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Measuring food safety culture: Insights from onsite foodservice operations

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IN MEMORY OF

Ungku Zainal Abidin Ungku Abdul Rahman

Whom I miss sorely, but I am glad to know he saw this process through to its completion. May Allah SWT have mercy on him and place his soul among those of believers. Amen.

DEDICATION

This dissertation is dedicated to my family:

Mohd Nurul Azizi Samuri
Ameera Najla Mohd Nurul Azizi

Their love, patience, and support throughout my graduate work have helped me immeasurably.

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ABSTRACT

Many researchers and practitioners have recently suggested that food safety requires a better understanding of organizational culture. Interventions to improve food safety are more likely to be effective if greater attention towards how an organization does food safety is considered. A concept called "food safety culture" has been introduced to understand how an organization does food safety. Researchers have adapted measurements from other research fields to evaluate factors that shape the organizational food safety culture. Yet, culture is context specific and it is not clear if these measurements are relevant for onsite foodservice, a specific segment of the foodservice industry. This study aimed to develop a measurement scale to assess food safety culture and tested this scale in two types of onsite foodservice, namely hospitals and schools. A mixed method data collection approach was used and included two research phases. In phase 1, four focus groups were conducted with foodservice employees, who held non-supervisory positions, to explore factors that influence safe food handling practices. Participants were asked during the focus groups to describe factors in the workplace that helped and prevented them from following food safety practices. Nine themes emerged and the findings were used in items' scale development: 1) leadership, 2) communication, 3) self-commitment, 4) management system and style, 5) environment support, 6) teamwork, 7) accountability, 8) work pressure, and 9) risk perceptions. In phase 2, a survey was conducted with foodservice employees to test and validate the developed measurement scale. A total of 582 useable survey responses were obtained and subjected to factor analysis with six factors extracted: management and coworkers support, communication, self-commitment, environment support, work pressure, and risk judgment. The six-factor structure of food safety culture showed a satisfactory level of reliability and validity. Further analysis of the survey data showed employees' perceptions on certain factors of food safety culture were significantly different across gender, age group, years of foodservice experience, time worked at current workplace, work status, and whether or not employees received food safety training. Significant differences were also found in employees' perceptions based on their workplace management system, operation type and size. Areas of strength and potential improvement of food safety culture were identified in this study. Significant differences in employees' perceptions can guide development of interventions that support safe food handling practices in onsite foodservices. Further research is needed to confirm and validate the application of the food safety culture scale in other types of onsite foodservice operations.

CHAPTER 1: INTRODUCTION

Background

Foodborne illness is a persistent problem and has caused morbidity and mortality worldwide. Food can become contaminated at any point along the farm-to-fork continuum. In the United States (U.S.), foodborne illness has sickened an estimated of 48 million people, causing 128,000 hospitalizations and 3,000 deaths every year (Scallan, Griffin, Angulo, Tauxe, & Hoekstra, 2011; Scallan et al., 2011). Foodborne illnesses are estimated to cause an economic loss between $10 and $83 billion annually in reduced productivity, medical expenses, legal fees, and other damages (Buzby et al., 1996). Many foodborne illness episodes have been associated with the foodservice industry. The Center for Disease Control and Prevention reported that 59% of foodborne disease outbreaks involved foodservice establishments (Center for Disease Control and Prevention [CDC], 2011). The U.S. Food and Drug Administration investigation on the occurrence of foodborne illness risk factors highlighted problems in food handling behaviors within retail foodservice including onsite foodservices (i.e., hospitals, nursing homes and elementary schools) (U.S. Food and Drug Administration [FDA], 2009b). Improper holding/time and temperature, poor personal hygiene, and cross contamination were identified as three categories of risk factors with the highest non-compliance rate (FDA, 2009a). Other studies have reported that foodservice employees' poor food handling practices is one of the significant sources of foodborne illness outbreaks (Bean, Goulding, Daniels, & Angulo, 1997; Hedberg et al., 2006).

In the U.S. foodservice industry, the changing demographic profile of foodservice employees (i.e., age, ethnicity, language and literacy) is becoming a challenge in managing food safety and ensuring employees safe food handling practices (Sneed & Strohbehn, 2008). It is suggested this changing trend requires increasing responsibility for foodservice organizations to assess and meet employees' needs when designing food safety interventions. Issues related to generational differences, language barriers, and illiteracy may have significant implications on food safety education and training (Sneed & Strohbehn, 2008). At present, most interventions are designed to promote safe food handling practices through training, enforcement, and implementation of food safety management systems. Literature is mixed regarding the results of such interventions (Mitchell, Fraser, & Bearon, 2007; Rennie, 1995) and even less persuasive regarding the effectiveness of knowledge-oriented food safety training (Egan, et al., 2007; Kassa,

Silverman, & Baroudi, 2010). Researchers have found that increased food safety knowledge may not necessarily be translated into improved practices (Luby, Jones, & Horan, 1993; Pilling et al., 2008; Roberts et al., 2008).

Numerous studies have investigated factors that influence employees' safe food handling practices with the overarching goal to enhance current interventions strategies and help address current challenges in managing food safety. Barriers and motivators to perform safe food handling practices were identified (Arendt & Sneed, 2008; Ellis, Arendt, Strohbehn, Meyer, & Paez, 2010; Strohbehn et al., 2013). Various factors were found to influence employees' practices including time constraints, availability of resources, and behavioral issues (e.g., management and coworker attitudes) (Green & Selman, 2005; Howells et al., 2008; Pragle, Harding, & Mack, 2007). Factors affecting employees' practices are multidimensional and extend beyond food safety knowledge. Research conducted in onsite foodservice facilities has found that even when foodservice employees demonstrate sufficient knowledge of food safety, their practices may not always be consistent with required standards (Giampaoli, Cluskey, & Sneed, 2002; Henroid & Sneed, 2004; Sneed & Henroid, 2007; Strohbehn, Paez, Sneed, & Meyer, 2011). Lack of resources (e.g., financial, supplies and time) and issues related to employees' motivation, turnover, and training were frequently cited as some of the barriers to perform safe food handling practices (Giampaoli et al., 2002; Sneed & Henroid, 2007; Sneed, Strohbehn, & Gilmore, 2004; Strohbehn et al., 2013). These findings indicate that a variety of organizational factors contribute to the success of food safety in onsite foodservice organizations.

Recently, there has been a growing interest in the potential role of organizational factors on changing food safety behaviors and practices among the foodservice workers (Arendt & Sneed, 2008; Griffith, Livesey & Clayton, 2010a; Mitchell et al., 2007; Powell, Jacob, & Chapman, 2011; Taylor, 2011; Yiannas, 2009). Mitchell et al. (2007) stated that food safety interventions in foodservice environments are more likely to be effective if greater attention toward organizational factors is considered. Researchers have recognized that food safety problems in the food industry are caused by organizational factors, including those related to organizational culture (Arendt & Sneed, 2008; Griffith, Livesey & Clayton, 2010b; Pragle et al., 2007; Ungku Fatimah, Arendt, & Strohbehn, in press; Yiannas, 2009). Knowledge of organizational culture has a great importance for improving food safety (Arendt & Sneed, 2008;

Griffith et al., 2010a; Mitchell et al., 2007; Powell et al., 2011; Yiannas, 2009). The concept of food safety culture has recently been introduced and refers to a specific form of organizational culture, which represents the way an organization "does food safety" (Yiannas, 2009).

The role of organizational culture in changing employee behavior has been widely studied in areas such as worker health and safety education (Flin, 2007; Guldenmund, 2007; Zohar, 2003), whereby the significance of safety culture in changing employee safety behavior is well documented. Many industries are showing interest in safety culture as means of reducing potential disasters, injuries, and accidents in the healthcare, constructions, aviation and other high-risk industries (Clarke, 2000; Larson, Early, Cloonan, Surgue, & Parides, 2000; Naveh, Katz-Navon, & Stern, 2005; Singer et al., 2007). Researchers have found safety culture varies across industries, but four dimensions have been consistently reported: 1) management/supervision, 2) safety system, 3) risk (e.g., risk taking behavior), and 4) work pressure (e.g., work pace) (Flin, 2007; Guldenmund, 2000). Many other types of culture have been previously identified (e.g., customer service culture, learning culture, and innovation culture). All kinds of culture are based on individual worker's perception of the policies, procedures, and practices in an organization (Schein, 1985).

Despite the contributions of organizational culture research to the scientific literature in numerous research fields, studies investigating the culture needed to foster safe food handling practices remain scarce (Griffith et al., 2010b; Taylor, 2011; Yiannas, 2009). To date, little research has attempted to understand what constitutes food safety culture in onsite foodservices, a specific sector of retail foodservices. In addition, there is a lack of developed measurement scales to evaluate food safety culture prevalence in this type of foodservice. Published works on what constitutes a food safety culture are primarily based on expert opinions. Referring to some of the organizational cultural elements found in the occupational safety and health literature, researchers have proposed that food safety culture can be assessed as employees' perceptions toward the management system and style, leadership, communication, sharing of knowledge and information, accountability, risk perception, and work environment (Griffith et al., 2010b; Powell et al., 2011; Yiannas, 2009). However, the relevancy of these elements for application in the onsite foodservice sector has not been empirically tested. Some studies have used the measurement scale adapted from other research fields, yet past research has shown

organizational culture is context specific and varies across industries (Flin, 2007; Guldenmund, 2000).

Purpose and Objectives of the Study

To fill the gap in the literature, the current study aims to develop and test a measurement scale to assess the food safety culture in onsite foodservices. The specific objectives were to:

1) determine factors that influence employees' safe food handling practices in onsite foodservices and use the findings for scale development.
2) evaluate the reliability and validity of the developed scale to establish the psychometric properties.
3) utilize the developed scale and assess employees' perceptions of food safety culture in two types of onsite foodservice, namely hospital and school.
4) compare employees' perceptions of food safety culture based on their demographic characteristics (i.e., gender, age group, work status, years of foodservice experience, time worked at present operation, job title, food safety training, and completion of food safety training).
5) compare employees' perceptions of food safety culture based on the characteristics of the operations in which they worked (i.e., management system, size, and type of operation)

Significance of the Study

Findings from this study provide insights into a fairly new but evolving research area in the foodservice setting. Although the significance of organizational culture on employee work performance has been widely documented in other fields of study, this concept has only recently received attention in the foodservice and hospitality research arenas. Of the works that have been published, most have been at a conceptual level, and little is known about the development of measurement scale to assess food safety culture in onsite foodservices, one sector of foodservice.

From the practical standpoint, the findings could aid in the design and evaluation of organizational interventions developed to enhance food safety outcomes. The scale could be used to assess compliance with recommended food safety practices and help organizations evaluate their food safety initiatives and training effectiveness. By understanding the differences in employees' perceptions of food safety culture based on demographic characteristics, organizations can develop interventions tailored to employees' needs. Comparing food safety cultures across different segments within onsite foodservices could provide a better

understanding of risk and provide organizations with the impetus to improve food safety outcomes.

From the academic perspective, the present study is one of the earliest works to develop a measurement scale and assess the food safety culture for onsite foodservices. Food safety culture is known to be context specific, thus the current study introduced a set of assessment questions developed and validated specifically for onsite foodservices whereby employees in this specific sector defined relevant aspects of culture. The measurement scale could be used to further research this topic and to better understand the impact of food safety culture on organizational food safety outcomes. Additionally, foodservice management educators could incorporate the concept into hospitality curricula, which help prepare future foodservice managers with soft skill competencies in managing food safety and preventing foodborne illness. The food safety culture measurement scale can be used in courses like quantity food production or fine dining management to evaluate and improve students' soft skills in a practice production setting.

Definition of Terms

Listed below are the definitions of key terms used in the study.

Foodborne illness: A disease that is carried by or transmitted to people through food (National Restaurant Association Educational Foundation, 2010).

Foodborne illness outbreak: "the occurrence of two or more cases of a similar illness resulting from the ingestion of a common food" (Olsen, MacKinon, Goulding, Bean, & Slutsker, 2000)

Food safety culture: "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" (Griffith et al., 2010a, p. 435).

Organizational culture: "A pattern of basic assumptions- invented, discovered, or developed by a given group as it learns to cope with the problems of external adaptation and internal integration - but that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems" (Schein, 1985, p. 9).

Safety culture: "the product of individual and group values, attitudes and beliefs, competencies and patterns of behaviors that determine the commitment to, and the style and proficiency

of, an organization's health and safety management" (Advisory Committee for Safety in Nuclear Installations [ACNSI], 1993 as cited by Cooper, 2000, p. 114).

Hazard Analysis and Critical Control Point (HACCP): "a systematic approach to food safety management based on recognized principles which aim to identify the hazards that are likely to occur at any stage in the food supply chain and put into place controls that will prevent them from happening" (Mortimore & Wallace, 2001, p. 2).

Measurement scale: "collections of items combined into a composite score, and intended to reveal levels of theoretical variables not readily observable by direct means" (DeVellis, 2003, p.8).

Onsite foodservice: "a not-for-profit auxiliary service provided to a 'captive market' within larger organizations that have other primary functions" (Khan, 1991, p. 5).

Soft skills: Intrapersonal skills (e.g., one's ability to manage oneself) and interpersonal skills (e.g., how one handles one's interactions with others) that facilitate the application of technical skills and knowledge in the workplace (Kantrowitz, 2005; Laker & Powell, 2006).

Dissertation Organization

This dissertation comprises five additional chapters and uses the alternate format. Chapter 2 and 3 present the Literature Review and Methodology, respectively. Chapter 4 is a journal article prepared for submission to the *Journal of Foodservice Management and Education*. Chapter 5 is a journal article prepared for submission to *Food Control*. The writing and referencing style of both articles in Chapter 4 and 5 correspond to the journals requirements. For both journal articles, I was involved in all the research stages including: idea conception, data collection, data analysis, and manuscript preparation. Drs. Arendt and Strohbehn served as co-major professors, and contributed at every phase of the research process including manuscript preparation. The final chapter, Chapter 6, presents general conclusions from the study. References lists are provided at the end of each chapter.

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CHAPTER 2: REVIEW OF LITERATURE

In the second chapter, a review of literature in related areas that support the current study are discussed. This chapter begins with an overview of food safety issues in onsite foodservice operations. Studies about factors affecting foodservice employees' safe food handling practices follow the discussion. Then, a background on organizational culture and safety culture is provided. In particular, definitions and dimensions of organizational culture and safety culture, as well as the relationship with safety performance indicators are discussed. Finally, the concept of food safety culture introduced in related previous works are presented.

Food Safety in Onsite Foodservices

Onsite foodservice is referred to as "a not-for-profit auxiliary service provided to a 'captive market' within larger organizations that have other primary functions" (Khan, 1991, p.5). This segment of the industry is also known as noncommercial foodservice, which includes educational, governmental or institutional organizations that operate its own foodservice (National Restaurant Association [NRA], 2012). The onsite foodservice sector is a unique market segment and differs from commercial retail foodservices in that this sector typically provides extended service, serves a high volume of meals, is part of a public entity receiving some form of taxpayer support, and has a consistent workforce. Onsite foodservices were forecasted to account for $54.2 billion in food sales for 2012 (NRA, 2012) and had generated a total of $95 billion retail sales-equivalent in 2008 (Technomic, 2008 as cited by Bright, Kwon, Bednar, & Newcomer, 2009). In schools alone, the National School Lunch Program, School Breakfast Program, Summer Food Service, After-school Snack Program, and Child and Adult Care Feeding Programs together account for more than 2.2 billion meals served annually in meeting the Food and Nutrition Services nutrition assistance programs (as cited in Boyce, 2011). Because of the significant industry size, ensuring the safety of food served to its customers is deemed critical.

Foodborne illness is a concern for high-risk populations of infants and young children, elderly people, and individuals with compromised immune systems. In 2010, the Centers for Disease Control and Prevention reported that incidence of foodborne illness was highest in children younger than five years old (69.5 infections per 100,000 children) with an estimated 5% of the infections associated with recognized outbreaks; whereas, infected persons older than 60 years old were reported to have the highest percentages of hospitalized cases (40%) and case-

fatality ratios (1.5%) (Centers for Disease Control and Prevention [CDC], 2011). For onsite foodservices serving these populations, food safety is of paramount importance for the health and well-being of their customers. As the elderly reportedly have the highest hospitalization of foodborne illness of any age groups (Henderson, 1988; Klontz, Adler, & Potter, 1997), the increasing trend of aging population in the U.S. may impact food safety concerns particularly for onsite foodservices serving this vulnerable group (Sneed & Strohbehn, 2008).

