8%

[a]No Experience, [b]Basic Experience, [c]Well Informed Experience

Table 6

Table 6

Most Frequently Listed Disadvantages and Percentages of Participants Who Listed Them

for All Three Food Safety Practices (N=270)

Food Safety Practice	Response	NE[a]	BE[b]	WIE[c]
Handwashing	Takes time	41.2%	37.8%	47.5%
	Dries hands	26.5%	18.3%	18.3%
	Other	19.1%	15.9%	--
	Hassle	--	--	22.5%
	Competes with other tasks	--	15.9%	--
Using a Thermometer	Possible cross contamination	30.9%	39.0%	40.0%
	Takes time	27.9%	25.6%	33.3%
	Competes with other tasks	23.5%	18.3%	--
	False sense of security if done wrong	--	--	25.0%
Properly Handling Food & Work Surfaces	Takes time	41.2%	36.6%	48.3%
	Hassle	20.6%	12.2%	14.2%
	Possibly carelessness leading to contamination	13.2%	13.4%	25.8%

[a]No Experience, [b]Basic Experience, [c]Well Informed Experience

Table 7

Table 7

Most Frequently Listed Factors That Make the Behaviors Easier to Perform and

Percentages of Participants Who Listed Them for All Three Food Safety Practices

(N=270)

Food Safety Practice	Response	NE[a]	BE[b]	WIE[c]
Handwashing	Sinks available	25.0%	17.1%	24.2%
	Sinks in a convenient location	25.0%	24.4%	31.7%
	Reminder signs	17.6%	--	23.3%
	Resources available	--	20.7%	--
Using a Thermometer	Easy to Use thermometers	27.9%	--	--
	Thermometers in convenient locations	20.6%	22%	26.7%
	Thermometers available	19.1%	18.3%	32.5%
	Easier process	--	19.5%	--
	Faster thermometers	--	18.3%	--
	Training on how to take temperatures	--	--	24.2%
Properly Handling Food & Work Surfaces	Resources in convenient locations	16.2%	24.4%	--
	Manager's monitoring	16.2%	13.4%	28.3%
	Equipment available	14.2%	13.4%	--
	Equipment easy to use	14.2%	--	--
	Proper training	--	14.6%	--
	Separate stations in the kitchen for different foods	--	--	25.0%
	Other	--	--	21.7%

[a]No Experience, [b]Basic Experience, [c]Well Informed Experience.

Table 8

Table 8

Most Frequently Listed Factors That Make the Behaviors More Difficult to Perform and

Percentages of Participants Who Listed Them for All Three Food Safety Practices

(N=270)

Food Safety Practice	Response	NE[a]	BE[b]	WIE[c]
Handwashing	Time constraints	41.2%	53.7%	61.7%
	Hassle	20.6%	--	--
	Thermometers not available	17.6%	--	--
	Competing tasks	--	19.5%	15.8%
	Forgetting	--	13.4%	18.3%
Using a Thermometer	Time constraints	42.6%	46.3%	41.7%
	Hassle	27.9%	17.1%	--
	Thermometers not available	16.2%	--	23.3%
	Thermometers not in convenient locations	--	14.6%	--
	Other	--	--	15.8%
Properly Handling Food & Work Surfaces	Time constraints	48.5%	47.6%	60.0%
	Hassle	20.6%	--	--
	Other	11.8%	--	--
	Resources not available	--	13.4%	--
	Forgetting	--	12.2%	--
	Not caring about the customer	--	--	20.0%
	Poor Training			16.7%

[a]No Experience, [b]Basic Experience, [c]Well Informed Experience.

Table 9

Table 9

Number of Responses for Using thermometers as a Function of Experience (N=270)

TpB Component	No Experience Mean ± SD	Basic Experience Mean ± SD	Well-Informed Experience Mean ± SD
Attitude Beliefs			
Advantages	1.72$_b$*** ± 0.69	1.83$_b$** ± 0.77	2.18$_a$ ± 0.88
Disadvantages	1.18$_{a,b}$ ± 0.86	1.09$_b$** ± 0.74	1.43$_a$ ± 0.89
Overall Attitude Beliefs (Advantages and Disadvantages)	2.90$_b$*** ± 1.20	2.91$_b$*** ± 1.22	3.61$_a$ ± 1.40
Control Beliefs			
Easier	1.38$_b$*** ± 0.88	1.23$_b$*** ± 0.79	2.01$_a$ ± 1.07
More Difficult	1.50$_b$* ± 0.79	1.43$_{a,b}$ ± 0.76	1.73$_a$ ± 0.95
Overall Perceived Behavioral Control Beliefs (Easier and More Difficult)	2.81$_b$*** ± 1.33	2.73$_b$*** ± 1.17	3.74$_a$ ± 1.67

$^{a, b}$ Means in the same row that do not share subscripts are significantly different.

*$p < .05$, **$p < .01$, ***$p < .001$.

Table 10

Table 10

Number of Responses for Properly Handling Food and Work Surfaces as a

Function of Experience (N=270)

TpB Component	No Experience Mean ± SD	Basic Experience Mean ± SD	Well-Informed Experience Mean ± SD
Attitude Beliefs			
Advantages	1.91b *** ± 0.82	1.84b *** ± 0.73	2.46a ± 1.08
Disadvantages	0.93a,b ± 0.85	0.76b ** ± 0.69	1.12a ± 0.96
Overall Attitude Beliefs (Advantages and Disadvantages)	2.84b *** ± 1.31	2.60b *** ± 1.08	3.58a ± 1.56
Control Beliefs			
Easier	1.53b *** ± 0.78	1.48b *** ± 0.88	2.10a ± 1.02
More Difficult	1.53b * ± 0.78	1.45b ** ± 0.71	1.79a ± 0.93
Overall Perceived Behavioral Control Beliefs (Easier and More Difficult)	3.06b *** ± 1.18	2.93b *** ± 1.42	3.89a ± 1.65

a , b Mean in the same row that do not share subscripts are significantly different.

*p < .05, **p < .01, ***p < .001.