



Motivators and Barriers to Safe Food Practices: Observation and Interview

ABSTRACT

This study aimed to determine employees' motivators and barriers to following food safety practices in both non-commercial and commercial foodservice operations. Data collection methods included observations of and interviews with 25 employees from 10 different foodservice operations. Observational data showed employees' attempts to follow proper hand hygiene (e.g., handwashing, glove use) did not meet Food Code requirements (Food Code 2005). Non-compliance rates with recommended safe food practices ranged from 23.5% (personal hygiene practices) to 69.4% (cleaning and sanitizing procedures). When employees were interviewed as to why they did comply with recommended practices, findings revealed eight motivators (avoiding bacterial growth and cross-contamination; not harming customers; knowledge and training; required by law, regulations, and procedures; good practices/habits; rewards; culture of workplace; and satisfying customers) and

six barriers (forgetfulness/no habit; too busy; lack of knowledge; consequence of following safe food handling practices; availability and use of resources; and culture of the workplace) associated with following safe food handling practices. Findings of this study indicated a continuing need to promote safe food handling practices among employees; thus, managers should infuse identified motivators and address barriers to effectively promote a work place culture where safe food handling is paramount.

INTRODUCTION

Adults in the U.S. eat out an estimated 4.8 meals a week (26). In addition, federal food programs such as the National School Lunch program, which serves 31 million lunches each day, provide meals away from home. Therefore, a large number of people may be at risk of contracting a foodborne illness as a result of eating away from home, whether in a non-commercial or commercial setting (17). Non-commercial settings also are referred to as "on-site foodservice," such as those seen with schools and hospitals. Safe food handling

at all types of retail foodservice operations, including restaurants, work-site cafeterias, and schools, is critical to the prevention of foodborne illness. Researchers have reported foodborne illness outbreaks based on type of retail foodservice operations (10). According to CDC Morbidity and Mortality Weekly Report (10), of the 13,405 foodborne disease outbreaks reported to the CDC between the years 1998 to 2008, 7,939 (59.2%) were associated with restaurants and delis.

The World Health Organization (46) has identified five practices important in prevention of foodborne illness: (1) keep food clean, (2) separate raw and cooked foods, (3) cook foods thoroughly, (4) keep food at safe temperatures, and (5) use safe water and raw materials. All factors are controllable in foodservice operations and, except for the fifth practice, are directly related to employee food handling practices. When examining foodborne illness outbreaks in retail foodservice operations, the U.S. Food and Drug Administration (44) identified similar foodborne illness contributors, including improper holding time/temperature, poor personal hygiene, and cross-contamination. To foster safe food handling practices in retail foodservices, states and local authorities have been encouraged to adopt current versions of the FDA Food Code, a set of recommendations, updated every two years, based on the most recent scientific findings about food safety practices. In spite of these multiple efforts, foodborne illness outbreaks are still common as a result of eating food prepared in retail foodservice operations (17).

In past work that has attempted to identify the factors affecting adoption of safe food handling behaviors, researchers have focused on food safety knowledge, attitudes, training and motivations (4, 15, 24, 32, 39). In addition to employee aspects, microbiological status of samples from various food contact surfaces and from bare or gloved hands have been analyzed to gain a better understanding of risk factors affecting food safety (16, 23, 25, 35, 37). Also, with the recent emphasis on the importance of organizational factors in encouraging employees to handle food safely, researchers have examined the effects of the food safety culture (1, 47), which refers to “the aggregation of the prevailing, relatively constant, learned, shared attitudes, values, and beliefs contributing to the hygiene behaviors used within a particular food handling environment” (20). According to Yiannas (47), once a food safety culture is created in a foodservice organization, employees will recognize how important food safety is to the organization, and the importance will permeate foodservice employees and their daily tasks.

Research has shown that food safety training and subsequent acquisition of knowledge do not necessarily translate into the practice of handling food safely (5, 9, 22, 34, 40); even if foodservice employees know correct safe food handling behaviors, they do not necessarily perform these. Observational research has focused on handwashing (41);

flow of food (40); and time and temperature abuse (22, 36). These findings indicate that underlying factors to explain the inconsistency between level of food safety knowledge and actual compliance with requirements for safe food handling practices, and clearly there is a critical need to identify the key factors that encourage or discourage employees' actions. Some preliminary work has investigated the roles of motivations in improving food safety behaviors (6, 14), but there is still a lack of research identifying overarching barriers and motivators affecting employees' actual safe food handling behaviors in both non-commercial and commercial foodservices.

The importance of considering employees' age/generational differences when investigating the extent of compliance with regard to safe food handling practices has been emphasized (15). Researchers generally have divided generations into four groups (Matures, Boomers, Generation X, and Generation Y) (30) and have found significant differences among these age groups in terms of work values (21); psychological traits (43); and work attitudes (42). Ellis et al. (15) found generational differences in perceived importance of motivational factors encouraging employees to follow safe food handling behaviors. Findings from that study indicated that although internal motivators were perceived as highly important by all age groups, employees 18–20 years old perceived extrinsic motivators, such as communication, reward or punishment, and resources, as more important than did those over age 40.