Observational research conducted by the U.S. Food and Drug Administration in various sectors of foodservice including onsite settings (i.e., hospitals, nursing homes and elementary schools) indicated that compliance with food safety was low (U.S. Food and Drug Administration [FDA], 2009a). Within the ten year observational study period (1998 – 2008), a trend analysis report on the occurrence of foodborne illness risk factors in these establishments showed three risk factors continue to occur: improper holding/time and temperature, poor personal hygiene and cross-contamination. The out-of-compliance percentage for these risk factors remained high at the end of study period (FDA, 2009b). Failure to control product holding temperatures and times was the risk factor with the highest out-of-compliance percentage in hospitals (36.2%). A similar risk factor was observed with the highest out-of-compliance percentage in nursing homes (29.2%) and elementary schools (27.5%). The hospitals and nursing homes did not have a statistically significant change in the percentage of incompliance and the occurrence of risk factors for nursing homes stayed relatively static during the research period. Only elementary schools showed significant improvement in the percentage of incompliance. However, none of the onsite foodservices studied actually met the FDA targeted improvement goal in the percentage of incompliance rate. FDA concluded these findings underscored the need for greater emphasis on the control of risk factors associated with improper holding/time and temperature, poor personal hygiene and cross contamination, which continue to be most in need of priority attention (FDA, 2009b).

Research is available on food safety issues associated with onsite foodservice operations including healthcare and educational institutions. A number of studies have been conducted in relation to food safety knowledge, attitudes, practices, training and implementation of Hazard Analysis Critical Control Point (HACCP) based food safety programs.

Strohbehn, Sneed, Paez, and Meyer (2008) conducted an observational study on hand washing practices to develop hand washing benchmarks in retail foodservice offering ready-to-

eat food and served vulnerable customers. A convenience sample of 16 retail foodservices was selected consisting of four types of operations: assisted living, schools, childcare centers, and restaurants. Hand washing practices (i.e., frequency and procedures) of 80 employees were observed for 240 hours during preparation, serving and cleaning using a verified hand washing form. Overall, hand washing practices in retail foodservice were not frequent enough, as per Food Code requirements, and recommended methods were not followed. Results showed almost all employees failed to wash hands between handling raw and handling ready-to-eat food. For example, employees in schools had only 23% hand washing compliance rate during the production phase. Specifically, failure to wash hands was observed after eating and drinking, before donning gloves, and when changing tasks. School employees only washed hands 142 times from a total of 640 times that they should wash according to Food Code recommendations (22% compliance rate). Frequency of compliance in childcare and assisted living also was observed to be low (31% and 33% compliance rate, respectively)

In a more recent observational study, Strohbehn, Paez, Sneed, & Meyer (2011) identified food handling practices that contribute to cross-contamination and tested the effectiveness of several intervention efforts in mitigating poor practices. The three-year study involved observations in 16 locations including onsite foodservices (schools, assisted living, childcare centers) and commercial operations (restaurants). Food handling practices were observed using three forms: food flow form, food safety practices assessment form, and hand washing observation form. Nine different interventions, consisting of formal and informal methods, were used to show ways of minimizing cross contamination, appropriate hand washing practices, and proper use of gloves. The study reported three food flow steps with the greatest number of cross-contamination opportunities: preparing/thawing, sanitizing and cleaning standard operating procedures, and serving. Results demonstrated some intervention efforts had improved the operation's food safety practice score, yet other post-intervention observations (i.e., handling practices at specific steps in food flow, general food safety procedures within the operation, hand washing behaviors, and temperature controls) showed minor improvement in mitigating cross-contamination.

Most studies on food safety issues in school foodservices reported that employees have sufficient knowledge about safe food handling; however, several improper food handling practices have been identified (Henroid & Sneed, 2004; Sneed & Henroid, 2007; Strohbehn et

al., 2008). For instance, Henroid and Sneed (2004) and Strohbehn et al. (2008) found that employees performed inadequate hand washing practices and did not record food temperatures or calibrate thermometers. In some cases, inadequate staffing in the dishroom contributed to inadequate hand washing practices. Improper sanitizing practices were also reported in these observational studies, often related to incorrect use of sanitizer concentration and incorrect use of detergent. In addition, improper cooling and thawing practices have been noted in these and other studies with food temperatures not regularly recorded (e.g., food was sometimes thawed overnight at room temperature) (Giampaoli, Cluskey, & Sneed, 2002; Henroid & Sneed, 2004; Sneed & Henroid, 2007).

Similar to employees in school foodservices, employees in assisted living facilities demonstrated adequate knowledge of food safety but their practices were not always consistent with required standards. In a study conducted by Sneed, Strohbehn and Gilmore (2004a), improper cooling and thawing of foods were observed in assisted living facilities. Also, employees in many facilities did not record refrigerator and freezer temperatures. Sneed, Strohbehn, Gilmore and Mendonca (2004b) noted inadequate sanitation and recontamination problems related to employee practices, as evidenced by high aerobic plate counts from cutting boards. In addition, employees hired as universal caregivers in assisted living facilities sometimes had overlapping duties, which required handling soiled laundry as well as food, which could be a source of cross-contamination (Sneed et al., 2004a; Buccheri et al., 2010).

Foodservice operations in colleges and universities dining employ many part-time employees (i.e., students) to meet the need for flexible staffing. Studies have compared the knowledge, attitudes, practices and training between part-time and full-time employees in university foodservice operations. A study conducted by Lin and Sneed (2005b) found that foodservice managers in university dining perceived full-time employees' food safety performance better than that of part-time staff. Aspects of performance included work attire, prevention of cross contamination, and hand hygiene. Part-time employees also were reported to lack knowledge and training related to proper hand washing procedures, time and temperature control, cross contamination, and sanitizer concentration (Lin & Sneed, 2005a).

Several research efforts about food safety training issues have also been reported. In schools, foodservice directors have identified various competing training needs such as cost effectiveness, employee motivation and staff retention (Kwon, 2003). The researcher noted that

small school districts may not have sufficient resources to support food safety training programs and to allow staff to attend off-site training (Kwon, 2003). Studies have highlighted problems related to food safety training among foodservice employees in childcare settings. Enke, Briley, Curtis, Greninger, and Staskel (2007) reported that training opportunities were limited to employees in childcare centers. Usually, only those managers of childcare operation, who attended annual training meetings provided by a national accreditation programs, received food safety training, and very few employees were given such opportunities. A study conducted by Riggin and Barrett (2008) found that, compared with better-educated employees such as teachers or administrators, less educated employees in childcare centers (such as foodservice workers) perceived more barriers to implementation of a HACCP-based program. Foodservice employees perceived the lack of time and funding for training as the main barrier to HACCP implementation. Although employees indicated the need for additional food safety training, managers may refuse to provide training other than that required by accrediting agencies, because of financial constraints.

Some researchers have identified barriers to implementing HACCP-based food safety programs in onsite foodservices. As required by Section 111 of the Child Nutrition and WIC Reauthorization Act of 2004 (Public Law 108-265), implementation of food safety programs based on HACCP principles became mandatory for school nutrition programs by the end of the 2005-2006 school year. Prior to the required year of implementation, studies found that most foodservice managers did not have sufficient knowledge to implement the program (Kwon, 2003; Giampaoli et al., 2002). Issues related to the lack of financial resources and time for employee training were also frequently cited as the major barriers to HACCP implementation (Hwang, Almanza, & Nelson, 2001; Youn & Sneed, 2002). Foodservice directors were discouraged by the complexity of HACCP programs (Hwang et al., 2001) and perceived employees' motivation and confidence as challenges to implementing HACCP (Giampaoli et al., 2002). Employee issues were also noted: 1) attitude and self-esteem, 2) time constraints, 3) perception that HACCP is an added responsibility, 4) ability to make good decisions, and 5) employee turnover (Sneed & Henroid, 2003). Other barriers to HACCP implementation were inconsistency in understanding and application of HACCP among state/local health departments, the school culture, foodservice system structure and union challenges (Almanza & Sneed, 2003; Sneed & Henroid, 2003).

Recently, Stinson, Carr, Nettles, and Johnson (2011) conducted a national study to assess the extent to which HACCP-based food safety programs have been implemented in school nutrition programs as well as barriers and practices associated with the implementation. Although many school nutrition directors and managers surveyed (n = 2716) reported that their districts and schools, respectively, had implemented the programs, incomplete implementation was reported in further assessment. It was more likely that directors who had worked in school nutrition programs for more than 20 years, school districts in southwest region, and larger school district had implemented these food safety programs. The top barriers to implementation associated with time, cost, and negative perceptions toward the programs were consistent with previous findings prior to the required year of implementation. The top important practices in the implementation process were: 1) role modeling regarding food safety practices, 2) restricting ill employees from with food, 3) ensuring that role expectations are understood, 4) providing necessary training and materials, 5) ensuring that programs are practical to apply, and 6) gaining employees "buy-in" to programs. Another national study identified the required and/or desired inputs needed to comply with the HACCP-based food safety program, as perceived by public school foodservice administrators (Story, 2008). Some variations in the purchase of large and small equipment items as well as provision of food safety training to comply with the program were found based on respondents' educational level, size of school district, years of school foodservice experience, and USDA region. Time, paperwork, training, and money were indicated as barriers, but the majority of the respondents agreed that the HACCP-based food safety programs resulted in safer food served.

As is the case in the school setting, foodservice managers in assisted living operations perceived employee issues related to turnover, knowledge, and training as barriers to HACCP implementation (Strohbehn, Gilmore, & Sneed, 2004). Inexperienced employees, lack of knowledge and incorrect hand washing practices were rated as the highest food safety concerns among managers (Strohbehn et al., 2004). Time issues and commitment to HACCP implementation were cited as barriers. In childcare settings, Riggin and Barrett (2008) found that managers perceived little risk of the occurrence of foodborne illness in their facilities. Food safety issues do not appear to be a concern, and food safety training is scarce. Managers' lack of knowledge about HACCP-based food safety programs were noted. Food safety training becomes less important for operations that are either losing money or just breaking even. For other onsite

facilities, lack of time for employee training and lack of resources to improve food safety practices are barriers to HACCP-based program implementation in childcare facilities (Enke et al., 2007). Less educated managers perceived more barriers to implementing the programs compared with those who had higher levels of education. Riggins and Barrett (2008) reported that managers were less confident in their ability to implement HACCP-based programs than employees. Moreover, there is lack support from professional organizations in providing guidance and training on food safety to childcare facilities (Enke et al., 2007). Only centers that were accredited (e.g., by a national organization) had opportunities to attend annual training, which included training on food safety.

Studies conducted in college and university foodservices found that managers were lacking in specific knowledge about HACCP systems and its components (Riggins, Roberts & Barrett, 2005). The least known areas of the HACCP system, as reported by managers, were the corrective actions and record keeping. The knowledge and ability to implement HACCP differed significantly between managers of self-operated facilities and those of contract-managed facilities. Consistent with other types of onsite operations, training was perceived usually as the most significant barrier to HACCP implementation in college and university foodservice. Lack of opportunities to provide employees in-house and off-site training is the main challenge perceived by managers (Riggins et al., 2005). In contrast to school settings, financial resources were not viewed as a barrier to HACCP implementation by managers in college and university foodservices, who perceived that increased funds alone would not lead to HACCP implementation in their operations.

To date, limited research was found regarding food safety issues in the U.S. hospital settings. However, a study conducted in the field of clinical infectious diseases demonstrated an increased initiative to mitigate hospital-acquired infections through hand washing. The use of a high-tech hand-hygiene system to change the culture of hand washing among health care workers has become a recent trend in hospitals as a way to reduce infections and improve ratings by third party evaluators. A study was conducted to evaluate the effectiveness of third party (paid company) video monitoring and sensor system to help increase hand washing rate and reduce deadly hospital-acquired infections (Armellino et al., 2010). Results showed application of this system, which provided real-time feedback on success, raised and maintained rates of hand

washing up to 80%. The rate was maintained through 75 weeks and successfully improved the culture of hand washing among health care workers.

In summary, researchers have consistently found that even when foodservice employees demonstrated sufficient knowledge of food safety, their practices were not always in line with required standards in onsite operations such as schools and assisted living facilities. Lack of resources (i.e., financial and time) and issues related to employee turnover, knowledge, and training have been frequently cited as barriers to implementation of HACCP-based food safety program in onsite foodservices including schools, assisted living facilities, and college and university dining. These findings indicate that multiple factors contribute to the success of food safety practices in onsite foodservice organizations. With the mass number of meals served and the demographic trends of at risk populations, continuous research to improve food safety practices in onsite foodservices is warranted.

Factors Affecting Food Safety Practices

Foodservice employees have critical roles and responsibilities in preventing foodborne illness outbreaks (Howells et al., 2008). A study on the CDC report of foodborne outbreaks between 1988 and 1992 found improper holding temperature of food and poor personal hygiene of employees reported in 59% and 36% of outbreaks, respectively (Bean, Goulding, Daniels, & Angulo, 1997). In a more recent study, employees' poor safe food handling practices associated with bare-hand contact and handling of food by infected person were identified as contributing factors in foodservice operations implicated with foodborne illness outbreaks (Hedberg et al., 2006). Factors affecting employees' safe food handling practices in commercial and noncommercial foodservice operations have been studied. Researchers have investigated factors influencing food handling practices associated with common risk factors to foodborne illness outbreaks: improper holding time and temperature of food, poor personal hygiene, and cross-contamination (Clayton, Griffith, Price, & Peters, 2002; Green, & Selman, 2005; Green et al., 2007; Howells et al., 2008; Pragle, Harding, & Mack, 2007). Several researchers have applied behavioral theories to understand underlying factors influencing food safety practices (Ball, Wilcock, & Aung, 2010a; Brannon, York, Roberts, Shanklin, & Howells, 2009; Clayton, & Griffith, 2008; Hinsz, Park & Nickell, 2007). Additionally, the role of organizational culture and motivation on employees' food safety behaviors has been researched and recognized as an emerging area of food safety research (Arendt & Sneed, 2008; Arendt, Ellis, Strohbehn, Meyer,

& Paez, 2011; Chapman, Eversley, Fillion, MacLaurin, & Powell, 2010; Ellis et al., 2010; Frash & MacLaurin, 2010; Lee, Almanza, Jang, Nelson, & Ghiselli, 2012).

Pragle et al. (2007) studied food handlers' perceived barriers related to hand washing in commercial restaurant operations. Two focus groups with nine participants in each group were conducted in two Oregon counties. Barriers to hand washing practices consisted of time pressures, inadequate facilities and supplies, lack of accountability, lack of encouragement from managers and coworkers, and lack of supportive organization. Insufficient and ineffective hand washing training was also perceived as a barrier. Training using a memorization approach was viewed as unfavorable. On the other hand, participants identified factors related to kitchen design and environment, proactive health and food inspectors, education and training, customer influences, good hand washing habits and personal internal beliefs and perception as providing a positive impact on hand washing practices. It was highlighted that accountability must be inculcated by managers and peers, and could be promoted by providing clear goals and expectations, rules, and training and education. The authors concluded that barriers to hand washing are multidimensional and require organizational change involving support of managers and coworkers to address these barriers.

Howells et al. (2008) investigated restaurant employees' perceived barriers to performing three safe food handling practices: hand washing, thermometer use, and cleaning of work surfaces. Two series of focus groups were used to gather data from two groups of employees. Ten focus groups were conducted with employees who had not received food safety training (n = 34) and twenty focus groups with employees who had completed ServSafe® training (n = 125). Time constraints, inconvenience, lack of resources and lack of training were most frequently cited as barriers to hand washing, thermometer use and cleaning of work surfaces by both trained and untrained employees. Employees who had completed ServSafe® training frequently mentioned additional barriers: lack of rewards and lack of monitoring as barriers to clean work surfaces, inconvenient location of sinks and drying of skin as barriers to hand washing, and lack of working thermometers and monitoring as barriers to thermometer use. Additional barriers frequently cited by untrained employees were inconvenient sink locations and dry skin as barriers to hand washing, lack of space and competing tasks as barriers to cleaning of work surfaces, and lack of thermometers and inconvenient thermometer location as barriers to thermometer use. The authors highlighted that most of the barriers identified by the focus groups

were not related to knowledge of food safety. Therefore, food safety training must be multidimensional and include topics perceived as barriers from the employees' perspectives in addition to increasing knowledge.

Green et al. (2007) studied factors related to hand hygiene practices among food handlers in restaurants in six of the 2004 Environmental Health Specialist Network states (Colorado, Connecticut, Georgia, Minnesota, Oregon, Tennessee). Observational data on 321 food handlers' hand washing and glove use were collected. Hand washing and glove use were observed for 45 to 50 minutes in 333 of the 808 contacted operations (41% response rate). In addition, interviews and observations were conducted to identify factors related to hand hygiene practices such as worker activities, restaurant characteristics, food safety training, and the physical and social surroundings. Observations on food handlers' activities were carried out for a median duration of 48 minutes. Appropriate hand washing practices were found to be associated with food preparation activities, training received, and number and location of sinks, but were less likely to occur when food handlers were busy (odd ratios [OR] = 0.45 95%, confidence interval [CI] = 0.30 – 0.66) and when gloves were worn (OR = 0.41 95%, CI = 0.26 – 0.67). Glove use was associated with type of activities, level of busyness, hand washing activities, restaurant ownership and glove availability. Specifically, food handlers were less likely to wear gloves when they were busy (OR = 0.51 95%, CI = 0.31 – 0.58). Also, they were less likely to wear gloves if they had washed hands appropriately (OR = 0.37 95%, CI = 0.23 – 0.58). Findings indicated that hand hygiene practices require provision of education and are also influenced by factors such as work activities, restaurant characteristics and the physical environment. The authors recommended that these multidimensional factors be addressed in training programs to improve hand hygiene practices.