In studies of food safety behaviors, self-reported data are frequently used. However, discrepancies can exist between self-reported and observed food safety behaviors. In particular, employees over-reported safe food behaviors, such as handwashing and cutting board washing (13). Dharod et al. (13) suggested that caution be used in analyzing and interpreting self-reported data. A few research groups have utilized observations to investigate employees' actual food handling behaviors. Chapman, Eversley, Fillion, MacLaurin, and Powell (11) used video observations to examine the impact of food safety intervention (posted food safety information sheets) in on-site/noncommercial foodservice operations. Strohbehn, Sneed, Paez, and Meyer (41) conducted observational research to determine employees' handwashing frequencies and procedures in four types of retail foodservices: schools, child care, assisted living facilities, and restaurants. However, although researchers recognize the limitation of self-reported data and have conducted observations to investigate employees' actual food safety behaviors, self-reported data are still widely used because of the efficiency and ease of collecting information.

Few observational data have been reported, likely because of the intensive inputs required at all stages of the process (including human subject approval, recruitment, observations and data analysis). For example, to collect data by observation requires obtaining approval from the operation, perhaps at multiple levels, and even after getting the “go ahead,” the

employee may not show up for work or another unexpected event (e.g., health inspector visit) may delay observations. In addition, the Hawthorne effect may bias results; “the Hawthorne effect suggests that when subjects know they are subjects in a research study, they will alter their usual behavior” (8), pg. 217. With this type of data collection, researchers must be familiar with operations and possess the ability to “blend in” with other staff; Stoddart (38) refers to the “invisible researcher.” Further, observing employees and analyzing the qualitative data requires extraordinary time inputs (7). Yet qualitative data can be “richly descriptive” and can provide a contextual setting to better understand the issues under investigation. The purpose of this study was to identify employees’ motivators and barriers to following safe food handling practices, with the goal of determining why practices were or were not being followed in non-commercial and commercial types of retail foodservice operations: schools, hospitals, universities, and restaurants.

MATERIALS AND METHODS

Data were collected using qualitative methods of observations and interviews by researchers experienced with this approach. As is common with qualitative research, the goal was to gather a breadth and depth of information and not to generalize findings. Employees and general operational practices were observed on two separate occasions by the same researchers, and most observations were completed within a 4-week period of time. Following the second observational period, employees were interviewed by the researcher, who used a structured interview guide asking why employees did or did not follow safe food handling practices. The appropriate institutional review board granted approval of the study prior to any contact with human subjects. Specifically, researchers were required to protect observed employees and ensure that interviews were held in a private location, to avoid having supervisors/managers hear responses.

Sample

A purposeful sampling method was used, based on type of operation and employees’ ages. Four non-commercial operations (one K-12 school, one university dining facility, one assisted living facility, and one hospital facility) and six commercial operations (one quick service restaurant, three casual dining restaurants, one deli, and one catering business) were recruited for participation in this study. To achieve diversity in age, four sub-groups of employees were created: 18–25 years, 26–39 years, 40–60 years, and over 60 years. Therefore, criteria for selection included the following: (1) location of operation located within a 45-minute drive of the home institution, (2) manager/owner willingness to allow researchers to collect data, (3) operation type, (4) employees’ schedules, (5) employees’ ages, and (6) researchers’ availability. A total of 28 employees representing

the four age groups (8, 10, 6, and 4 employees, respectively for each of four sub-groups) were recruited to participate, with two observation periods and one interview scheduled; however, not all completed the entire study period. Two observations and one interview were completed with 25 employees. Because two employees from the 18–25 groups and one from the 40–60 groups were observed only once, data from these participants were excluded from analysis. Participation in the study was voluntary. Reasons for withdrawing were not asked, as per institutional review board guidelines for working with human subjects.

Instrument development

An observation form, modified from validated forms used in Paez et al. (29) and Strohbehn et al. (41) and a study in progress at the time (33), was developed and pilot tested to ensure internal reliability before on-site observations were conducted. As part of the pilot testing, each of the four researchers observed selected students in a quantity food production class for 9 hours over multiple class sessions, for a total of 36 hours of observation. The results of the pilot testing were used to make changes and corrections to the form, as researchers gained further experience in observation collection and recording protocols were agreed upon. The final observation form consisted of five sections: (1) demographics of the employee and the operation, (2) tally of proper handwashing, glove use, and glove changes, (3) yes, no, or not observed indication of observed employee’s behaviors/practices in terms of personal hygiene, based on Food Code (18 items), temperature control (5 items), and cleaning and sanitizing (3 items), (4) yes, no, or not observed indication of operational characteristics regarding food defense concerns, storage and holding temperatures, temperature control, cleaning and sanitizing processes, and allergen handling (28 items), and (5) an open-ended section for general comments.

Data collection

Researchers went on two or three occasions to each of the ten sites, with the same researcher viewing each employee each time. Each visit consisted of a three-hour observation period during meal production and service (either the noon or the evening meal); thus, each employee was observed a total of six hours by one researcher. To avoid the Hawthorne effect (8) and reduce employees’ nervousness, several steps were taken: (1) an extended period of observation was scheduled, (2) a small note pad, to discreetly record observations instead of a large clipboard was used, (3) researchers dressed similarly to employees, in collared, short-sleeved polo shirts and khakis, and (4) researchers initiated small talk with the employee and other staff present. After the second observation period was completed, the employee was interviewed in either Spanish or English (as the employee preferred) on how and why food safety practices were/were

not followed. One of the researchers spoke fluent Spanish, so she interviewed all employees who spoke Spanish (5 employees in total). Before the interview was conducted, an informed consent form was signed by the employee; English or Spanish informed consent forms were used, depending on employee preference. A structured interview script, developed in both English and Spanish, was used. Interviews were customized based on employees' behaviors observed; for example, if an employee was observed using bare hand contact when handling salad ingredients, that employee was asked why he/she didn't use a utensil or gloves when handling the salad ingredients. Researchers were able to probe further with follow-up questions as needed, based on the particular circumstances of that operation. Interviews generally lasted about 15 minutes and were conducted in a private location so that supervisors or managers could not overhear responses.

Data analysis

Observational data compiled from 10 foodservice operations were analyzed both quantitatively (e.g., number of times behavior was observed) and qualitatively (e.g., verbal comments and work situations observed). The food safety practices of 25 employees were observed on two occasions, after which they were interviewed. Compliance rates with Food Code standards were calculated by dividing the total number of times the behavior was observed by the number of times it should have been observed. Percentages of compliance with Food Code standards by those who were observed practicing the behavior were then calculated. Thus, compliance with practice of Food Code recommendations and compliance with Food Code procedures were calculated. Interviews were taped, transcribed, and analyzed. Three researchers developed themes independently, based on analysis of interview transcripts followed by discussion until consensus was achieved.

RESULTS

Profile of respondents

The 25 participants consisted of 14 females and 11 males. The numbers of employees in each age group (18–25 years old, 26–39 years old, 40–60 years old, and older than 60 years) were 6, 10, 5 and 4, respectively. Each participant was observed on two occasions by the same researcher and was interviewed.

Observations

Handwashing and glove use

Table 1 shows compliance with handwashing and glove use Food Code recommendations. During the 50 observations made (25 employees × 2 observations each), employees washed their hands approximately 36% (258/721) of the times they should have. Of those times they washed their hands, 18.6% (48/258) were in compliance with the Food

Code procedure. At the time of data collection, Food Code 2005 was the current version for these sites. The current version of the Food Code has not changed significantly from previous versions with regard to “when” or “how” to wash hands. Food Code 2009 (45) addresses “when” by requiring food employees to wash their hands after touching human body parts, using the restroom, and handling raw food, soiled dishware or garbage, as well as before beginning food preparation and before working with ready-to-eat food. The current and past editions of Food Code address the “how,” or proper steps for handwashing. Employees were often observed skipping steps in the handwashing process. The rates of compliance (35.8% and 18.6%) with requirements for handwashing (“when” and “how”) are lower than those reported in other observational studies, including the study by Green et al. (18) in which compliance for “how” handwashing was done was 27%, and in an FDA report (44) in which compliance for “when” and “how” ranged from 24.2% for employees working in full-service restaurants to 72.5% for staff in elementary school nutrition programs. Previous studies have found different compliance rates, depending on the type of foodservice operation; for example, compliance for frequency (“when”) ranged from 5% at restaurants to 33% at assisted living facilities as reported by Strohbehn et al. (41). Compliance rates also varied depending on type of occasion requiring handwashing, such as after touching the face or hair (9%) versus after handling potentially contaminated food (57%) (12).

The observed employees used gloves 63.1% (169/268) of the times they should have. However, the way in which they used them (compliance with recommendations) was only 9.5% (16/169); one frequent observation was that employees did not wash their hands prior to donning gloves. Employees changed gloves 33.3% (123/369) of the times they should have, and, of the times gloves were changed, practices were in compliance with Food Code 2009 (45) at a rate of 5.7% (7/123).

The compliance rates in this study related to glove use and changes of gloves can be compared to rates reported in other observational studies. For example, the FDA surveillance report (45) demonstrated compliance rates for practices preventing contamination from bare hand contact, which includes use of gloves, ranged between 53.7% (full service restaurants) and 93.7% (deli). Higher compliance rates from the FDA report (44) can be explained by the broader focus, which included not only the use of gloves but also other practices to avoid contamination of food from bare hand contact (e.g., using tongs or other utensils). In a study (33) observing part-time (primarily student) university dining employees in 2011, a compliance rate of 29.5% was found for glove changes occurring according to Food Code recommendations.

Table 1. Handwashing and glove use compliance^a

Behavior	Number of times should be done	Number of times was done	Percent compliance with Food Code frequency	Number of times (%) in compliance with Food Code procedure
Hands washed properly	721	258	35.8	48 (18.6)
Gloves used at proper times	268	169	63.1	16 (9.5)
Gloves changed as needed	369	123	33.3	7 (5.7)

^aTwenty-five employees observed for six hours each.

Personal hygiene, temperature control, and cleaning and sanitizing practices

The number of times employees were in compliance with 21 identified personal hygiene practices (e.g., clean uniform/apron worn, no fingernail polish, and eating away from food production) was 473 out of a total of 607 occasions when these practices may have been presented, for a 77.9% compliance rate. Percentages of observed times employees either followed or did not follow temperature control practices were similar (50.3% and 49.7%, respectively). The temperature control practices included five items: thermometers are used to check temperature controlled for safety (TCS) foods after cooking; thermometers are used to check TCS cold foods prior to service; proper thermometers are used for thin foods; TCS hot foods are held above 135°F; and cold TCS foods are held below 41°F. The category of practice regarding cleaning and sanitizing (food contact surfaces are washed, rinsed, and sanitized as needed; clean, designated wiping cloths are used; and handling of clean and sanitary dishware and equipment

minimizes cross contamination) had a compliance rate of 30.6% (44 out of 144 observations), which was the lowest compliance rate among the three categories of food safety behaviors observed (personal hygiene, temperature control, and cleaning and sanitizing).