Green and Selman (2005) studied factors influencing restaurant managers and food workers with regard to following safe food handling practices. Data were collected using eleven telephone focus groups with geographically scattered participants. Each focus group, consisting of 4 to 8 participants, discussed food workers' current implementation of seven food preparation activities and factors affecting those activities: hand washing, cross-contamination prevention, glove use, determining degree of doneness, hot and cold holding, cooling, and reheating. Time pressures and structural environments, including equipment and resources, were the two most consistently recognized factors affecting each food preparation practices. Other factors reported

as influencing safe food preparation practices were: managers' and coworkers' emphasis, worker characteristics, negative consequences, education and training, restaurant procedures, and availability of gloves and sanitizers. The authors asserted that management influences many of the factors identified by the focus groups; thus management plays a significant role in encouraging safe food handling practices among food workers. Furthermore, the findings also indicated that providing food safety education is insufficient to safe food handling practices. This study found a number of factors that could influence the transfer of knowledge into practice, such as manager and co-worker emphasis or worker characteristics. Hence, in addition to knowledge, intervention to improve food safety practices must address the full range of factors impacting food preparation practices.

Clayton et al. (2002) surveyed 137 food handlers from 52 small to medium-sized food businesses in Wales to investigate beliefs and self-reported practices with regard to food safety. Only those businesses that prepared or handled high-risk foods were included in the study. Food handlers mostly cited lack of time (48%), lack of staff (33%), and lack of resources (9%) as barriers to safe food handling practices. Most food handlers believed food safety could be facilitated by having more staff (57%), less work (49%), more space (28%), better workspace design (23%), more cleaning cloths (18%), and better location of sinks (15%). The majority of food handlers (60%) perceived an advantage to performing safe food handling. However, 63% of food handlers admitted to sometimes not following safe food handling practices and they perceived the risk of implicating foodborne illness in their business to be low. The authors recommended that food safety training for food handlers must use a risk-based approach. In addition, adequate resources and appropriate hygiene culture of an organization must be in place to support safe food handling practices.

Researchers have applied behavioral theories from social psychology to explain factors influencing safe food handling behavior. Applications of the Theory of Planned Behavior, Theory of Reasoned Action, and Health Belief Model have been reported in a number of studies (Ball et al., 2010a; Brannon et al., 2009; Clayton & Griffith, 2008; Hinsz et al., 2007). These models were used as frameworks to understand numerous factors thought to influence behaviors and behavioral change, specifically associated with education and training. These behavioral models support the contention that factors other than knowledge, education, and training influence safe food handling behaviors and ought to be considered more fully. Yiannas (2009)

emphasized the importance of considering behavioral theories and looking at the various aspects that can influence behavior within an organization. Limitations of considering only individual behavior when investigating food safety practices have been discussed and the relevancy of organizational factors was suggested (Clayton & Griffith, 2008; Hinsz et al., 2007).

Clayton and Griffith (2008) applied the social cognitive theory to examine factors impacting hand hygiene practices among food handlers. Participants in 29 catering businesses were recruited from Cardiff Food Premises Register in South Wales, using sampling intervals. Observational data on 115 food handlers' food preparation and hygiene actions (n = 31, 050) were collected. Subsequently, a survey was conducted using the Hand Hygiene Instrument (HHI) to measure participants' attitudes toward hand hygiene practices. The HHI was developed based on the Theory of Planned Behavior framework, consisting of measures of attitudes, subjective norms, perceived behavioral control, behavioral belief, and control belief. Some elements of the Health Belief Model (perceived severity, perceived susceptibility, and self-identity) and two additional variables, namely descriptive norms and moral norms, were incorporated into the HHI. Multiple regression analysis indicated the framework explained 34% of the variance in hand hygiene malpractice. Attitudes (ß = -0.20), subjective norms (ß = 0.20), descriptive norms (ß = 0.23), perceived behavioral control (ß = -0.47) and intention (ß = -0.20) were identified as the significant factors impacting hand hygiene malpractices. The findings revealed that food safety practices of supervisors and coworkers influence food handlers' intentions to perform hand hygiene actions. Based on this finding, the authors underscored the importance of considering organizational factors when designing food safety interventions.

Brannon et al. (2009) surveyed undergraduate students (n = 270) at a large Midwest university to examine whether level of foodservice experience influenced attitude, subjective norm, and perceived behavioral control associated with hand washing, thermometer use, and work surfaces sanitizing. Participants were grouped into three categories based on their level of experience: well-informed experience (i.e., had foodservice experience and formal food safety course), basic experience (i.e., had foodservice experience but have not completed food safety course), and no experience (i.e., had neither experience nor completed formal food safety training). Open-ended questions asked participants to list items related to attitudes, subjective norm, and perceived behavioral control in performing hand washing, thermometer use, and work surfaces sanitizing. Compared to those with basic experience or no experience, employees who

had well-informed experiences identified more advantages (F [2,269] = 17.05, $p < 0.001$), disadvantages (F [2,269] = 5.73, $p = 0.004$), and challenges (F [2,269] = 11.33, $p < 0.001$) of food safety, as well as listed more people who cared about them performing food safety behavior (F [2,269] = 15.08, $p < 0.001$). Participants across all groups identified time constraints, hassles, and lack of resources as the main barriers to performing all of the three food safety practices. Educators could modify training to address these barriers to performing specific food handling practices.

Hinsz et al. (2007) conducted a study to develop an integrated framework to understand the role of work habits in the motivation of food safety behaviors. The framework drew upon theories of intentional behavior, namely the theory of reasoned action, the theory of planned behavior, and Triandis's model of intentional behavior. A total of 162 workers at a fully integrated turkey-processing plant participated in the study. Data were collected by use of a survey questionnaire consisting of measures of general self-reported behavior, behavioral intention, attitude, subjective norm, perceived behavioral control, work habits (i.e., habit strength and work routines), and social desirability. An integrated framework was tested, and path analysis indicated that intention and self-reported food safety behaviors were influenced by attitude (ß = 0.34), perceived behavioral control (ß = 0.17), subjective norm (ß = 0.48) and work habits (ß = 0.18). Work routine was a better predictor of food safety behavior than habit strength ($p < 0.01$). The authors emphasized the important role of work routines in performing food safety behavior.

A qualitative method was used to identify background factors affecting implementation of food safety management systems in small and medium sized meat-processing plants ($n = 5$). Thirteen in-depth interviews and two series of focus group sessions with government and industry representative were conducted. Ball et al. (2010a) found ten themes emerged from the data and were viewed as background factors influencing implementation of a food safety management system: conscientiousness, adaptability, work unit factors, senior manager commitment to food safety, workplace atmosphere, training, firm's production system factors, firm's production priorities, firm's approach to food safety management system implementation, and firm's food safety program requirement. These themes were consistent with the elements explaining food safety behavior in the Theory of Planned Behavior and the model by Hinsz et al. (2007): attitude, subjective norm, perceived behavioral control, and work routines. The authors

concluded that understanding dominant background factors would aid in the development of interventions to improve the implementation of a food safety management system.

Other studies have explored factors that motivate employees to perform safe food handling practices. By integrating components of expectancy theory, Arendt and Sneed (2008) developed a conceptual model to explain employee motivation for following safe food handling practices. The authors surveyed 169 students from three hospitality management classes at a Midwest university (95% of students were between 18 and 25 years) to determine what motivates them to follow safe food handling. Questionnaires consisting of open-ended questions were used to identify safe food handling motivators related to cleaning and sanitizing, hand washing, wearing clean uniforms, and taking food temperatures. Responses were coded and themed into six motivators: establish policy and standards, expect accountability, serve as role model, provide training, control reward and punishment, and provide resources. All the theme areas were connected with the important role of supervisors in motivating employees to follow safe food handling practices. For example, supervisors, who serve as role models, motivate employees to follow safe food handling as they lead by example. Based on the findings, the authors recommended that supervisors be trained to motivate employees to follow safe food handling practices as a new approach for encouraging behavioral changed among employees. In addition, the role of supervisor must be incorporated into the context of organization in establishing a culture of food safety.

To further research the topic, Arendt et al. (2011) developed an instrument to measure employees' motivation for following food safety practices based on the previously proposed conceptual model. A mixed methods approach was employed in the data collection process; combining open-ended questions and survey. A pilot instrument containing 31 items was tested with employees (n = 283) from foodservice operations. Three motivation factors were extracted from the data – resources and communication, severe punishment and rewards, and model appropriate behavior. Modifications were made in the final instrument with the inclusion of items measuring internal motivation based on comments received in pilot phase. The final instrument was distributed to a national sample (n = 368), and four motivational factors were statistically confirmed: communication (Cronbach's coefficient alpha, $\alpha = 0.971$), reward/punishment ($\alpha = 0.945$), internal motivation ($\alpha = 0.904$), and resources ($\alpha = 0.927$). Additional research was conducted to test the influence of demographic differences on

employees' motivation to follow safe food handling practices (Ellis et al., 2010). The role of the four motivational factors to follow safe food handling was found varied across employees of different ages, genders, years of foodservice experience, place of employment, and job status.

The impact of organizational culture on employees' food safety practices has been recently studied. Frash and MacLaurin (2010) explored the influence of a range of behavioral factors supporting transfer of food safety training to restaurant food safety performance. Organizational culture was one of the factors studied. By using a case study approach, the researchers investigated the relationship between employees' perceptions of organizational culture and the restaurant's safety inspection scores. Although the relationship is not evident, the findings revealed that employees' perceptions toward organizational culture differed significantly based on their job positions (i.e., front-of-the-house or back-of-the-house). Front-of-the-house employees had a more positive perception of the organization's food safety culture than back-of-the-house employees. This implies that a heterogeneous culture exists within an organization, and thus assessment of food safety culture should be measured separately across those subcultures. Another study conducted by Lee et al. (2012) tested the influence of organization culture and transformational leadership on employees' attitude and intention to follow safe food handling practices in restaurant settings. Only organizational culture showed significant effect on attitude and intention, while transformational leadership influenced organizational culture and not the two dependent constructs (i.e., attitude and intention). Additionally, the study found employees' food safety certification moderates the relationship between organizational culture and attitude and intention toward food safety. This finding implied the relationship between employees' perceptions of organizational culture and employees' attitude and intention were different between those with and without food safety certification (Lee et al., 2012).

Chapman et al. (2010) developed a risk communication intervention tool known as a "food safety infosheet" to improve risk-reduction practices among food handlers in foodservice operations. The tool was designed to encourage behavioral change based on the prevailing organizational culture using four emotion-generating factors: story-telling, dialog, surprise and context. The effectiveness of the food safety infosheet was evaluated by observing food handlers' hand washing behaviors and cross-contamination events after seven weeks posting of the infosheet in highly visible locations (e.g., kitchen work areas and hand washing stations).

Food handlers (n = 47) in eight foodservice operations were observed using video observation for 348 hours of pre- and post-interventions. Hand washing attempts (t = -2.253, p = 0.029) and correct hand washing outcomes (t = -4.482, $p < 0.001$) increased significantly after the posting. Similarly, significant reduction of direct (t = 2.718, $p < 0.001$) and indirect cross-contamination events (t = 2.939, p = 0.005) were observed. The authors stated that the introduction of the food safety infosheet had a positive impact on risk-reduction practices and can lead to safer food handling behaviors among food handlers if the use is integrated into the organizational culture.

In conclusion, factors affecting safe food handling practices are multidimensional and extend beyond knowledge-related factors. Most of the factors identified or suggested by previous works are related to time constraints, availability of resources, and behavioral issues (e.g., management and coworkers' attitudes). The application of behavioral models further support the complexity surrounding multiple factors influencing food safety practices. Some common elements of the models include knowledge, attitude, self-efficacy, and work environment (influence of others, barriers and facilitators to perform food safety practices). Researchers also underscored the role of organizational culture in influencing employees' safe food handling practices. Table 2.1 presents the summary of factors affecting employees' safe food handling practices identified in various types of food establishments.

Table 2.1: Summary of factors affecting safe food handling practices in various types of food establishment

Author(s)	Context/Sample	Practice(s)/Food safety management system	Contributing Factors
Green et al. (2007)	Commercial restaurant/Food worker	Hand hygiene practices (i.e., hand washing and glove use)	Factor related the following hand hygiene practices: <u>Hand washing</u> - Food preparation - Worker training - Glove use - Number and location of sinks - Worker busyness <u>Glove use</u> - Type of activities - Worker busyness - Hand washing activities - Restaurant ownership - Glove availability

Author(s)	Context/Sample	Practice(s)/Food safety management system	Contributing Factors
Howells et al. (2008)	Commercial restaurant/Employees involved in food production	- Hand washing - Thermometer use - Cleaning of work surfaces	Barriers to perform the following practices (Most frequently cited): <u>Hand washing</u> - Time constraints - Resource in inconvenience locations - Drying of skin - Inadequate resource <u>Thermometer use</u> - Time constraints - Lack of working thermometer - Not knowing temperatures - Not knowing how to take temperature - Inadequate training <u>Cleaning of work surfaces</u> - Time constraints - Inadequate training - Management and employee attitude - No incentive
Pragle et al. (2007)	Commercial restaurant/Food workers	Hand washing	Barriers: - Time pressures, - Inadequate facilities and supplies, - Lack of accountability, - Lack of encouragement from managers and coworkers, - Lack of supportive organization. - Insufficient and ineffective hand washing training Facilitators: - Kitchen design and environment - Proactive health and food inspectors - Education and training - Customer influences - Good hand washing habits - Personal internal beliefs and perception
Clayton et al. (2002)	Small to medium-sized food business/Food handlers	Safe food handling	Barriers: - Busy period - Other things to do - Lack of staff - Lack of equipment Facilitators: - More staff - Recognition of problem by management - New staff - Less work - Less customer - More space - Better design of workspace - Better location of sinks - More storage - More cleaning cloths

Author(s)	Context/Sample	Practice(s)/Food safety management system	Contributing Factors
			- More equipment - More money
Green and Selman (2005)	Commercial restaurant/Food workers and managers	- Handwashing - Cross-contamination prevention - Glove use determining degree of doneness - Hot and cold holding - Cooling - Reheating	Factors impacting the following practices (three most frequently cited): <u>Hand washing</u> - Sink accessibility - Time pressures/high volume of business/staffing - Management emphasis <u>Cross-contamination prevention</u> - Multiple-color coded cutting board - Glove and utensil use - Sanitizer use <u>Glove use</u> - Manager emphasis - Negative consequences - Comfort and fit of glove <u>Determining degree of doneness</u> - Time pressures/high volume of business/staffing - Types of meat - Worker motivation <u>Hot and cold holding</u> - Equipment/thermometer - Management emphasis - Food safety educational and training <u>Cooling</u> - Time at which cooling occurs - Worker motivation/experience/age - Equipment/thermometers <u>Reheating</u> - Food safety educational and training - Thermometer - Time pressures/high volume of business/staffing
Clayton and Griffith (2008)	Catering businesses/Food handlers	Hand hygiene practices	- Attitude (i.e., belief about outcomes and evaluation of outcomes of performing hand hygiene practices) - Subjective norms (i.e., perception of other's opinion) - Descriptive norms (i.e., perception of what others do) - Perceived behavioral control (i.e., ease/difficulty and practicality of carrying out hand hygiene practices)
Brannon et al. (2009)	Undergraduate students grouped into three level of foodservice experience (i.e., well-informed, basic	-Hand washing - Thermometer use - Sanitizing work surfaces	- Attitude (i.e., advantages and disadvantages of food safety) - Subjective norm (i.e., people who care about one performing food safety behavior) - Perceived behavioral control (i.e.,

Author(s)	Context/Sample	Practice(s)/Food safety management system	Contributing Factors
	experience, and no experience)		barriers to perform safe food handling)
Hinsz et al. (2007)	Turkey processing plan/plant worker and supervisor	Safe food handling practices	- Attitude - Subjective norm - Perceived behavioral control - Work habits (i.e., habit strength and work routines)
Ball et al. (2010a)	Food production plan/ Co-owner, general manager, food safety coordinator, production worker, government and industry representative	Food safety management system implementation	- Conscientiousness - Adaptability/willingness to change - Work unit factor - Senior manager commitment - Workplace atmosphere - Training - Firm's production system - Firm's production priorities - Firm's approach to FSMS implementation - Food safety program requirement
Arendt & Sneed (2008)	Hospitality Management students	Safe food handling practices	- Policy/standards - Accountability - Supervision (i.e., role model and reward and punishment) - Training - Resources

Background on Organizational Culture and Safety Culture

Definition

Organizational culture is a concept that describes how employees see their organizations. It is referred to as "a system of shared meaning" (Chatman, 1998, p. 333), that members of an organization hold and that distinguishes one organization from another. This system of shared meaning can be represented by a set of key characteristics that the organization values, as perceived by individual members. Some of these characteristics are risk taking, attention to detail, team orientation, outcome orientation, and aggressiveness (Chatman, 1998; O'Reilly, Chatman, & Caldwell, 1991; Sheridan, 1992). Other researchers have defined organizational culture as a concept that encompasses a range of individual evaluations of the work environment (James & James, 1989). These evaluations may refer to general perceptions of environmental aspects such as leadership, management style or communication (James & McIntyre, 1996) or to specific perceptions such as perception about the safety culture (Flin, 2007; Guldenmund, 2007), customer service culture (Schneider, Wheeler, & Cox, 1992), or innovation culture (Klein &

Spora, 1996). Thus, organizational culture can involve assessment of an organization at two different levels: a more general level as represented by norm or implied assumptions and a specific level as it relates to a particular work task within the organization. According to Schneider (1990), employees' evaluations are based on individuals' perceptions of practices, procedures, and rewards in the organization.