Operational characteristics

Compliance with 28 best practices related to general operational practices (e.g., door into food production area is kept closed, thermometers are calibrated, food defense precautions are taken, storage and holding temperatures are correct, temperature controls are in place, cleaning and sanitizing processes are followed, and allergen handling avoids cross contact) was seen for slightly over half of the 994 observations (51.1%). The two practices with the lowest observed compliance rates, were those related to monitoring of cleaning and sanitizing procedures (e.g., sanitizing effectiveness is verified with test strips) and control of food temperatures (i.e., hot foods are rapidly cooled using the two-stage cooling process).

Table 2. Personal hygiene, temperature control, and cleaning and sanitizing compliance

Observation	Total number of times observed	Number of times in compliance (%) ^a	Number of times out of compliance (%) ^b
Personal hygiene	607	473 (77.9)	134 (22.1)
Temperature controls	161	81 (50.3)	80 (49.7)
Cleaning and sanitizing	144	44 (30.6)	100 (69.4)

^a(Number of times in compliance/total number of observations) × 100

^b(Number of times out of compliance/total number of observations) × 100

Interviews

Why safe food practices are followed

Table 3 shows the themes identified from reasons employees gave as to why they follow safe food handling practices and illustrative quotations to support these themes. A total of 9 themes were gleaned from the interviews: do not harm customer; satisfied customers; avoid bacterial growth and cross-contamination; good practices/habits; rewards; knowledge and training; resources; required laws, regulations, and procedures; and culture of workplace. Employees' reasons for following specific safe food handling practices that were observed fit within one or more of these 9 themes.

Do not harm customer

This theme included the importance of keeping customers safe. Some participants, primarily those serving school children and the elderly, recognized their customers as vulnerable to foodborne illness and mentioned how important employees' roles are in providing safe foods for their customers.

Satisfied customers

Participants recognized that customers should be provided with quality foods prepared safely because they were paying for this service. Also, participants indicated they were motivated because they saw themselves in the "customers' shoes," which encouraged them to handle food safely. Overall, this theme represented customer empathy and a desire to treat others as they would like to be treated.

Avoid bacterial growth and cross-contamination

Another reason given for following safe food handling practices was preventing bacterial growth and cross-contamination, with specific examples offered, such as air drying and not touching dirty faucets with clean hands. The use of terms such as "cross-contamination" suggest knowledge about safe food handling on the part of the participants.

Good practices/habit

The importance of developing good work habits also was identified as a theme as to why food safety practices are

followed. A participant noted that once people get in a habit, they will automatically follow safe food handling practices.

Rewards

Internal rewards (e.g., self-satisfaction) was another rationale for following safe food handling practices. For example, employees noted that they followed certain food safety behaviors because they enjoyed doing the right thing and they gained satisfaction from handling food correctly.

Knowledge and training

Acquiring knowledge about food safety from supervisors and senior co-workers, in addition to food safety training, was described as influencing participants' food safety behaviors. One participant mentioned the importance of constant reminders of what they should do to handle food safely, suggesting that reminder messages can be helpful.

Resources

Availability of resources was indicated as one of the motivators to following safe food handling behaviors. For example, one respondent reported that he/she used thermometers to check whether meat was appropriately cooked, and another that the prep sheet was used for recording food temperatures and the amount of leftovers.

Required laws, regulations, and procedures

Federal and state laws as well as the foodservice operations' policies were described as influencing participants' safe food handling behaviors. Participants provided examples of food safety actions required by state law, such as temperature controls for foods and use of a lid on a garbage container.

Culture of workplace

Some participants mentioned that aspects of the workplace environment motivated them to follow safe food handling practices. Participants noted the importance of teamwork and defined workplace standards in completing tasks and handling food safely.

Table 3. Reasons employees follow safe food handling practices

Themes	Illustrative Quotations
Do not harm customers	<ul style="list-style-type: none">• "I just think I don't want to get anyone sick."• "I think my motivation is just to keep the residents safe."• "... I don't want to be like it is not safe for them to eat because they are old so you can get sick really easy... so (I) try my best to make the food safe for them."

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Table 3. Reasons employees follow safe food handling practices (cont.)

Themes	Illustrative Quotations
Satisfy the customer	<ul style="list-style-type: none"> • “I would like the customer to receive the right product.” • “If people pay you money, they’re paying my wages in sense you are paid to do a job you do the job well and that will motivation.”
Avoid bacteria growth and cross-contamination	<ul style="list-style-type: none"> • “For sanitation to prevent contamination of the food.” • “I do not want to cross-contamination, you know between ready to-eat food and raw food.” • “For cross-contamination reasons — I think that’s what it’s called.”
Good practices/habit	<ul style="list-style-type: none"> • “If you really get it in a habit it is not hard, even if you are busy you do it automatically... if you are not in a habit, you can miss and that could be bad.” • “Now it is a habit for me.” • “To keep things cold, I have a habit that if I do not use (items in the preparation cooler) I always close it, to keep temperature.”
Rewards	<ul style="list-style-type: none"> • “I just, I just really enjoy doing it...” • “There is a big trust that people have in you... I am not one of those people that kind of don’t care, I take cooking pretty seriously... I want to do the right things...”
Have knowledge and training	<ul style="list-style-type: none"> • “I was taught to do that.” • “Around here we have a short training class or some kind of dietary training...” • “Because the manager is always reminding us, telling us ... and that keeps us motivated.”
Resources	<ul style="list-style-type: none"> • “I put the thermometer there it got to be over 150 ...” • “We call them prep sheets and at the end of the day we write down ... we record what they temp at and recording how much left over and stuff...”
Required law, regulations, and procedures	<ul style="list-style-type: none"> • “You have, you know, the State and the Federal Government says... you have to be at a certain temperature.” • “It’s a policy of ours now. We used to not have it but now that we are Medicaid Certified, our policy went now.” • “Our policy and is a policy that we got from the State, is during heavy use the lid (for a garbage can) can be off and then when is not heavy use the lid should be on.”