According to Neal, Griffin, and Hart (2000), organizational culture sets the context in which specific cultures manifest. The concept of organizational culture has been used to study specific areas of organization and employee performance of which safety culture is one of the most widely researched. The culture of safety could be reflected in an organization that is people-oriented and product-oriented (Zohar, 2003), or proactive and risk averse (Schneider & Gunnarson, 1996). The concept of safety culture has been used in a broad spectrum of industries to describe an organization's "state of safety" (Mearns & Flin, 1999, p. 5). The safety culture of an organization is viewed as the values shared among organization members about what is important, their beliefs about how things operate in the organization, and the interaction of these with work unit and organizational structures and systems, which together produce safety-promoting behavioral norms in the organization thereby promoting safety (Yiannas, 2009). Based on this concept, culture has been defined as "the product of individual and group values, attitudes and belief, competencies to, and the style and proficiency of, an organization's health and safety management" (Advisory Committee for Safety in Nuclear Installations [ACNSI], 1993 as cited by Cooper, 2000, p. 114).

The term safety culture often appears to be used interchangeably with the term "safety climate." However, culture and climate are actually distinct, and research emphases in previous work using the two concepts have different perspectives (Table 2.2). Generally, the concept of culture is taken to mean something more complex than climate in the organizational literature. A number of researchers have proposed that safety climate provides a surface view of employees' attitudes toward safety at a given point in time, which could represent a snapshot of the prevailing safety culture (Flin, 2007; Guldenmund, 2000). Culture is difficult to measure, whereas safety climate can be traced more easily (Griffin & Neal, 2000).

Table 2.2: Organizational culture and organizational climate research emphases

Research Perspective	Cultural literature	Climate literature
Epistemological	Contextualized	Comparative and nomothetic
Viewpoint	Emic (native view)	Etic (researcher's view)
Methodological	Qualitative observation	Quantitative data
Temporal orientation	Historical evolution	Historical snapshot
Level of analysis	Underlying values and assumption	Surface level manifestations
Discipline	Sociology	Psychology

Source: Denison (1996, p. 625)

Dimensions of Safety Culture

Research has identified various organizational aspects that affect employees' behaviors. Flin (2007) and Guldenmund (2000) suggested four dimensions of safety culture that appear relatively persistent: 1) management/supervision, 2) system, 3) risk, and 4) work pressure. In the healthcare setting, each of these themes is evaluated by a range of criteria or properties. Management or supervision is a dimension of safety culture, which is concerned with employees' perceptions toward management commitment to safety, adequacy of supervision and training, or institutional responses. System describes the availability of safety standards, regulation, maintenance, infrastructure, planning, and coordination (Clarke, 2000; Singla, Kitch, Weissman, & Campbell, 2006). Risk, on the other hand, is concerned with risk taking behavior or willingness to ask for help. Work pressure associated with work tasks is an example of a measure that can be used to evaluate perception of safety culture.

Safety culture is a context-specific concept; therefore, various instruments have been developed to measure safety culture for a particular industry. In the healthcare industry, some of the instruments are the Hospital Survey on Patient Safety, Hospital Transfusion Service Safety Culture, Medication Safety Self-Assessment, and Strategies for Leadership: An Organization Approach to Patient Safety. Other industries such as aviation, construction, and manufacturing have used instruments such as the Safety Attitudes Questionnaire, Culture Safety Survey, Work Environment Instrument, and Organizational Culture Index to measure the culture of safety. Different instruments have also been developed to measure safety culture in other regions and

nations. These instruments vary in the dimensions covered, and different typologies have been used to describe safety culture dimensions and subcultures. General characteristics of the instruments have been studied, including target populations, psychometric properties, length of instrument, application, and originality (Colla, Bracken, Kinney, & Weeks, 2005; Sammer, Lykens, Singh, Mains, & Lackan, 2010; Singla et al., 2006).

Singla et al. (2006) conducted a review of literature to identify available measurement tools of patient safety climate. Thirteen instruments were reviewed in detail. The target populations, number of questions, safety climate dimensions covered, and psychometric properties of these instruments were evaluated. Most (9 out of 13) instruments were targeted to various positions, from general administration staff to physicians, nurses, and pharmacists. Instruments contained 10 to 112 questions. A total of 23 dimensions of the patient safety climate were grouped into six categories: management/supervision, risk, work pressure, competence, rules, and miscellaneous. Dimensions related to management and institution commitment, communication openness, and belief about causes of errors and adverse events were addressed in the majority of the instruments (11 out of 13). Psychometric analysis performed on six of the 13 tools indicated internal consistency ranging from 0.15 to 0.93. The authors concluded that substantial variations exist among instruments.

Sammer et al. (2010) performed a qualitative meta-analysis on patient safety culture studies conducted within U.S. hospitals. Based on a review of 38 studies, the authors proposed a typology of safety culture describing seven subcultures and their properties: 1) leadership (e.g., accountability, governance, role model), 2) teamwork (e.g., alignment, mutual respect, psychological safety, 3) evidence-based (e.g., outcome driven, best practices, standardization), 4) communication (e.g., bottom-up approach, clarity, transparency), 5) learning (e.g., awareness, data driven, proactive), 6) just (e.g., blame-free, disclosure, trust), and 7) patient-centered (e.g., community involvement, empowered patient, exemplary patient experiences). In general, similar to other industries, health care exhibits a safety culture typified by common attributes related to beliefs, attitude, behaviors and values. However, the authors acknowledged the complexity of safety culture in healthcare systems.

Colla et al. (2005) assessed nine survey instruments for measuring patient safety climate and compared them with regard to general characteristics, common domains covered, psychometric quality and applications. Five common dimensions of patient safety were

identified: leadership, policies and procedures, staffing, communication, and reporting. These instruments were used to evaluate different healthcare settings ranging from general such as a hospital ward to specific healthcare locations such as a pharmacy or transfusion unit. The quality of psychometric properties varied across instruments. Only a few survey instruments had been used to test the relationship between safety climate and patient safety outcomes. The authors recommended that reliability, as indicated by comprehensive and sound psychometric testing, as well as the purpose of use, should be the basis for selecting a patient safety climate instrument.

The Role of Safety Culture on Safety Behavior and Performance

Organizational culture has been identified as a significant determinant or predictor of employee performance within an organization (Dawson, Abbott, & Shoemaker, 2010; Tepeci & Bartlett, 2002). For instance, organizational culture influences performance outcomes such as work attitudes, service quality, and staff turnover (Millman & Ricci, 2004; Sirakaya, Kerstetter, & Mount, 1999). In the field of safety science, the concept of organizational culture has been widely adapted to investigate the influence of safety culture on employees' safety performance. During the past 30 years or more, safety culture has proven to be a robust indicator of injury rate, accident rate, and near misses in various high-risk organizations, including healthcare, aviation, and construction (Zohar, 2010).

Initiatives to measure safety culture in health care organizations proliferated when culture was identified as a key determinant of the ability to address and reduce risks to patients (McCarthy & Blumenthal, 2006). In particularly, research has investigated the significant role of safety culture on employees' hand washing practices (Larson, Early, Cloonan, Surgue, & Parides, 2000), compliance with safe work practices, workplace exposure incidents (Gershon et al., 2000) and overall hospital safety performance (Singer, Lin, Falwell, Gaba, & Baker, 2009). Additionally, the extent to which safe culture could predict the occurrence of treatment errors in health care settings has been reported (Naveh, Katz-Navon, & Stern, 2005).

Larson et al. (2000) investigated the influence of an intervention to change the organizational culture so as to foster employees' hand washing practices and subsequently reduce nosocomial infections in a hospital. By use of quasi-experimental design, a hospital that received and one that did not receive the intervention were compared with regard to multiple components of Schein's framework for changing organizational culture. The framework suggests that leaders have the greatest potential for reinforcing new aspects of culture through the use of

five mechanisms: attention, reaction to crises, role modeling, allocation of rewards, and criteria for selection and dismissal. The intervention hospital recorded a significantly increased hand washing frequency (relative risk [RR] = 2.1: 95% CI = 1.99 – 2.21) and reduced infection rates of vancomycin-resistant enterococci (RR = 0.29, $p = 0.002$) at the six months follow-up, although no such difference was seen in the infection rates of methicillin-resistant *Staphylococcus aureus*. The authors concluded that "intervention directed toward changing organizational culture and expectations may offer a successful approach to improve hand washing and other clinical practices" (p. 21).

Gershon et al. (2000) developed a 46-item questionnaire, later shortened to 20 items, to measure hospital safety climate specifically with regard to commitment to bloodborne pathogen risk management programs. The questionnaire was tested with 789 hospital employees (85% women), who have the highest risk for bloodborne pathogen incidents exposure. Factor analysis produced six factors: 1) senior management support, 2) absence of workplace barriers to safe work practices, 3) cleanliness and orderliness of the work site, 4) minimal conflict and good communication, 5) frequent safety-related feedback/training by supervisors, and 6) availability of protective equipment and engineering controls. Among these factors, senior management support had a significant relationship to both compliance with safe work practices (odds ratio [OR] = 2.3, 95% CI = 1.5 - 3.4) and workplace exposure incidents (OR = 0.56, 95% CI = 3.8 – 0.81). The authors concluded that organizations may utilize this assessment tool to evaluate hospital employees' perceptions of the bloodborne pathogen management program in order to increase compliance and reduce exposure incidents.

Naveh et al. (2005) investigated the association between patient safety climate and treatment errors in healthcare systems. A safety climate survey was conducted in 21 medical units of a public hospital and was cross-validated in 15 medical units in a different hospital. Factor analysis resulted in four dimensions with regard to employees' perception of safety climate: 1) suitability of the organization's safety procedures for daily work demands, 2) frequency and clarity of safety information, 3) manager's safety practices, and 4) priority given to safety. The authors identified an intricate pattern of relationships among the four dimensions of safety climate as they related to treatment errors. The occurrence of treatment errors was significantly influenced by perceived suitability of the organization's safety procedures as well as the frequency and clarity of safety information, primarily when employees' perception of both

the manager's safety practices and priority given to safety were high. The authors asserted "intervention aimed at increasing information flow or changing safety procedures can result in worse safety outcomes if managerial safety practices are not taken into account" (p. 959).

Singer et al. (2009) studied the relationship between hospital safety climate and hospital performance with regard to certain safety indicators. Data on the hospital safety climate were collected from 105 acute-care hospitals using the Patient Safety Climate in Healthcare Organization survey. The dimensions of Patient Safety Climate in Healthcare Organization were broadly categorized into three components: organization, work units and interpersonal. Selected Patient Safety Indicators data were used as the measure of safety performance. The authors found that a higher level of safety climate was associated with higher safety performance. Only the interpersonal component of safety climate, such as the presence of fear of blame or shame, significantly predicted Patient Safety Indicators. In addition, this relationship varied among personnel with different levels of exposure to safety hazards.

In summary, the concept of organizational culture has been applied in rather ambiguous ways despite its role as an important indicator of performance. It has been criticized as a fuzzy academic concept because there is no agreement as to what constitutes the best approach to measuring the relationship between organizational culture and performance (Clarke, 2000). Numerous definitions and measurement scales of organization culture have been introduced. Although no consensus exists regarding the theoretical foundation of this concept, three significant commonalities arise in most applications: the interrelationship between the individual and the environment, emphasis on multi-dimensions, and context specificity. Table 2.3 presents a summary of safety culture components that have been identified and examples of subcomponents in various fields of study.

Table 2.3 Safety culture components and sub-components identified in previous works

Author(s)/Year published/Context	Safety Culture Components	Safety Culture Subcomponents
Gershon et al. (2000)	Senior management support	Given high priority, involved in safety activities, influenced other attitudes, responsible.
	Absence of workplace barriers to safe work practices	Do not interfere, enough time, adequate staff, less work.

Author(s)/Year published/Context	Safety Culture Components	Safety Culture Subcomponents
	Cleanliness and orderliness of the work site	Clean, not cluttered, not crowded
	Minimal conflict and good communication	Work together, minimal conflict, support one another, feel comfortable reporting, communication is open, unsafe practices are corrected.
	Frequent safety-related feedback/training by supervisors	Offer training classes, properly trained, encourage to attend seminar, taught to be aware and recognize hazard.
	Availability of protective equipment and engineering controls	Readily available and accessible, adequate resource
Naveh et al. (2005)	Suitability of organization's safety procedures	Suitable for daily work demands, written rules and regulations, all work-related issue, detailed, practical.
	Frequency and clarity of safety information	Updated, well-informed, training available, distribute regularly, simple and understandable.
	Manager's safety practices	Draw attention, committed to adherence, create atmosphere of openness, praise those who follow rules
	Priority given to safety	Follow procedure, ignoring safety is not acceptable, does not cut corner, does not ignore any aspects of safety standards
Sammer et al. (2010)	Leadership	Accountability, change management, commitment, executive rounds, governance, open relationship, physical engagement, role model, support, vigilance, visibility, vision/mission
	Teamwork	Alignment, difference to expertise whenever found, flattened hierarchy, mutual respect, psychological safety, readiness to adapt/flexibility,

Author(s)/Year published/Context	Safety Culture Components	Safety Culture Subcomponents
		supportive, watch each other back
	Evidence-based	Best practices, high reliability/zero defect, outcomes driven, standardization, technology/automation
	Communication	Assertion/speak-up, bottom-up approach, clarity, hand-offs, linkages between executive and front-line/feedback, safety briefing/debriefing, structured technique, and transparency
	Learning	Awareness, celebrate success, data driven, education/training, learn from mistakes/evaluation, monitor/benchmark, performance improvement, proactive, root-cause analyses, share lessons learned
	Just	Blame-free, disclosure, trust, nonpunitive reporting, no at-risk behaviors, system-not individual, trust
	Patient-centered	Community involvement, compassion, empowered patient, exemplary patient experiences, focus on patient, formal participation in care health promotion, informed patient, patient stories
Singer et al. (2009)	Organization	Senior managers' engagement, organizational resources, overall emphasis on patient safety
	Work units	Unit safety norms, unit support and recognition for safety efforts
	Interpersonal	Fear of blame, fear of shame
Singla et al. (2000)	Management/supervisor	Commitment, adequacy of training, institutional response, nonpunitive response error
	Safety system	Detection infrastructure, handoffs and

Author(s)/Year published/Context	Safety Culture Components	Safety Culture Subcomponents
		transitions and coordination, patient safety planning, adequacy of staffing, adequacy of equipment, information, and processes, reporting infrastructure.
	Risk	Risk taking, willingness to ask for help
	Work pressure	Work pressure
	Competence	Adequacy of crisis management
	Procedures/rules	Reporting procedure, compliance with rules and procedures
	Additional component	Teamwork, communication openness, organizational learning, feedback and communication, beliefs about causes of errors and adverse events, job satisfaction, overall perception of safety

Food Safety Culture

Adaptation of safety culture concepts into food safety culture has been recently proposed in managing food safety and preventing foodborne illnesses. Researchers have asserted that the importance of safety culture in improving workers' safety behaviors in occupational safety and health fields is a similar concept that can be applied to the foodservice industry (Griffith, Livesey, & Clayton, 2010b; Yiannas, 2009). Researchers acknowledge that food safety problems in the food industry are partly caused by behavioral issues, including those involving organizational culture (Griffith, Livesey, & Clayton, 2010b; Yiannas, 2009). Food safety culture has been increasingly recognized as an emerging risk of foodborne illness outbreaks in foodservice organizations (Griffith et al. 2010a). Poor food safety culture reflected in management commitment, organizational priority and support, and communication policy have been suggested as the causes of foodborne illness outbreaks involving several food companies (e.g., Peanut Corporation of America and Maple Leaf Foods, Inc.) (Powell, Jacob, & Chapman, 2011).

Food safety culture is a specific form of organizational culture that represents the way an organization treats food safety, and has been conceptualized as "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" (Griffith, 2010a, p. 435). On the basis of some of the cultural elements found in the occupational safety and health literature, researchers have proposed components of food safety culture applicable to the food industry (Griffith et al., 2010b; Yiannas, 2009). Other researchers have incorporated the concept of culture from multiple research areas to provide a broader and multidimensional view of food safety culture (Taylor, 2011). Additionally, an attempt to develop a tool to measure food safety culture in meat processing has recently been reported and the tool has been applied into the foodservice setting (Ball, Wilcock, & Colwell, 2010b; Neal, Binkley, & Henroid, 2012).

Griffith et al. (2010b) reviewed the literature in the safety sciences field to identify food safety culture components and proposed six dimensions: management systems and style, leadership, communication, commitment, environment and risk. Employees' perceptions toward management system and style are influenced by the "coordinated activities to direct or control food safety," documented procedures and practices and management involvement in daily operations. Leadership is a component that measures the extent to which staffs are leveraged, by their leader(s), to perform and comply with business food safety standards. Communication can be evaluated by the quality of top-down, and bottom-up messages as well as coworkers' transfer of food safety information among themselves. Employees' perceived food safety commitment is measured by how closely organizational values and beliefs regarding food safety are aligned with theirs. Values associated with rewards, roles, job satisfaction and empowerment are subcomponents of perceived commitment. The environmental component is referred to as the "visible or discernible organizational structures and processes that characterize the internal dimensions of business" (Griffith et al., 2010b, p. 450). Tangible factors, complacency, standards, degree of excellence, consistency and organizational support are elements in employees' perceived environment support. Finally, employees' perceptions of risk taking behavior are related to perceived risk, disposition, locus of control, mood, performance feedback, trust, and risk communication strategy.

Based on research by Whiting and Bennett (2003) about how 65 leading companies in the U.S. developed their safety culture, Yiannas (2009) reviewed relevant components of a food

safety culture. The author suggested five core components of food safety culture adapted from this review: leadership, employee confidence, management support, accountability, and sharing of knowledge and information. He distinguished food safety management from food safety leadership and highlighted the role of leaders in influencing others and leading the way to safe food handling. He underscored the importance of gaining employee confidence and stated that it should be earned through "walk the talk" (p. 16). Accountability refers to "checks and balances" (p. 17), a measure taken to ensure that outcome is attained. Information sharing should be done frequently by an organization, using multiple messages and modes of delivery to encourage employees to action.

Other researchers have viewed food safety culture as a broad and multidimensional concept, which could be extended to a multicultural environment. By including relevant elements of culture from management, international business and psychology, Taylor (2011) proposed that food safety culture is influenced by 20 elements in four broad factor categories: knowledge factors, attitude/psychological factors, external factors, and behavioral factors. Although presented in four categories, Taylor (2011) asserted that these factors are inter-connected within and between different categories and should not be viewed separately.

Recently, Ball et al. (2010b) developed a Food Safety Climate tool to investigate key factors that influence meat processing plant workers to follow food safety procedures. The tool consisted of 65 items measuring five workplace factors: management commitment, work unit commitment, food safety training, infrastructure, and worker food safety behaviors. Factor analysis was conducted to identify the underlying dimensions of food safety climate in meat processing plants. Fifteen factors with Eigenvalue greater than one were extracted and the results showed considerable cross loadings among factors extracted. The authors further classified the fifteen factors into five higher order factors (i.e., factor that contain several sub-factors). The cross loadings were suggested as an indication of possible inter-connection among factors. Neal et al. (2012) found two factors, management commitment and worker food safety behavior, when evaluating food safety culture in restaurants using the aforementioned Food Safety Climate tool (Ball, 2010b). Employees' perceptions of food safety culture were compared based on their demographics. No significant differences were found in perceptions of food safety culture among restaurant employees with different years of foodservice experience, time worked at the present job, prior food safety training, and food safety certification.

In sum, researchers have adapted the concept and measurement scales of organizational culture in various other fields to understand factors impacting food safety culture as summarized in Table 2.4. The scope of measurement vary depending on study context but three factors appear relatively persistent: 1) management support and commitment, 2) system and process (e.g., procedures, communication, and resources), and 3) employee attitude and behaviors. Assessments of food safety culture help organizations understand why employees do not perform safe food handling practices at work (Ball et al., 2010a; Griffith et al., 2010a; Taylor, 2011; Yiannas, 2009). Efforts to assess and establish positive food safety culture and to better define its role in improving food safety practices can be facilitated by its measurement.

Table 2.4. Food safety culture factors

Author(s)/year published	Context	Area adapted/ Tool	Food safety culture factor
Yiannas (2009)	Retail and foodservice industry	Safety science	Leadership, employee confidence, management support, accountability, and sharing of knowledge and information
Griffith et al. (2010)	Food industry	Safety science	Management systems and style, leadership, communication, commitment, environment and risk perception
Taylor (2011)	Multi-cultural food industry	Management, international business, psychology	Knowledge (e.g., awareness, technical expertise, training), attitude/psychological (e.g., agreement, risk awareness, self-efficacy, motivation), external (e.g., inspection, government/industry guideline), and behavioral (e.g., organizational culture, resources, competence)
Ball et al. (2010b)	Meat processing plant	Food Safety Climate tool	Five higher order factors: Management commitment, work unit commitment, food safety training, infrastructure and worker food safety behavior
Neal et al. (2012)	Restaurant	Food Safety Climate tool	Management commitment, worker food safety behavior

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CHAPTER 3: METHODOLOGY

Introduction

Limited studies have developed a valid and reliable instrument to evaluate a work place's food safety culture, particularly for onsite foodservice operations. This study aimed to develop an instrument for assessing employees' perceptions of the food safety culture in their organizations using a mixed methods approach. An in-depth understanding of what constitutes food safety culture among foodservice employees was discovered in phase one through focus groups (more qualitative approach), and this information was used to develop a measurement scale (more quantitative approach). The reliability and validity were evaluated to establish the psychometric properties of the scale. This chapter describes use of human subjects, research design, study sample, research instrument, data collection and data analysis.

Use of Human Subjects

The Iowa State University Human Subjects Institutional Review Board reviewed and approved the research protocol of this study before data collection began (Appendix A and B). The process ensured the protection of participants' health, rights, and safety. To ensure that the participants were free from risks or discomfort, the informed consent form and questionnaire cover letters for participants explicitly explained the purpose of this study and assured confidentiality of participants' responses. Researchers involved in this study completed the Human Subjects Research Assurance Training certified by Iowa State University.

Research Design

A two-phase exploratory design was used with a combination of qualitative and quantitative methods to develop an instrument assessing food safety culture. As suggested by Creswell and Clark (2007), the exploratory study design is useful when an instrument needs to be developed or tested. In the first phase, focus groups, a more qualitative method of data collection, were conducted with a selected group of employees in two types of onsite foodservice, hospital and school, to assess perceptions of food safety culture in organizations. A survey, a more quantitative approach, was developed based on findings from the focus groups and administered in the second phase. The questionnaire was used to collect empirical data on employees' perceptions toward organizational food safety culture. For this second phase, a questionnaire was developed and distributed to hourly employees from onsite foodservice operations in three Midwest states. In addition to findings from focus groups, existing safety

culture surveys, a review of the literature in specific areas of food safety, expert reviews, and pilot testing results were used to develop the questionnaire.

Phase 1: Focus Groups

The present study explored how foodservice employees in onsite operations defined various elements of the organizational culture that influence their safe food handling practices. Focus groups were conducted to assess perceptions of hourly employees in hospital and school foodservice operations.

Participant Selection

Participants for the focus group discussions were hourly employees recruited from hospitals and schools foodservice operations located in central Iowa. It has been noted that the use of participants from different types of onsite foodservice organizations helps increase credibility through triangulation (Merriam, 2002; Shenton, 2004). The current study employed triangulation via data sources, which involved the use of a wide range of informants, as described by Shenton (2004). In each focus group session, participants came from the same work site to ensure they felt comfortable speaking around one another, thus generating productive discussions (Morgan, 1998).

Foodservice directors or managers of the operations were contacted via email to seek permission to recruit participants from their operations (Appendix C). Participant recruitment flyers were posted in each operation with the foodservice director's approval. The flyers contained information regarding the date, time, and place of the focus group session as well as contact information for sign-up. Foodservice employees who were interested in participating in the focus group called in to sign up. A reminder e-mail or letter was sent to volunteering employees prior to the focus group date in order to increase participants' show rate. Due to a very low number of employees who signed-up from hospital operations, focus groups for these work sites were canceled and modification in recruitment procedure was made. Difficulties in obtaining participation with the use of qualitative approach in food safety research have also been reported in the literature (Arendt et al., 2012; Pragle, Harding, & Mack, 2007). Therefore, undergraduate students from a university in the Midwest, who were currently working or had worked as an hourly employee in health care foodservice operations (e.g., hospital, nursing home, assisted living, or long-term care facility), were recruited. After obtaining instructors' permission and assistance in distributing recruitment flyers and sign-up sheets, participants were

selected from two Hospitality Management courses.

All focus group participants (n = 33) were selected based on purposive sampling procedure with three selection criteria. First, the participants selected had experience as employees with nonsupervisory positions in health care and school foodservice operations. Second, participants were at least 18 years of age at the time of recruitment. Third, only individuals with experience in a job category involving food handling were selected. These selection criteria were established to ensure participants were well positioned to provide information regarding their organizations' food safety culture. During one of the focus sessions, two participants were identified as not meeting the selection criteria (i.e., held supervisory position and worked in other type of onsite foodservice operation). Responses (data) from both participants were excluded from analysis. All participants received $40 as a token of appreciation for their participation.

Data Collection

Four focus groups were held to gather data; two sessions with employees from school foodservices and two sessions with students who currently worked or had worked in health care foodservice. The number of participants in each session ranged between five and twelve. An experienced moderator was hired to facilitate the focus group discussions; the principle researcher served as assistant moderator. As suggested by Morgan, Krueger, and King (1998), the moderator primarily directed the discussion and ensured continued attention to the topic, while the assistant took comprehensive notes, operated the audio recording and handled environmental conditions. Participants were asked to voluntarily sign a consent form, which included assurance that all data would remain anonymous and kept confidential with analysis and reporting only for research purposes (Appendix D). A short survey was conducted before each focus group session started to obtain information on participants' demographic characteristics and about the organization where they currently or had previously worked These questions included: gender, age, length of experience in the foodservice, job title, organization management system, number of employees at any particular shift, and estimated meal numbers prepared by operation (Appendix E).

The moderator began each session by welcoming the participants, reviewing the goals of the focus group discussions, and describing the process that would be utilized. It was emphasized that the discussion did not concern right or wrong answers, but rather the

participants' experiences of their working realities and opinions about organizational food safety practices. Participant pseudonyms were used to preserve the identity of the participants and address privacy issues. Each participant was provided with a name tent identifying his/her pseudonym to all other members of the focus group. A focus group topic guide with semi-structured and open-ended questions was designed and used to encourage group discussions. The guide was reviewed and approved by an expert panel of dissertation committee members (Appendix F). Two key questions were included in the guide: 1) What does your workplace do to help you follow safe food handling practices? 2) What do you believe are the main factors in the workplace that prevent you from following safe food handling practices? Follow-up questions were asked when participants did not mention anything related to supervisor/manager, coworkers, food safety policies and procedures, facilities, tools, or perception of risk when answering the two key questions.

Focus groups with the employees from school foodservice were held in convenient locations away from participants' work sites, such as at a local library. Meeting rooms on campus were used when conducting focus group with the university students. Each focus group session lasted between 60 and 90 minutes and a light snack was provided as participants arrived and completed the short questionnaire. All discussions were audio-recorded and field notes were taken during each session using a moderator form adapted from Krueger (1998).

Data Analysis

Focus group audio-records were transcribed and then verified by a second researcher. Verification was done to ensure that each transcription was transcribed according to the audio-record. The transcripts were manually analyzed using thematic analysis, which involves identification of themes through "careful reading and re-reading of the data" (Rice & Ezzy, 1999, p. 258). A combination of deductive and inductive thematic analysis, as modified from Fereday and Muir-Cochrane (2006), was used to interpret the data. This method of analysis integrated both the data-driven codes with literature-driven ones. The data analysis included a four-stage process. First, the coding process involved recognizing (seeing) an important factor and encoding it (seeing it as something) prior to a process of interpretation. Encoding the information organizes the data to identify and develop themes from them. Next, a template in the form of codes was developed as a means of organizing text for subsequent interpretation. The template was developed based on food safety culture factors described by previous work (Griffith,

Livesey, & Clayton, 2010b; Yiannas, 2009). Six broad code categories formed the template: 1) leadership, 2) communication, 3) management system and style, 4) environment support, 5) accountability, and 6) risk. Then, inductive codes were identified that described a new theme observed in the transcripts. In the second stage of analysis, a second researcher coded and themed the data to assure the deductive and inductive codes occurred in each focus group transcript. Themes were developed independently, and then discussed until consensus between the two researchers was achieved. Triangulation via the use of multiple researchers in data analysis helped to achieve confirmability (Shenton, 2004). The final stage involved the process of connecting the codes and identifying themes across the four sets of focus group data. Data on participants' demographic and organization information obtained from the short survey were analyzed descriptively using SPSS (Version 18.0 for Windows, 2009).

Phase 2: Questionnaire Development and Administration

Following focus groups analysis, a measurement scale of food safety culture was developed and pilot tested. The final questionnaire was distributed and evaluated to establish psychometric properties using a regional sample.

Questionnaire Content

A paper survey questionnaire containing two sections was developed as the research instrument for this study. The first section consisted of the food safety culture measurement. Based on the focus group results, review of literature on safety culture surveys and food safety studies, a list of key topics pertaining to the culture for safe food handling practices in onsite foodservice organizations was developed. Nine key topics were identified for this study: 1) leadership, 2) communication, 3) self-commitment, 4) environment support, 5) management system and style, 6) team work, 7) accountability, 8) work pressure, and 9) risk perception. As recommended by DeVellis (2003), a range of five to seven items was developed for each topic that represented a construct. In total, 47 items were generated as a scale to measure food safety culture. Participants were asked to rate their level of agreement to 47 statements (positively and negatively worded) describing food safety culture in their current workplace. They responded using a seven-point Likert scale ranging from 1 = Strongly Disagree to 7 = Strongly Agree with a midpoint labeled "Neutral". The scopes of the questions for each construct were as follows:

1) Leadership (5 items) - This construct evaluated employees' perceptions toward the extent to which leaders visibly demonstrate their commitment to food safety.

2) Communication (7 items) - This construct evaluated employees' perceptions toward the quality of the transfer of food safety messages and knowledge among management, supervisory staff and food handlers.

3) Self-commitment (5 items) - This construct evaluated employees' perceptions toward the extent to which employees values and beliefs about food safety are aligned with those of the organization.

4) Management system and style (5 items) – This construct evaluated employees' perceptions toward coordinated activities or policy and procedure to direct or control food safety.

5) Environment support (5 items) - This construct evaluated employees' perceptions toward the availability and quality of infrastructure that support food safety culture.

6) Teamwork (5 items) - This construct evaluated employees' perceptions toward coworkers support with regard to safety in the workplace.

7) Accountability (5 items) - This construct evaluated employees' perceptions toward checks and balances in place that made certain desired outcomes are being achieved.

8) Work pressure (5 items) - This construct evaluated employees' perceptions toward various aspects of pressure associated with food preparation that affects safe food handling practices.

9) Risk perception (5 items) - This construct evaluated employees' perceptions on organizational risk awareness and risk taking decisions with regard to food safety.

The second section contained questions on participant's demographic and organization information. Demographic questions included were age, gender, job position, job status, years of experience at the current organization, years of experience in the foodservice industry, food safety training completed, training mode, and food safety certification. Four questions on organization were pertaining to type of management, number of employees on various work shifts, estimated number of total meals served daily, and type of foodservice system.

Expert Review

Prior to pilot testing, the questionnaire was reviewed by experts, among faculty members, in the areas of food safety (n = 3), curriculum instruction (n = 1), and statistics (n = 1). The questionnaire was evaluated in terms of content validity, clarity of wording, and formatting. Revisions were made to modify and improve the questionnaire based on suggestions given.

Pilot Study

Pilot testing of the questionnaire was conducted with hourly employees from onsite foodservice operations located in north and central Iowa. A total of 41 foodservice employees from hospitals (n = 2) and schools (n = 4) not included in the study sample participated in the pilot study. Only 31 pilot questionnaires were usable after responses from employees with supervisory position were excluded. The purpose of the pilot testing was to evaluate if the questionnaire was understandable and readable. The questionnaire was distributed along with the Pilot Study Form (Appendix H) to gain participants' feedback on how easy it was to understand the words used in the questionnaire and the total time needed to complete it. Participants were requested to indicate any questions that are not understandable and what needed to be clarified. They were also asked to provide suggestions on how to improve the instrument.