Why safe food practices are not followed

Table 4 presents the themes identified from interview data on why employees do not follow safe food handling practices and sample quotations to illustrate these themes. A total of 6 themes were identified: forgetfulness/not habit; too busy; lack of knowledge; consequences of following safe food

handling practices; ability and use of resources; and culture of the workplace.

Forgetfulness/Not habit

One rationale given by participants was forgetting what is needed for handling food safely. However, most

acknowledged that the safe food handling practices they had not followed (e.g., handwashing) were important.

Too busy

Participants agreed that time constraints affected their actions related to food safety. Some indicated the need to save time by deliberately not following safe food handling practices and others said they just forgot them when they were too busy.

Consequences of following safe food handling practices

Participants mentioned negative effects of following safe food handling practices as reasons for not using such practices. Some examples given were that they thought safe food handling practices would ruin the cooking tools (e.g., dull a knife) and handwashing would hurt their hands (e.g., dry out hands).

Availability and use of resources

Unavailable resources were mentioned as a barrier to handling food safely, with participants emphasizing

the importance of having necessary supplies in the food production and service areas. Specifically mentioned during interviews were availability of a designated sink for washing of produce and sanitizing wipes for use on thermometers.

Lack of knowledge

Insufficient food safety knowledge was also identified as one reason participants did not follow safe food handling practices; participants mentioned that they had not been told about food safety issues and that training had not been provided.

Culture of the workplace

Participants noted a variety of environmental factors related to a lack of a food safety culture in their work place as a reason that safe food handling practices were not followed. Interviewees stated they were open to suggestions that would improve their food safety behaviors, but there were no workplace standards established, or they were not encouraged to follow such behaviors.

Table 4. Reasons employees do not follow safe food handling practices

Themes	Illustrative Quotations
Forgetfulness/No habit	<ul style="list-style-type: none"> • “I totally forgot about washing my hands. I just got busy.” • “I honestly forgot to take the temperatures ... Like since day one it is hard for me to remember ...” • “I should have (employee acknowledges need to do it); I forgot.”
Too busy	<ul style="list-style-type: none"> • “Is too much time it takes me to go, maybe it can be done but sometimes we have too much work and we have no time ...” • “Honestly I was probably in a rush ... I mean sometimes when is busy, yesterday was a little bit busier kind of bring a little cluster but.” • “It’s just probably; rushing, rushing, and getting everything done and not really thinking about it.”
Consequences of following safe food handling practices	<ul style="list-style-type: none"> • “The dish machine I’ve been told that dull the knife and that’s why usually don’t.” • “My skin right now is super dry is starting to crack and that’s why I wear gloves more often. I use to never wear gloves always wash my hands constantly and the soap will dry your hands out and will make your hands crack.”
Lack of knowledge	<ul style="list-style-type: none"> • “Never even thought about why we don’t take our aprons off.” • “I thought that because I was wearing gloves I did not need to wash my hands because I am already covering them.” • “I guess I have never had anybody tell me to do that. I have never heard that.”

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Table 4. Reasons employees do not follow safe food handling practices (cont.)

Themes	Illustrative Quotations
Availability and use of resources	<ul style="list-style-type: none"> • “There is no other place for me to wash it.” (referencing why the employees washed produce in the hand sink) • “Because when I was back by the steamers I didn’t have the wipes available.”
Culture of the workplace	<ul style="list-style-type: none"> • “No, here they don’t require anything.” • “Because since I started working here they told me it was not hygienic to eat there (preparation area).”

DISCUSSION

This study identified foodservice employees’ perceived motivators and barriers to following food safety practices. To our knowledge, this is the first study in which employee food safety behaviors were observed and then rationalized and discussed by the employee, thus truly exploring reasons why employees do or do not handle food safely. Further, this study included foodservice employees in different age cohorts and working in various types of retail foodservice establishments. Thus, findings provide an overarching perspective of a typical retail foodservice worker. Observational data indicated that employees had low compliance with respect to when they washed their hands, used gloves, and changed gloves (35.8%, 63.1%, and 33.3%, respectively). However, compliance rates with recommended procedures for these actions (when they did occur) were even lower (6.7%, 6.0%, and 1.9%, respectively). These findings support the results of other observational research in which it has been shown that even if employees perform certain food safety practices, their practices may not be effective enough to prevent foodborne illness. Because proper hand hygiene, including effective handwashing and glove use, is an important way to prevent transmission of microorganisms to foods (27), high non-compliance with recommended procedures is a concern. Researchers have reported the importance of food safety training coupled with the availability of handwashing sinks and gloves to enhance hand hygiene practices (19, 29, 33, 40). It has also been noted that glove use can cause a decline in handwashing frequency (18, 19), as employees may think that using gloves negates the need to wash hands. Therefore, food safety training regarding hand hygiene practices should be designed to help employees better understand not only *how* and *when* to wash hands, and use and change gloves (resources are available at <http://www.extension.iastate.edu/foodsafety/presentations/gloves.cfm>), but also understand *why* it is important to do so. However, food safety knowledge is not always transferred to actual behaviors (22, 40). Managers can alleviate the need to wash hands and wear or change gloves by reorganizing job responsibilities, task

sequences, and work stations, i.e., by addressing the “who,” “when,” and “where” of assigned work tasks.

Other areas of safe food handling behaviors (personal hygiene, temperature controls, and cleaning and sanitizing) and operational characteristics were assessed through observations. Personal hygiene behaviors showed the highest compliance rates (76.5%), whereas cleaning and sanitizing practices demonstrated the lowest compliance (30.6%) with recommended procedures. Practices observed related to temperature controls and operational characteristics were around 50% in compliance with best practices. Cleaning and sanitizing practices related to “contaminated equipment/ protection from contamination” were identified as one of the risk factors with the highest non-compliance rates in the FDA Report of the Occurrence of Foodborne Illness Risk Factors in Selected Institutional Foodservice, Restaurant, and Retail Food Store Facility Types (44). In particular, improper cleaning and sanitizing practices had the highest non-compliance rates. Opportunities for re-contamination of cleaned and sanitized equipment as a result of poor personal hygiene are routinely presented in foodservices (40). For example, in many retail settings, one person is assigned to the dishroom; this person loads soiled items into the machine and then unloads clean and sanitized dishware and small equipment. Thus transfer of pathogens via hands is possible. The literature, including the current study, shows there is continual need to address noncompliance for many employee practices, particularly hand hygiene, glove use, and cleaning and sanitizing procedures.

Post-observation interviews provided insights as to why safe food practices were or were not followed. This information may be useful in development of food safety messages targeted to retail foodservice workers. Employees’ perceived motivators and barriers to following safe food handling practices can provide supervisors and managers with information to better address gaps between what should be done and what is done in their workplaces. It is interesting that food safety knowledge and training, work habits, and culture of the workplace were identified as both motivators and barriers.

The importance of food safety knowledge and training has been extensively investigated and found to be necessary in helping employees understand why safe food behaviors are needed; managers weaving identified motivators into work place communications can enhance and provide opportunities to improve employees' food safety behaviors. Further, addressing identified barriers may also contribute to improvements in safe food handling. For example, managers could begin each work shift with a short "briefing session" and emphasize particular actions to follow, such as changing of gloves. These sessions instill a work place culture supportive of food safety and send a message about expected behaviors.

Work habits related to food safety were also identified as a reason why safe practices were followed. This factor can also be connected to "forgetfulness," which was identified as one of the food safety barriers. If a certain behavior becomes part of an employee's daily routine, such as always washing hands before donning gloves, this behavior will soon be performed automatically, becoming a habit. Repetition leads to a routine. Managers can assist with formation of good habits by communicating proper behaviors as an expectation, providing resources to ensure behaviors can be practiced easily and regularly, and monitoring to ensure these are done. Further, managers should empower co-workers to coach and remind one another about food safety practices. Through these actions, the work place culture evolves to the point where it is commonly understood that "this is the way we do things here."

Food safety culture has recently drawn attention because of its critical role in improving employees' safe food handling behaviors (1, 2, 3, 6, 20, 28, 31, 47). Griffith, Livesey, and Clayton (20) viewed food safety culture as "the shared attitudes, values and beliefs towards the food safety behaviors that are routinely demonstrated" in a food handling organization. The components of food safety culture most commonly identified are management support, communication, and employees' attitudes and behaviors (2, 20, 31, 47). Therefore, managers should emphasize the value their foodservice operations place on food safety and demonstrate this commitment to enhancing food safety practices by providing sufficient resources and training to employees. Effective communication about the operation's food safety values and updates to food safety information between managers and non-managerial staff is important in establishing the safe food culture. This communication occurs through the use of written policies and procedures as well as role modeling by managers and peers.

In interviews, customer-oriented motivators to following safe food handling practices were identified. Employees reported that they follow food safety practices to satisfy, or not to harm, their customers. Such customer-oriented motivators should be strengthened through management support of a work culture that emphasizes customers and the importance of ensuring their satisfaction and safety.

Ellis, Arendt, Strohbahn, Meyer, and Paez (15) grouped employees' motivators into four categories, consisting of three considered external motivators (communication, reward and punishment, resources) and one internal motivator (i.e., desire not to make someone sick). In the Ellis et al. study (15), the category of internal motivator had the highest mean score of agreement for following food safety behaviors regardless of employees' ages and gender. The customer-orientated motivator identified in this study aligns with this category of internal motivation. Thus, managers should continue to promote employees' intrinsic motivation, similar to a customer service orientation, to enhance food safety behaviors.

Employees indicated additional barriers of time pressure (too busy), consequences of following safe food handling practices (e.g., damage of tools or drying of hands), and unavailability of resources as reasons why safe food handling practices were not followed. The work pace in foodservice operations, particularly during meal service, can affect the ability to practice safe food handling, even for the motivated employee. Rajagopal and Strohbahn (33) found higher non-compliance rates related to handwashing and glove use during peak hours. To reduce employees' time pressures, managers can monitor employees' work processes and identify tasks that could be modified or reorganized to increase productivity. Some strategies might address more efficient arrangement or location of work stations, ergonomically designed equipment, or training focused on how to "work smarter, not harder." Finally, adequate resources, such as hand sinks, thermometers, and gloves, should be available and easily accessed. As Green et al. noted (19), placing such resources in sight of employees is an effective way to promote safe food handling behaviors.