The majority of the participants reported that they only required between 10 and 15 minutes to complete the questionnaire and the questions were understandable. Participants who worked in more than one operation unit had difficulty in responding to section 1 questions, thus revisions were made to the instructions for this section in the final questionnaire. Also, participants indicated they had more than one response for some questions in section 2, so changes in directions and question formats were made in the final questionnaire. Thus, minor modifications were made to improve the questionnaire based on comments and suggestions of participants from the pilot test.

Questionnaire Sample Selection

The target population of this study was hourly foodservice employees in hospital and school foodservice operations. Only employees who held nonsupervisory job positions and age 18 years old or older were included in the sample for the study. Hourly employees selected had job tasks involving food handling activities such as food preparation or serving. Onsite foodservice employees were located in three Midwestern states: Iowa, Minnesota, and Kansas. Higher response rates have been demonstrated with the use of mail surveys in restricted geographical areas compared to national surveys (Unger, 2002).

Cluster sampling technique was employed for selecting the sample of hourly foodservice employees. This technique involved the selection of groups of study units (i.e., foodservice organizations) instead of individual study units (i.e., employee). The technique was used because it is difficult or almost impossible to identify a complete sampling frame due to: 1) inability to

create a current list of employees in licensed facilities, 2) privacy issues for the employees, and 3) high turnover within foodservice industry. A sample size of approximately 400 foodservice employees from hospital and school was targeted. With an estimated 20% response rate based on literature (Dillman, 2007), about 1000 questionnaires were distributed in each operation category to obtain the targeted sample size.

Because one of the study objectives was to compare food safety culture based on operation size, a quota-sampling technique was used to select onsite foodservice organization (i.e., groups of study units). A sampling list of hospital foodservice operations was developed based on bed capacity. Each state hospital association website was used as a reference to develop the list. A total of 117 hospitals were listed in the Iowa Hospital Association (http://www.ihaonline.org/imis15/Ihaonline). Minnesota Hospital Association contained a list of 151 operations (http://www.mnhospitals.org/), and the Kansas Hospital Association had a total of 141 operations in their list (http://www.kha-net.org/). The sample of hospitals for each state consisted of three sizes based on bed capacity: 1) fewer than 25 beds, 2) 25 –100 beds, 3) more than 100 beds. Contact information of the foodservice directors was gathered from the Association for Healthcare Foodservice membership profile, inspection report, and hospital websites. The hospital's general phone line was used when foodservice director contact information could not be found.

A sampling list of school foodservice operations was developed based on number of students. The Department of Education, National Center for Education Statistics website (http://nces.ed.gov/ccd/districtsearch/index. asp) was used as a reference to develop the list. The website indicated there were 348, 555, and 321 public school districts in Iowa, Minnesota, and Kansas, respectively. The sampling list for each state included four sizes of school: 1) less than 1000 students, 2) between 1000 – 4999 students, 3) 5000 – 10,000 students, and 4) more than 10,000 students. Contact information for school foodservice authorities included in the study sample was gathered by visiting each school district's website.

Foodservice directors were initially contacted via telephone or email to seek assistance in distributing the questionnaires to hourly employees. The study purpose, confidentiality and questionnaire distribution procedure were explained (Appendix I). To motivate participation, the researcher explained that a donation of 50 cents would be made to a local food pantry for every questionnaire completed by the targeted study sample. If foodservice directors agreed to

participate, they were asked the number of questionnaires they were willing to help distribute. A follow-up email was sent to foodservice directors initially contacted via phone call to provide the study specifics and procedures as document of participation (Appendix I).

A total of 37 hospital and 24 school foodservice operations agreed to participate and distribute the questionnaires to their combined 2,030 hourly employees. Reasons for unwillingness to participate among operations contacted for the study included: 1) operations were very busy at the time, 2) operations were in the process of changing management, 3) management policy did not allow staff to participate in external surveys, and 4) not interested.

Data Collection

A paper questionnaire was printed in booklet format and color-coded by type of operation (Appendix G). The instrument was 8 pages and contained 60 items. A cover letter and donation form were included as part of the booklet on the first two pages. Instructions on returning completed questionnaires directly to the researchers were provided at the end of the questionnaire. A self-addressed prepaid business reply was printed on the last page of the questionnaire to facilitate the return process. A coding label (hand-written) was used on the questionnaire, which allowed researchers to track responses and avoid unnecessary follow up to organizations during the data collection process.

A packet containing a cover letter and the requested copies of the questionnaire was mailed to the foodservice directors. The researcher had little control over the distribution of questionnaires to the foodservice employees. However, explanation regarding the selection criteria of employees and how the questionnaire should be distributed was provided in the cover letter (Appendix J). Foodservice directors were asked to distribute the questionnaires to employees who held nonsupervisory position and at least 18 years of age.

Each employee received a questionnaire with cover letter explaining the purpose of the study, the participant's rights and confidentiality, and a modified clause of consent to participate. To motivate participation, the researchers' donation of 50 cents to local food pantry per completed questionnaire was also mentioned in the cover letter. Employees were asked to identify a food pantry to which they would like their donation to go from three given options. A self-addressed prepaid business reply was used on the questionnaire to facilitate the return process and allow employees to send their completed questionnaires directly to the researcher.

As recommended by Dillman (2007), a post card was sent to foodservice directors after two weeks to remind those who had not distributed the questionnaires to their employees and to thank those who had distributed (Appendix K). The foodservice directors were also asked to encourage employees to complete and return the questionnaire as soon as they could even after the return deadline.

Data Analysis

Data were coded and entered using the procedures recommended by Dillman (2007). Statistical analysis was performed using the Statistical Program for Social Science SPSS (Version 18.0 for Windows, 2009). Frequency analysis was conducted on all items in the questionnaire to check if the responses were within the correct range and to detect double data entry. Descriptive statistics including mean, standard deviation, frequency, and percentage were used to summarize the data. Extraction of factors using principal component analysis, followed by varimax rotation, was conducted to identify the underlying constructs of food safety culture. Internal consistency (measured by Cronbach's alpha) of each identified construct were calculated to evaluate instrument reliability. Confirmatory factor analysis was performed using AMOS statistical software to assess construct validity. Construct validity refers to the extent to which a set of test measures accurately represents the concept of interest (Trochim & Donnelly, 2007). The two most widely accepted forms of construct validity, convergent and discriminant validity, were examined (Hair, Black, Babin, & Anderson, 2007).

This study applied several techniques to estimate the relative amount of construct validity. The size of factor loadings was one of the important considerations. A standardized regression weight was recommended to be 0.5, or ideally 0.7 and above, to satisfy convergent validity. The average variance extracted for each construct was calculated and the average percentage of 50% or higher suggested an adequate convergence (Hair et al., 2007). Discriminant validity was evaluated by comparing the squared correlations or coefficient of determination of the paired constructs with the average variance extracted of each corresponding constructs (Fornell & Larcker, 1981; Hair et al., 2007). Additionally, mean comparison tests (i.e., independent t-tests and one-way ANOVA) were conducted to compare mean rating of employees' perceptions of food safety culture based on respondents' demographic (gender, age group, work status, years of foodservice experience, job title, received food safety training, and completion of food safety certificate), characteristics of the organization (size or management

system), and type of operation (hospital vs. school).

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CHAPTER 4: FOOD SAFETY CULTURE IN ONSITE FOODSERVICES: DEVELOPMENT AND VALIDATION OF A MEASUREMENT SCALE

A paper to be submitted to Journal of Foodservice Management and Education

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ABSTRACT

The purpose of this research was to develop and validate a measurement scale for food safety culture in onsite foodservices. Nonsupervisory employees in hospital and school foodservices participated in a two-phase, mixed methods research design process. In phase 1, four focus groups were conducted to identify relevant factors of food safety culture. In phase 2, a survey completed by 582 respondents appeared to validate six food safety culture factors: management and coworkers support, communication, self-commitment, environment support, work pressure, and risk judgment. The scale can be used to assess current food safety practices and strategize future food safety improvement goals.

Keywords: Food safety culture, onsite foodservice, measurement scale development, safe food handling practices, organizational culture.

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INTRODUCTION

Food safety continues to be one of the most pertinent issues in the foodservice industry. Annually in the United States (U.S.), there are approximately 48 million cases of foodborne illness, from specified and unspecified agents, resulting in 128,000 hospitalizations and 3,000 deaths (Scallan, Griffin, Angulo, Tauxe, & Hoekstra, 2011; Scallan et al., 2011). According to the Centers for Disease Control and Prevention, incidence of foodborne illness was highest in children younger than five years old (69.5 infections per 100,000 children) with an estimated 5% of the infections associated with recognized outbreaks; in contrast, infected persons older than 60 years old were reported to have the highest percentages of hospitalized cases (40%) and case-

fatality ratios (1.5%) (Centers for Disease Control and Prevention [CDC], 2011). For onsite foodservices serving these populations, food safety is of paramount importance for the health and well-being of their customers. Institutional settings have been identified as the most commonly reported place for norovirus outbreaks in CDC surveillance reports (CDC, 2007). Between 1994 and 2006, long-term care facilities accounted for 35.5% of the norovirus outbreaks confirmed by the CDC, while other institutional settings such as school and childcare centers accounted for 13% of the confirmed incidents (CDC, 2007).

Researchers showed the most commonly reported risk factors for foodborne illness outbreaks were improper holding temperatures, poor personal hygiene, and cross-contamination (U.S. Food Drug Administration [FDA], 2009). Multiple studies have been conducted to identify barriers to perform food safety practices associated with these risk factors, particularly hand washing, thermometer use, glove use, and cleaning of work surfaces (Green et al., 2007; Howells et al., 2008; Pragle, Harding, & Mack, 2007; Strohbehn, Sneed, Paez, & Meyer, 2008). Besides lack of knowledge and technical skills, factors related to organizational culture were identified as barriers to perform food safety practices (Green et al., 2007; Howells et al., 2008; Pragle et al., 2007). Lack of organizational support, lack of encouragement from managers and coworkers, inadequate facilities and supplies, as well as lack of accountability were some of the reported barriers related to organizational culture. These studies evidently showed that preventing foodborne illness requires going beyond food safety training. Such findings also highlighted the potential impact of organizational culture on changing food safety practices.

Recognizing organizational culture was a contributing factor to food safety practices, experts have recommended the establishment of a positive food safety culture to encourage and improve practices (Arendt & Sneed, 2008; Griffith, Livesey & Clayton, 2010a; Taylor, 2011; Yiannas, 2009). Organizational culture has been studied in a broad spectrum of research areas and there are many definitions given for this concept. In this study, organizational culture is viewed as shared perceptions among members of an organization regarding policies, procedures, and practices (Schein, 1985). Food safety culture is a specific form of organizational culture that represents the way an organization "does food safety" (Yiannas, 2009, p. 12). The role of organizational culture in changing behavior in the workplace is well documented in areas such as workers health and safety education (Flin, 2007; Guldenmund, 2007; Zohar, 2003). Studies have shown that workers' behaviors are partly influenced by the prevailing cultural norms in their

work environments, thus effective interventions for behavioral changes need to be designed to take these cultural factors into account. Likewise, organizational culture is predicted to play a significant role in determining the success of food safety interventions (Mitchell, Fraser, & Bearon, 2007; Yiannas, 2009) and food safety management systems (Ball, Wilcock, & Aung, 2010a; Griffith, Livesey, & Clayton, 2010b; Taylor, 2008) in the food industry.

Although many food safety experts have suggested the importance of creating a positive food safety culture, limited research has been conducted to understand what constitutes food safety culture in onsite foodservices. In addition, there is a lack of measurement scales to evaluate food safety culture prevalence in this type of foodservice. Published work on what constitutes a food safety culture is primarily based on expert opinions. Some studies have used the measurement scale adapted from other research fields, yet research has shown organizational culture is context specific and varies across operations. Thus, the current study developed a measurement scale for onsite foodservices by identifying specific items to assess food safety culture (including those determined in previous works). Validity of the developed scale was evaluated to establish the psychometric properties.

LITERATURE REVIEW

In recent years, the concept of food safety culture has attracted increased attention from practitioners and academics. Researchers acknowledge that food safety problems in the food industry are partly caused by organizational culture, thus food safety culture has been highlighted as another focal area for improving food safety practices (Ball et al., 2010a; Griffith et al., 2010a; Powell, Jacob, & Chapman, 2011; Yiannas, 2009). In other fields of study, organizational culture has been identified as a significant determinant or predictor of employee performance. Organizational culture has been found to influence performance outcomes such as work attitudes, service quality, and productivity (Asree, Zain, & Razalli, 2010; Davidson, 2003).

Despite being an important indicator of performance, organizational culture is recognized as a nebulous academic concept and has been applied in rather ambiguous ways. Numerous definitions and measurement scales of organizational culture have been introduced. There is no agreement on the best approach to measuring the relationship between organizational culture and performance (Clarke, 2000). Although no consensus exists regarding the theoretical foundation of this concept, three significant commonalities arise in all applications: the interrelationship between the individual and the environment, emphasis on multi-dimensions, and context

specificity. Researchers have adapted measurement scales of organizational culture in various fields of study to understand factors impacting food safety culture as shown in Table 4.1. The scope of measurement vary depending on study context but three factors appear relatively persistent: 1) management support and commitment, 2) system and process (e.g., procedures, communication, and resources), and 3) employee attitude and behaviors. Assessments of food safety culture help organizations understand why employees do not perform safe food handling practices while working (Ball et al., 2010a; Griffith et al., 2010a; Taylor, 2011; Yiannas, 2009). Corrective measures can then take place to improve the culture. Efforts to assess and establish a positive food safety culture and to better define its role in improving food safety practices can be facilitated by its measurement.

METHODS

A mixed methods design was used in this study and included two phases. In phase 1, focus groups were conducted with foodservice employees to explore factors influencing safe food handling practices, thus defining relevant factors of food safety culture in onsite foodservice. In phase 2, a measurement scale of food safety culture was developed based on focus group findings. The measurement scale was tested and validated in two types of onsite foodservices- hospitals and schools. Human Subjects Institutional Review Board approval was obtained prior to data collection.

Phase 1 – Focus groups

Participant selection. Participants were selected based on purposive sampling procedure (Patton, 2003) with three selection criteria: 1) current or former employee with nonsupervisory position in hospital or school foodservice, 2) at least 18 years of age at the time of recruitment, and 3) have or had experience in a foodservice job involving food handling. These selection criteria were established to ensure participants could provide information regarding food safety culture in foodservice organizations. Participants were recruited from hospital and school foodservices located in central Iowa. Recruitment flyers were posted at operations after foodservice directors' approvals were received. Employees who were interested in participating called one of the researchers to sign up. Due to difficulties recruiting participants in hospitals, a modification in the recruitment procedure was made. Difficulties recruiting potential participants for qualitative food safety research have been reported by others also (Arendt et al., 2012; Pragle et al., 2007). Undergraduate students from two Hospitality Management courses, who met the

selection criteria, were recruited at one university in the Midwest. All participants received a $40 token of appreciation for participating.

Data collection. An experienced moderator was hired to facilitate the focus group sessions with the help of an assistant moderator; one of the researchers. The assistant moderator took field notes, operated the tape record and handled environmental conditions. Four focus groups were held; two sessions with employees from school foodservices and two sessions with students who were working or had worked in health care foodservice. A topic guide was used to encourage discussion; it consisted of two key questions: 1) What does your workplace do to help you follow safe food handling practices? 2) What do you believe are the main factors in the workplace that prevent you from following safe food handling practices? Follow-up questions were asked, when appropriate, relating to supervisor/manager, coworkers, food safety policies and procedures, facilities, tools, and perception of risk. These follow up areas of questions were based on organization culture factors identified in other fields. Focus groups lasted 60-90 minutes with 5-12 participants in each session. Morgan (1998) recommended 6-12 as an optimum number of participants for enabling effective and meaningful discussion. All focus groups were audio-recorded.

Data analysis. Focus group audio-records were transcribed verbatim and manually analyzed using deductive and inductive thematic analysis (Fereday & Muir-Cochrane, 2006). Two researchers, trained in qualitative data analysis, developed themes independently and then discussed until consensus was achieved. Use of multiple researchers in the data analysis helps to achieve confirmability (Merriam, 2002; Shenton, 2004). Only those themes found in all four focus groups were used in measurement scale development.

Phase 2 – Survey

Survey Design. A paper-based survey containing two sections was developed to test the food safety measurement scale developed for this study. The first section consisted of the food safety culture questions. Participants were asked to rate their level of agreement on 47 statements (positively and negatively worded) describing food safety practices in their current workplace using a seven-point Likert scale (1 = Strongly Disagree; 7 = Strongly Agree). Three negatively worded statements were used to minimize agreement bias (DeVellis, 2003). The second section contained 13 questions on demographic and organization information. The questionnaire was printed in booklet format and color-coded by operation type. Pilot testing of the questionnaire

was conducted with onsite foodservice employees (n = 31) in Iowa. Minor modifications were made to improve the questionnaire based on suggestions from the pilot test participants.