This study shows overall low compliance rates by employees for most of the safe food handling practices studied, indicating the importance of continuous efforts in all sectors of retail foodservice to encourage employees to follow such practices. Although the study has the limitations of a small sample size and observations that reflect only a window of time, it does provide a fairly complete view of employees' behaviors and explanations for food handling behaviors. Further, the sample included employees representing different age categories and from various segments of retail foodservice. Findings show there are overarching reasons related to food safety practices. To promote safe food handling practices effectively, managers should tap into employees' motivators and consider ways to remove barriers to following safe food behaviors, ultimately creating a culture of food safety within the organization. While specific differences will exist by types of operations and characteristics of work forces, findings from this study support the idea that there are fundamental reasons why employees do or don't follow practices that mitigate the risk of foodborne illness. Part of management's role is to assist in

employees' acquisition of the requisite knowledge, skills and attitudes needed as part of a safe food culture. Tools such as training resources and posted messages can assist managers in creating this type of culture, and relieve managers, who have multiple responsibilities, of the task of creating these tools. Yet managers must provide oversight in establishing a culture focused on safe food. Results from this research provide a foundation for managers to use in creating a safe food culture in their foodservices.

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REFERENCES

- Abidin, U. F. U. Z., S. W. Arendt, and C. H. Strohbehn. 2013. Exploring the culture of food safety: The role of organizational influencers in motivating employees' safe food-handling practices. *J. Qual. Assoc. Hosp. & Tourism* 14:321–343.
- Abidin, U. F. U. Z., S. W. Arendt, and C. H. Strohbehn. 2014. Food safety culture in onsite foodservices: Development and validation of a measurement scale. *J. Foodserv. Mgmt. Edu.* 8:1–10.
- Abidin, U. F. U. Z., C. H. Strohbehn, and S. Arendt. 2014. An empirical investigation of food safety culture in onsite foodservice operations. *Food Cont.* 46:255–263.
- Allwood, P. B., T. Jenkins, C. Paulus, L. Johnson, and C. W. Hedberg. 2004. Hand washing compliance among retail food establishment workers in Minnesota. *J. Food Prot.* 67:2825–2828.
- Almanza, B. A., Y. Namkyung, J. A. Ismail, and D. C. Nelson. 2007. Clients' safe food-handling knowledge and risk behavior in a home-delivered meal program. *J. Am. Diet. Assoc.* 107:816–821.
- Arendt, S. W., and P. J. Sneed. 2008. Employee motivators for following food safety practices: Pivotal role of supervision. *Food Prot. Trend.* 28:704–711.
- Arendt, S., K. R. Roberts, C. Strohbehn, J. Ellis, P. Paez, and J. Meyer. 2012. Use of qualitative research in foodservice organizations: A review of challenges, strategies, and applications. *Int. J. Contemp. Hosp. Mgmt.* 24:820–837.
- Berg, B. L., and H. Lune. 2012. Qualitative research methods for the social sciences. Pearson Upper Saddle River, N.J.
- Byrd-Bredbenner, C., J. Maurer, V. Wheatley, E. Cottone, and M. Clancy. 2007. Observed food safety behaviours of young adults. *Br. Food J.* 109:519–530.
- Centers for Disease Control and Prevention. 2013. Surveillance for foodborne disease outbreaks — United States, 2009–2010. *Morb. Mortal. Wkly. Rep.* 62:41–47.
- Chapman, B., T. Eversley, K. Fillion, T. MacLaurin, and D. Powell. 2010. Assessment of food safety practices of food service food handlers (risk assessment data): Testing a communication intervention (evaluation of tools). *J. Food Prot.* 73:1101–1117.
- Clayton, D. A., and C. J. Griffith. 2004. Observation of food safety practices in catering using national analysis. *Brit. Food J.* 106:211–227.
- Dharod, J. M., R. Pérez-Escamilla, S. Paciello, A. Bermúdez-Millán, K. Venkitanarayanan, and G. Damio. 2007. Comparison between self-reported and observed food handling behaviors among Latinas. *J. Food Prot.* 70:1927–1932.
- Edwards, Z. M., M. Edlefsen, V. Hillers, and S. M. McCurdy. 2005. Evaluation of a teaching kit for Family and consumer science classrooms: Motivating students to use a food thermometer with small cuts of meat. *J. Food Sci. Ed.* 1:47–52.
- Ellis, J. D., S. W. Arendt, C. H. Strohbehn, J. Meyer, and P. Paez. 2010. Varying influences of motivation factors on employees' likelihood to perform safe food handling practices because of demographic differences. *J. Food Prot.* 73:2065–2071.
- Gomez-Aldapa, C. A., E. Rangel-Vargas, and J. Castro-Rosas. 2013. Frequency and correlation of some enteric indicator bacteria and *Salmonella* in ready-to-eat raw vegetable salads from Mexican restaurants. *J. Food Sci.* 78:M1201–M1207.
- Gould, L. H., I. Rosenblum, D. Nicholas, Q. Phan, and T. F. Jones. 2013. Contributing factors in restaurant-associated foodborne disease outbreaks, FoodNet sites, 2006–2007. *J. Food Prot.* 76:1824–1828.
- Green, L. R., A. S. Carol, V. Radke, D. Ripley, J. C. Mack, D. W. Reimann, T. Stigger, M. Motsinger, and L. Bushnell. 2006. Food worker hand washing practices: An observation study. *J. Food Prot.* 69:2417–2423.
- Green, L., V. Radke, R. Mason, L. Bushnell, D. W. Reimann, J. C. Mack, M. D. Motsinger, T. Stigger, and C. A. Selman. 2007. Factors related to food worker hand hygiene practices. *J. Food Prot.* 70. 661–666.
- Griffith, C. J., J. M. Livesey, and D. Clayton. 2010. Food safety culture: The evolution of an emerging risk factor? *Brit. Food J.* 112:439–456.
- Hansen, J-I. C., and M. E. Leuty. 2012. Work values across generations. *J. Career Asst.* 20:34–52.
- Henroid, D., and J. Sneed. 2004. Readiness to implement hazard analysis and critical control point (HACCP) systems in Iowa schools. *J. Am. Diet. Assoc.* 104:180–185.
- Koo, O. K., A. W. Mertz, E. L. Akins, S. A. Sirsat, J. A. Neal, R. Morawicki, P. F. Crandall, and S. C. Ricke. 2013. Analysis of microbial diversity on deli slicers using polymerase chain reaction and denaturing gradient gel electrophoresis technologies. *Lett. Appl. Microbiol.* 56:11–119.
- Lynch, R. A., B. L. Elledge, C. Griffith, and D. T. Boatright. 2003. A comparison of food safety knowledge among restaurant managers, by source of training and experience, in Oklahoma County, Oklahoma. *J. Environ. Health.* 66:9–14.
- Lynch, R. A., M. L. Phillips, B. L. Elledge, S. Hanumanthaiah, and D. Boatright. 2005. A preliminary evaluation of the effect of glove use by food handlers in fast food restaurants. *J. Food Prot.* 68:187–190.
- Mandala Research. 2011. LivingSocial dining out survey. Available at http://mandalaresearch.com/index.php/purchase-reports/download_form/index.php?Itemid=7. Accessed April 8, 2014.
- Montville, R., Y. Chen, and D. W. Schaffner. 2001. Glove barriers to bacterial cross-contamination between hands to food. *J. Food Prot.* 64:845–849.
- Neal, J. A., M. Binkley, and D. Henroid. 2012. Assessing factors contributing to food safety culture in retail food establishments. *Food Prot. Trends.* 32:468–476.
- Paez, P., C. H. Strohbehn, and J. Sneed. 2007. Developing benchmarks for handwashing in retail foodservice operations: A pilot study in delicatessens. *Food Prot. Trends* 27:903–908.
- Pekala, N. 2001. Conquering the generational divide. *J. Prop. Mgmt.* 30–38.
- Powell, D. A., C. J. Jacob, and B. J. Chapman. 2011. Enhancing food safety culture to reduce rates of foodborne illness. *Food Ctrl.* 22:817–822.
- Pragle, A. S., A. K. Harding, and J. C. Mack. 2007. Food workers' perceptions on handwashing behaviors and barriers in the restaurant environment. *J. Environ. Health.* 69:27–32.

33. Rajagopal, L., and C. H. Strohbehn. 2013. Observational assessment of glove use behaviors among foodservice workers in a university dining setting: Testing a visual intervention tool. *Food Prot. Trends*. 33:315–324.
34. Robertson, L. A., R. R. Boyer, B. J. Chapman, J. D. Eifert, and N. K. Franz. 2013. Educational needs assessment and practices of grocery store food handlers through survey and observational data collection. *Food Ctrl.* 34:707–713.
35. Sirsat, S. A., J. K. Choi, B. A. Almanza, and J. A. Neal. 2013. Persistence of *Salmonella* and *E. coli* on the surface of restaurant menus. *J. Environ. Health*. 75:8–14.
36. Sneed, J., C. H. Strohbehn, and S. A. Gilmore. 2007. Impact of mentoring on food safety practices and HACCP implementation in Iowa assisted-living facilities. *Top. Clin. Nutr.* 22:162–174.
37. Sneed, J., C. H. Strohbehn, S. A. Gilmore, and A. Mendonca. 2004. Microbiological evaluation of foodservice contact surfaces in Iowa assisted-living facilities. *J. Am. Diet. Assoc.* 104:1722–1724.
38. Stoddart, K. 1986. The presentation of everyday life. Some textual strategies for adequate ethnography. *Urban Life* 15:103–121.
39. Strohbehn, C. H. 2003. Food safety and sanitation in hospitality operations: Students' perspectives. *J. Hosp. Tourism Ed.* 15:36–42.
40. Strohbehn, C. H., P. Paez, J. Sneed, J. Meyer. 2011. Mitigating cross contamination in four retail foodservice sectors. *Food Prot. Trends*. 31:620–630.
41. Strohbehn, C., J. Sneed, P. Paez, and J. Meyer. 2008. Hand washing frequencies and procedures used in retail food services. *J. Food Prot.* 71:1641–1650.
42. Twenge, J. M. 2010. A review of the empirical evidence on generational differences in work attitudes. *J. Bus. Psychol.* 25:201–210.
43. Twenge, J. M., and S. M. Campbell. 2008. Generational differences in psychological traits and their impact on the workplace. *J. Manag. Psychol.* 23:862–877.
44. U. S. Food and Drug Administration. 2009. FDA report of foodborne illness risk factors in selected institutional foodservice, restaurant, and retail food store facility types. Available at: <http://www.fda.gov/downloads/Food/GuidanceRegulation/RetailFoodProtection/Foodbornellness-RiskFactorReduction/UCM224682.pdf>. Accessed 30 November 2013.
45. U. S. Food and Drug Administration. 2009. FDA Food Code 2009. Available at <http://www.fda.gov/Food/FoodSafety/RetailFoodProtection/FoodCode/default.htm>. Accessed 10 December 2013.
46. World Health Organization 2006. Five keys to safer food manual. Available at: http://www.who.int/foodsafety/publications/consumer/manual_keys.pdf. Accessed 17 November 2013.
47. Yiannas, F. 2009. Food safety culture: Creating a behavior-based food safety management system. Springer, Bentonville, AK.



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