Study sample. The psychometric properties of the food safety culture scale were tested by surveying foodservice employees from hospitals and schools in Iowa, Minnesota, and Kansas. Only employees who held nonsupervisory jobs, were at least 18 years old, and had food handling job tasks were selected for the study. A cluster sampling technique was employed for selecting groups of study units (i.e., foodservice organizations) instead of individual study units (i.e., employee) (Babbie, 2001). The sample of hospital and school foodservices selected represented operations of different size (i.e., bed capacity and number of students, respectively). Foodservice directors from 37 hospitals and 24 school foodservices agreed to participate and distribute the questionnaires to a combined 2030 hourly employees.

Data collection. Questionnaires were mailed to foodservice directors, who then distributed the questionnaires to their foodservice employees. Each employee received a questionnaire with a cover letter explaining the purpose of the study, the participant's rights and confidentiality. A self-addressed prepaid business reply was used to facilitate the return process and allow employees to send their completed questionnaires directly to the researcher. To motivate participation, a donation of 50 cents was made to a local food pantry for every questionnaire completed.

Data Analysis. Survey data were analyzed using the Statistical Program for Social Science SPSS (Version 18.0 for Windows, 2009). Exploratory factors analysis was conducted using principal component analysis to identify the underlying factors of food safety culture. Internal consistency (Cronbach's alpha) of each construct identified was calculated to evaluate the scale reliability. Confirmatory factor analysis was performed using the Analysis of Moment Structures (AMOS) statistical software (Version 3.61) to validate the measurement scale. Data were analyzed using individual foodservice employee as unit of analysis.

RESULTS AND DISCUSSION

Participant profile

Table 4.2 presents participants profile for the focus group and survey research phases. Participants show rate for the focus groups was 94.0% (31 of 33 recruited came to the focus groups). Seventeen hourly employees from school foodservices and 14 students who were currently or had worked in health care foodservices participated in the focus groups. A majority

of the focus group participants were female (93.5%) and slightly more than half (54.9%) were 30 years of age or older. Experiences in foodservice varied from less than a year (19.4%) to more than 20 years (12.9%), and while 25.8% had worked in their current operation for less than a year, 6.5% had worked more than 20 years. Most of the participants were part-time employees (64.5%) and had received food safety training (93.5%) and certification (71.0%). Participants mainly worked in self-operated (71%) as opposed to contract-managed (29.0%) foodservices.

For the survey phase, about an equal number of the respondents were employees in hospital (31.7% response rate from 1,010) and school foodservices (35.5% response rate from 1,020). Females constituted 89.6% of the respondents with more than 50% aged 50 years old and older. Slightly more than half (54.4%) of the respondents had at least 8 years of experience in foodservice and almost 36.6% had stayed in the current operation 8 years and more. Respondents were comprised of 56.6% part-time employees. Almost all respondents (95.2%) had received some food safety training and 68.9% of the respondents had completed formal food safety certification. About 73% of the respondents were employees in self-operated organizations.

Determining factors of food safety culture

Nine themes emerged from the focus groups based on participants' discussions about factors that help or prevent safe food handling practices in the workplace: 1) leadership, 2) communication, 3) self-commitment, 4) management system and style, 5) environment support, 6) teamwork, 7) accountability, 8) work pressure, and 9) risk perception. These themes were identified in focus groups with both health care and school foodservice employees. In the following section, the nine themes reflecting factors influencing employees' safe food handling practices in onsite foodservice are presented with some pertinent excerpts of participants' narratives included to support the interpretation of the themes.

Leadership. This theme included the role of leaders in inspiring, monitoring, being a role model, and being physically engaged. The extent to which the leader emphasizes and prioritizes food safety was expressed during the focus group as potentially important in inspiring safe food handling practices. Participants also mentioned that leader's commitment by serving as a role model could affect employees' practices. Participants agreed that their leaders showed commitment by monitoring safe food handling practices and physically engaging in monitoring activities. The following quotations illustrate the leader's role in monitoring and inspiring employees' practices:

"*He [manager] just kinda makes it a habit to like go around and then kinda say hi to everyone, like at some point. And so, that's when he see like the hairnets and like the nail polish and just things like that.*"*[health care foodservice employee]*

"She's [foodservice director] very adamant about us knowing... what we're doing. And her philosophy is, she never wants any children in this district become sick from food because that will ruin the District if there is an outbreak of anything."[school foodservice employee]

***Communication*.** Participants described several aspects of communication influencing safe food handling practices: openness, consistency, bottom-up approach, respect, feedback, and clarity. Participants noted that there was open communication among coworkers in which they can freely speak up if something that may affect food safety occurred. Managers' feedback and a bottom-up communication approach were mentioned as effective two-way communication that helps improve employees' safe food handling practices. Some participants mentioned that they appreciated when feedback on practices was given nicely and with respect. Others mentioned that employees could better perform their jobs when they know what is expected and organization clearly communicated the expectations. The following quotations are examples of how organization expectations on employees' food safety practices were clearly communicated:

"they tell us daily, weekly, if we're having an issue or coming close to not meeting the safety regulations, ah...say, the food temperatures are getting low. Ah, they review them with us, making sure that, hey, we need to be within this guideline when it's prepared so that way it kills all the bacteria and such. And we need to try to maintain that temperature." [school foodservice employee]

"And actually before I got hired, right in my interview, like before I was offered the job, um, our boss told us what was expected of us as far as our being up, no nail polish, no chewing gum, like...basic stuff to expect." [health care foodservice employee]

However, participants also mentioned that sometimes inconsistent food safety information was received at the workplace as indicated in the following quotations:

"I think it reflects on who trains you when you are welcomed into the workplace. We have someone, some girls [managers] who train you and they follow the rules. They're very particular. But then you also have some who are more lenient, and I think that has a big influence on it as well." [health care foodservice employee]

"So I pretty much learned three different ways to do stuff, and like there were some congruencies but then...for a lot of other stuff, it just wasn't, like it's not as uniform as you would hope, across the board." [health care foodservice employee]

Management style and system. Several coordinated activities and provisions of standard practices in management systems were described influencing participants' food safe practices. These included policies and procedures, documentation, guideline, and implementation/ enforcement. Enforcing food safety practices with regular and detailed checking on employees' compliance positively affected safe food handling practices. Participants noted how organizations have detailed food safety procedures and guidelines in the following quotations:

"You know, anything where there's a whole procedure. You write your notes down, you know, and, and everything and how to do it. So it gets very detailed on, on every, in our little aspect...procedure." [school foodservice employee]

"....like by some of the equipment, there's like proper cleaning procedures on there and like checklists that say, "Did you make sure to do this?" Or "Before you leave, did you forget to resanitize this?" So, it's just kind of like little reminders and like step-by-step instructions..." [health care foodservice employee]

Environment support. Adequate and quality resources were mentioned as instrumental elements of environment support that influenced employees' food safety practices. Examples of resources mentioned during the focus groups were facilities, equipment, supplies and food safety training. Some participants confirmed that environment support not only facilitates, but also prompts food safety practices as illustrated in the following quotations.

"when we do room service, um, they have the automatic hand sanitizer things too. And so, we can just, ah, that's like, an easy reminder as soon as you walk outta the room. And so that's an easy reminder, and it's right there." [health care foodservice employee]

"they provided like extra hair restraints or like nail polish remover, um, just kind of, so there's no excuse to not be following the proper codes." [health care foodservice employee]

However, participants also voiced that equipment or facilities not functioning appropriately did not support production of safe food.

"Equipment failure is a big one too. We have freezers that go down all the time, refrigerators that go down and lose everything out of reserves and milk coolers going

down in the middle of the night. …losing your milk because they temp it in the morning and it's outta temp [not safe temperature].” [school foodservice employee]

Teamwork. Teamwork among coworkers was reportedly another important aspect that influenced food safety practices. Participants noted that coworkers help remind and support each other to comply with safe food handling procedures. Teamwork spirit would likely cause experienced employees to be helpful to the newcomers. The following quotations reflect how participants perceived teamwork spirit among coworkers:

“we all kind of work together, tellin' each other, you know. It's, it works out pretty good.” [health care foodservice employees]

“New people come in, and we...help them and it's like a little family.” [school foodservice employee]

According to participants, following food safety practices is sometimes challenging when there is a lack of teamwork among coworkers from other departments.

“…if Environmental Services isn't keeping up with everything, you know, the towels and, ah, hand sanitizer…it is really hard for us to leave in the middle of our shift to bring back more paper towels or soap dispensers when we're serving forty or fifty residents in an hour-long period.” [health care foodservice employee]

Accountability. Participants mentioned that their organizations stressed the importance of food safety by giving disciplinary action to those who do not follow the food safety policies. Termination or suspension was noted as examples of disciplinary actions taken to show how critical food safety is to the organization. The following quotations give indication how organizations have used accountability measures to shape food safety culture as described by participants:

“If we're not up to date on those (ServSafe), we're not on the schedule either. So, you have to keep really up-to-date.” [health care foodservice employee]

“And they have like cameras that they watch, so, um, if you do anything like that, like I know people have been fired for like eating food while they were like making it or something.” [health care foodservice employee]

Work pressure. Participants agreed that some aspects of work pressure did affect their food safe practices. Time constraints were commonly mentioned as the main challenge to comply with the standard procedures. Customers’ expectations also created pressures on

employees to comply with procedures, as some participants were aware that customers now are demanding a greater assurance from employees to handle food safely. Participants' descriptions on these work pressures are indicated in the following quotations:

> *"So if you're running low on time or, you know, there's so much to do, sometimes I think that's an easy way to just slough off and not follow exact procedures." [health care foodservice employee]*
>
> *"..in this day and age, a lot of the kids, they're become more, you know, aware...of, [food] safety." [school foodservice employee]*
>
> *"I mean, resident complaints can obviously influence how you're washing hands and being sanitary." [health care foodservice employee]*

Additionally, inadequate number of staff was mentioned as another work pressure affecting employees' practices. Participants mentioned that they had difficulty complying with standards when tasks become overloaded due to inadequacy of staff as demonstrates by the following quotes:

> *"If you are shorthanded, if you start hurrying, you know…. And temps don't get taken."[health care foodservice employee]*
>
> *"And it's very hard to get all the work done. Like say, on grilled cheese day...ah, we had sixty pans of grilled cheese going out. And that's a, one pan has twenty-four grilled cheese on it. One person cannot do it in one day." [school foodservice employee]*

Risk perceptions. Participants admitted that some of their food safety practices had also been influenced by the extent to which organizations were aware of the risks of not complying with food safety regulations and how far precaution measures were taken to avoid the risk. Financial reasons were frequently noted as the drive in making decisions involving risk. One participant explained why this is the case:

> *"due to the funding, the supervisors and most of the people know that, ah, if we don't follow the procedures, we can lose the funding for the State and, ah, we lose the funding then creates a big deficit and jobs will be on the line." [school foodservice employee]*

Participants noted some risk-taking behaviors in their organizations such as cutting corners with food safety to meet production demands or save money. Several organizational practices were perceived as risky and some participants argued that they did not agree with following these practices as illustrated in the following example of quote:

"we were asked to serve milk that was expired like by a day or something, but still not...something I was really not comfortable with." [health care foodservice employee]

Scale Development and Validation

Forty-seven items were developed to represent the nine themes identified in the focus groups: 1) leadership, 2) communication, 3) self-commitment, 4) management system and style, 5) environment support, 6) teamwork, 7) accountability, 8) work pressure, and 9) risk perceptions. As recommended by DeVellis (2003), five to seven items were developed to reflect the specific content of the nine themes. Table 4.3 presents the scope and examples of questions measuring food safety culture based on themes and subthemes from focus groups data. In addition, food safety culture aspects in the focus groups unique to this study were identified (see Table 4.3).

To demonstrate that the factors of food safety culture identified in phase 1 are nine distinct factors, exploratory factor analysis was carried out on the questionnaire data. Principal component extraction with varimax rotation was conducted on the 47 food safety culture items. The Kaiser-Meyer-Oklin value was 0.971, which exceeded the minimum recommended value of 0.60 (Kaiser, 1974), and the Barlett's test of sphericity was significant ($p < 0.001$), which suggested the data were appropriately structured for factor analysis (Pedhazur & Schmelkin, 1991). Six factors with Eigenvalues greater than one were extracted, which explained 64.64% of the variance after rotation. To identify significant items, three criteria were used: 1) retain items with factor loadings exceeding 0.60 because loadings in excess of 0.60 (40% variance) are considered good (Tabachnick & Fidell, 1996), 2) retain factors that have at least three items per factor, and c) eliminate items that load significantly (i.e., 0.50 and above) on more than one factor after rotation as recommended by Hair, Blank, Babin, Anderson, and Tatham (2006). Thirty-one items were retained (Table 4.4). All items have communalities ranging from 0.571 to 0.845. Standardized Cronbach's alpha reliability coefficient was used to assess the reliability of each factor. Alpha scores for the six factors ranged from 0.756 to 0.948, suggesting acceptable internal consistency (Nunally & Benstein, 1994). Examples of items excluded were "Management provides adequate training to improve employees' food safety practices", "Managers' actions show that providing safe food to customers is a top priority" "I receive feedback if I do not follow food safety practices", "The customers have high expectations for employees to follow safe food handling" and "Management will not take even a small risk when

it comes to food safety".

Factor 1 was termed "management and coworkers support" because the 10 items loading on this factor were related to managers and management roles in encouraging safe food handling practices and teamwork among coworkers. Factor 2 was labeled "communication" because this factor contained items related to communication between management and employees as well as communication among coworkers. Factor 3 was labeled "self-commitment" because all items in this factor reflected employees' internal motivation to perform safe food handling. Factor 4 was referred to as "environment support" because this factor contained four items representing measures on adequacy and quality of infrastructures that support safe food handling practices. Labeled as "work pressure", factor 5 contained three items that described pressures in the workplace associated with time, work load and staff adequacy that affect safe food handling practices. Finally, the last factor was named "risk judgment" because the items included were associated with organization risk taking decisions when implementing and complying with food safety rules and regulations.

Confirmatory factor analysis (CFA) was performed to further evaluate the psychometric properties of the scale. A measurement model comprising the six food safety culture factors was tested to assess reliability (latent variables) and construct validity. The results of CFA indicated a good fit level ($\chi^2/df = 3.914$, normed fit index [NFI] = 0.916, incremental fit index [IFI] = 0.940, Tucker Lewis fit coefficient [TLI] = 0.929, comparative fit index [CFI] = 0.940, root-mean-square error of approximation [RMSEA] = 0.057). The values for NFI, IFI, TLI, and CFI greater than 0.90 indicated a satisfactory model fit (Hair et al., 2006). A RMSEA with a value less than 0.08 is recommended (Hoyle & Panter, 1995). Composite reliability and average variance extracted (AVE) were used to test the reliability of the constructs. The composite reliability of the six constructs ranged from 0.793 to 0.960 (Table 4.5) suggested acceptable reliability (Nunally, 1978). The AVEs of all six constructs ranged from 0.577 to 0.759, greater than the cut-off value of 0.5 (Bagozzi & Yi, 1988; Hair et al., 2006).

Construct validity was assessed by convergent validity and discriminant validity. All the confirmatory factor loadings were significant at the 0.001 levels (Table 4.4), which indicated satisfactory convergent validity of the measure (Hair et al., 2006). Discriminant validity was determined by comparing the AVE for each construct with the squared inter-construct correlations. As illustrated in Table 4.5, all the AVEs were greater than the corresponding inter-

construct squared correlation (except for inter-construct squared correlation 0.630) supporting the discriminant validity of the measurement scale (Fornell & Larcker, 1981).

Evaluation of the food safety culture scale developed in the current study showed a good level of reliability and construct validity. In addition, all items were found to load on only one factor (Table 4.4). A possible explanation for this result could be the use of a homogenous sample in the survey (i.e., only employees who held nonsupervisory position). Studies using multiple groups of respondents within a sample (e.g., employees of different job positions) reported poor measurement validity because factor structure was found unique to each group (Coyle, Sleeman, & Adams, 1995; Ginsburg et al., 2009). Another possible reason accounting for this result was the utilization of mixed methods approach in the development of the scale. Creswell and Clark (2007) asserted mixed methods design is a good approach in identification of items and scales for quantitative instrument development. Arendt, Strohbehn, Ellis, Paez, and Meyer (2011) reported a statistically acceptable finding with combined use of open-ended questions and survey in developing an instrument to measure motivators for following food safety practices. The current study further supports the advantages of using a mixed methods approach with a combination of focus group and survey data collection in scale development.

Researchers have proposed a range of factors impacting food safety culture. These factors were incorporated from a broader field of studies including safety and health science, management, international business, psychology, and food processing (Ball, Wilcock, & Colwell, 2010b; Griffith et al., 2010b; Neal, Binkley, & Henroid, 2012; Taylor, 2011; Yiannas, 2009). As evident in the current study, factors related to management and coworker support, communication, self-commitment, environment support, work pressure, and risk judgment appeared to be relevant in the context of onsite foodservice. Most of these factors were in line with previously proposed or identified factors affecting food safety culture in a broader context of the food industry. Some disparities between previous research and the current findings were identified. Neat et al. (2012) found two factors, management commitment and worker food safety behavior, when evaluated food safety culture in restaurants using a Food Safety Climate tool (Ball et al., 2010b). A larger set of factors identified in the current study exhibits a context effect that distinguished food safety culture in commercial and noncommercial sectors of the foodservice industry.

CONCLUSIONS

This study explored food safety culture in onsite foodservices and addressed the questions: what is food safety culture in this context and what are the factors? Six food safety culture factors were identified using a mixed methods approach. Based on the satisfactory statistical evidence obtained in the six-factor structure, the measurement scale shows potential application to further researching this topic. Food safety culture is known to be context specific, thus the current study introduced a set of assessment questions developed and validated specifically for onsite foodservices whereby employees in this specific sector defined relevant aspects of culture. The scale was established based on what factors were perceived to help or prevent employees from following safe handling practices in the workplace. Recognizing that food safety culture is a multidimensional and broad concept, it could become a challenge to capture relevant aspects of culture while making a manageable assessment. The measure developed in this study consists of a reasonable number of questions (31 questions) and captures six areas of food safety culture. Because the measurement scale was developed and tested in two segments of the onsite sector, it has a generic feature that may be applicable for other foodservices in this sector, such as college and university dining, child care centers, or assisted living facilities.

Food safety culture has been recognized as an emerging area of food safety research (Arendt & Sneed, 2008; Griffith et al., 2010a; Powell et al., 2011), thus educators should introduce this concept to hospitality and dietetics students; thereby highlighting the importance of various soft skills in managing food safety and preventing foodborne illness. This study showed that food safety culture is shaped to some degree by soft skills (not the job specific knowledge and skills, but rather the interpersonal attributes and ability to work with others) such as communication, leadership, and human resources management (e.g., encouraging teamwork among employees or managing employees work stress), therefore future foodservice managers must be equipped with these soft skills. Several researchers have stressed the importance of soft skills in food safety education (Roberts, Arendt, Strohbehn, Ellis, & Paez, 2012; Scheule, 2000). To help educators prepare future foodservice managers with such skills, the measurement scale developed in this study can potentially be used in courses such as quantity food production or fine dining management to evaluate and improve students' skills required for managing food safety in a practice production setting. Students who are in the management role for events held

during the course are charged with creating a food safety culture and making sure everyone in the class is following food safety procedures. Following each event, the food safety culture could beevaluated by all classmates with results discussed to identify areas requiring improvement (such as communication) and for students to gain feedback on how the food safety culture could be improved. Researchers have suggested that lecture–style approach may not be a sufficient way to teach soft skills (Roberts et al., 2012); hence the use of food safety culture assessment questions in class can be a more pragmatic and effective alternative approach.

As organizations continue to invest substantial resources in interventions for implementation of food safety procedures, it is imperative to measure the outcome of such investments. Organizations could evaluate the effectiveness of these interventions by assessing the impact on food safety culture. The food safety culture measurement scale described in this study could be used as a guide in identifying areas where interventions might not have been successful. Using this information, organizations could develop better strategies to improve food safety interventions and ensure positive food safety culture prevails in the organization.

It is important to take into account some limitations of this study. The food safety culture measurement scale was tested in three states, thus limited generalization of the current findings call for more research particularly in other states with different food safety regulations or different labor pool characteristics. Because the study was conducted only among employees with nonsupervisory position, future research could gain insight into a broader view about food safety culture from policy makers and managerial perspectives to understand the consistency of what constitute food safety culture as perceived by them and other work units. Additionally, future research is needed to confirm and validate the application of this food safety culture measurement scale in other types of onsite foodservices (e.g., college/university dining, childcare center, and assisted living).

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Table 4.1 Food safety culture factors

Author(s)/year published	Context	Area adapted/ Tool	Factors
Yiannas (2009)	Retail and foodservice industry	Safety science	Leadership, employee confidence, management support, accountability, and sharing of knowledge and information
Griffith et al. (2010b)	Food industry	Safety science	Management systems and style, leadership, communication, commitment, environment and risk perception
Taylor (2011)	Multi-cultural food industry	Management, international business, psychology	Knowledge (e.g., awareness, technical expertise, training), attitude/psychological (e.g., agreement, risk awareness, self-efficacy, motivation), external (e.g., inspection, government/industry guideline), and behavioral (e.g., organizational culture, resources, competence)
Ball et al. (2010b)	Meat processing plant	Food Safety Climate tool	Five higher order factors: Management commitment, work unit commitment, food safety training, infrastructure and worker food safety behavior
Neal et al. (2012)	Restaurant	Food Safety Climate tool	Management commitment, worker food safety behavior

Table 4.2 Participants Profile

Characteristics	Focus group (n = 31)		Survey (n = 582)	
	n	%	n	%
Gender				
Female	29	93.5	517	89.6
Male	2	6.5	60	10.4
Age				
18-29 years old	14	45.2	71	12.2
30-49 years old	8	25.8	190	32.6
50-60 years old	6	19.4	184	31.6
Older than 60 years old	3	9.7	137	23.5
Time worked in foodservice operations				
Less than 1 year	6	19.4	43	7.4
1-3 years	11	35.5	84	14.4
4-7 years	6	19.4	138	23.7
8-12 years	2	6.5	114	19.6
13-20 years	2	6.5	84	14.4
More than 20 years	4	12.9	119	20.4
Time worked in current operation				
Less than 1 year	8	25.8	91	15.6
1-2 years	11	35.5	131	22.5
4-7 years	5	16.1	147	23.5
8-12 years	4	12.9	95	16.3
13-20 years	1	3.2	54	9.3
More than 20 years	2	6.5	64	11.0
Employment status				
Full-time	11	35.5	250	43.2
Part-time	20	64.5	328	56.6
Job title				
Cook/line cook	7	22.6	142	24.6
Food prep	9	29.0	69	12.0
Foodservice assistant	8	25.8	108	18.7
Dishwasher	0	0	22	3.8
Server	3	9.7	52	9.0
Other	4	12.9	88	15.3
More than one job title	0	0	96	16.6
Received food training*	29	93.5	554	95.2
Completion of formal food safety certification*	22	71.0	396	68.9
Type of operation				
Hospital	14	45.2	287	49.3
School	17	54.8	295	50.7
Management system				
Self-operated	22	71.0	270	72.8
Contract management	9	29.0	101	27.2

* Yes responses

Table 4.3 Development of Questionnaire Items Based on Themes and Subthemes

Themes	Subthemes	Scope of question	Examples of questionnaire items
Leadership	• Inspire • Monitor • Role Model • Physical engagement	The extent to which leaders demonstrate their commitment to food safety	….My manager always watches to see if employees are practicing safe food handling ….My manager is actively involved in making sure safe food handling is practiced
Communica-tion	• Openness • Consistency* • Bottom-up approach • Respect* • Feedback • Clarity	Transfer of food safety messages and knowledge among management, supervisory staff and coworkers	….I can freely speak up if I see something that may affect food safety ….I receive feedback if I do not follow food safety practices
Self-Commitment	• Personal practices • Personal value • Internal motivation	Employees values and beliefs about food safety practices	….Food safety is a high priority with me ….I follow food safety rules because I think they are important
Management style and system	• Policy and procedure • Documentation • Guideline • Implementation/ Enforcement	Coordinated activities or policy and procedure to direct or control food safety	….Managers' actions show that providing safe food to customers is a top priority ….Our food safety policies and procedures give detailed guidance for practices
Environment support	• Availability of facilities • Quality of facilities* • Adequacy of supplies • Quality of supplies* • Adequacy of training	The availability and quality of infrastructure and training that support food safety practices	…. Adequate supplies (e.g., gloves, thermometers, etc.) are readily available to perform safe food handling practices ….. I am provided with quality supplies that make it easy for me to follow safe food handling practices

Teamwork	• Within department • Between department • Between new and experienced staff	Coworkers support with regard to food safety practices in the workplace	…..Employees remind each other about following food safety practices ….New employees and experienced employees work together to ensure food safety practices are in place
Account-ability	• Reward and punishment • Internal rules and regulations • External rules and regulations	Checks and balances in place that made certain desired outcomes are being achieved	….Employees are disciplined or reprimanded when they fail to follow food safety practices ….Food safety inspections by health inspectors help to ensure safe food handling practices are followed
Work pressure	• Time • Adequacy of staffing • Work schedule • Customer* expectation	Various aspects of pressure associated with food preparation that affects safe food handling practices	….The number of staff scheduled at each shift is adequate for me to get my work done and handle food safely ….I always have enough time to follow safe food handling procedures, even during rush hours
Risk	• Risk-taking • Risk awareness	Organizational risk awareness and risk taking decisions with regard to food safety	…..No compromises with safe practices are made when handling food …..When there is pressure to finish food production, managers sometimes tell us to work faster by taking shortcuts with food safety

* Subthemes unique to this study

Table 4.4 Exploratory and Confirmatory Factor Analysis Results from the Survey (n = 582)

Factor	Items	Varimax rotation loading						Commu-nalities	Standardized loadings
		F1	F2	F3	F4	F5	F6		
F1: Manage-ment and coworker support	My manager always watches to see if employees are practicing safe food handling	0.689	0.325	0.108	0.172	0.047	0.031	0.704	0.424
	My manager is actively involved in making sure safe food handling is practiced	0.664	0.430	0.127	0.178	0.003	0.092	0.812	0.781
	My coworkers are always supportive of each other regarding food safety	0.789	0.225	0.133	0.219	0.211	0.063	0.787	0.816
	When lots of work needs to be done quickly, employees work together as a team to get the tasks completed safely	0.738	0.203	0.157	0.179	0.303	0.062	0.755	0.769
	Employees remind each other about following food safety practices	0.743	0.210	0.216	0.124	0.266	-0.002	0.735	0.811
	New employees and experienced employees work together to ensure food safety practices are in place	0.664	0.324	0.217	0.252	0.254	0.162	0.770	0.878
	There is good cooperation among departments to ensure that customers receive safely prepared food	0.601	0.263	0.220	0.281	0.288	0.177	0.690	0.832
	Management enforces food safety rules consistently with all employees	0.701	0.378	0.089	0.218	0.038	0.112	0.814	0.447
	Management inspires me to follow safe food handling practices	0.643	0.415	0.134	0.290	0.008	0.138	0.790	0.411
	Employees are disciplined or reprimanded when they fail to follow food safety practices	0.603	0.258	0.166	0.017	0.212	0.044	0.664	0.706
F2: Communi-cation	I can freely speak up if I see something that may affect food safety	0.226	0.688	0.277	0.036	0.279	0.104	0.693	0.685
	I am encouraged to provide suggestions for improving food safety practices	0.299	0.715	0.199	0.068	0.252	0.048	0.715	0.774
	All managers give consistent information about food safety	0.476	0.640	0.173	0.170	0.111	0.087	0.756	0.879

	Management provides adequate and timely information about current food safety rules and regulations	0.355	0.670	0.216	0.301	0.122	0.116	0.800	0.915
	My manager generally gives appropriate instructions on safe food handling	0.410	0.671	0.263	0.224	0.001	0.147	0.819	0.888
	All of the necessary information for handling food safely is readily available to me area	0.229	0.609	0.130	0.359	0.203	0.076	0.666	0.744
F3: Self-commit-ment	Food safety is a high priority to me	0.190	0.156	0.808	0.274	0.040	0.088	0.807	0.862
	I follow food safety rules because I think they are important	0.151	0.231	0.829	0.231	0.092	0.120	0.840	0.904
	I follow food safety rules because it is my responsibility to do so	0.129	0.170	0.840	0.246	0.105	0.075	0.845	0.892
	I am committed to following all food safety rules	0.176	0.206	0.828	0.194	0.093	0.111	0.833	0.910
	I keep my work area clean because I do not like clutter	0.066	0.118	0.612	0.112	0.103	0.070	0.575	0.565
F4: Environ-ment support	Adequate supplies are readily available to perform safe food handling practices	0.228	0.248	0.336	0.694	0.108	0.110	0.734	0.803
	Equipment items needed to prepare food safely (e.g., hand washing sinks) are readily available and accessible	0.140	0.155	0.300	0.723	0.185	0.063	0.730	0.796
	Facilities are of adequate quality to follow safe food handling practices	0.254	0.178	0.346	0.705	0.206	0.106	0.792	0.881
	I am provided with quality supplies that make it easy for me to follow safe food handling practices	0.284	0.231	0.295	0.700	0.243	0.043	0.780	0.866
F5: Work pressure	I always have enough time to follow safe food handling procedures, even during rush hours	0.258	0.208	0.222	0.258	0.633	0.136	0.675	0.803
	My work load does not interfere with my ability to follow safe food handling	0.279	0.202	0.137	0.359	0.662	0.167	0.767	0.886
	The number of staff scheduled at each shift is adequate for me to get my work done and handle food safely	0.367	0.224	0.055	0.238	0.668	0.132	0.737	0.814

F6: Risk judgment	I am sometimes asked to cut corners with food safety so we can save costs when preparing food	0.098	0.097	0.035	0.156	0.027	0.862	0.571	0.858
	When there is pressure to finish food production, managers sometimes tell us to work faster by taking shortcuts with food safety	0.110	0.077	0.080	0.154	0.036	0.861	0.791	0.888
	I believe that written food safety policies and procedures are nothing more than a cover-up in case there is a lawsuit	0.005	0.167	0.076	0.107	0.195	0.620	0.796	0.476
% of variance explained		17.08	14.23	10.79	10.12	6.94	5.48	Total variance explained 64.64	
Eigenvalue		23.53	3.04	1.97	1.68	1.17	1.07		
Cronbach's alpha		0.948	0.923	0.915	0.903	0.878	0.756		
Number of item		10	6	5	4	3	3		

Table 4.5 Inter-construct Correlation, Composite Reliability, and Average Variance Extracted for Identified Factors

Factor*	Management & coworker support	Communi-cation	Self-commit-ment	Environment support	Work pressure	Risk judgment
Management and coworker support	-	0.630	0.213	0.377	0.430	0.085
Communication	0.794	-	0.251	0.376	0.371	0.118
Self commitment	0.461	0.501	-	0.399	0.191	0.056
Environment support	0.614	0.613	0.632	-	0.382	0.086
Work pressure	0.656	0.609	0.437	0.618	-	0.110
Risk judgment	0.291	0.344	0.236	0.293	0.331	-
Composite reliability	0.960	0.949	0.928	0.908	0.852	0.793
Average variance extracted	0.720	0.759	0.725	0.713	0.658	0.577

* For all factors, values below the diagonal are correlation estimates and values above are squared correlations

CHAPTER 5: AN EMPIRICAL INVESTIGATION OF FOOD SAFETY CULTURE IN ONSITE FOODSERVICE OPERATIONS

A paper to be submitted to Food Control

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Abstract

Limited studies have explored employees' perceptions of food safety culture in onsite foodservices, despite the growing recognition of the impact of improving food safety practices. A cross-sectional paper-based survey was conducted with nonsupervisory employees (n = 582) from health care and school foodservice operations (n = 51) in three Midwest states to assess food safety culture using an instrument developed and validated in this specific context. This study aimed to investigate the extent to which employees' perceptions of food safety culture differ based on demographic variables and operation characteristics (management system, size, and type of operation). Employees' perceptions of food safety culture were evaluated on factors of management and coworkers support, communication, self-commitment, environment support, work pressure, and risk judgment. Areas of strength and potential improvement were identified; significant differences found in employees' perceptions can guide development of interventions that support safe food handling practices in onsite foodservices.

Keywords: Food safety culture, employees' perceptions, onsite foodservices, safe food handling practices.

1. Introduction

Over the last few decades, foodborne diseases have prevailed as a worldwide challenge to ensuring global health. A high percentage of reported outbreaks in the United States (U.S.) have been associated with the foodservice industry (Center for Disease Control and Prevention [CDC], 2007). It was found that 59% of foodborne disease outbreaks in the U.S. reported in 2008 involved retail foodservice establishments (CDC, 2011). The U.S. Food and Drug Administration investigation on the occurrence of foodborne illness risk factors highlighted problems in food handling behaviors within retail foodservice including onsite foodservices (i.e., hospitals, nursing homes and elementary schools) (U.S. Food and Drug Administration [FDA], 2000, 2004, 2009). Onsite foodservice is referred to as "a not-for-profit auxiliary service provided to a 'captive market' within larger organizations that have other primary functions" (Khan, 1991, p. 5). This segment of industry is also known as noncommercial foodservice, which

includes educational, governmental, or institutional organizations that operates their own foodservice (National Restaurant Association [NRA], 2012). In the U.S., onsite foodservices were forecasted to account for $54.2 billion in food sales for 2012 (NRA, 2012) and generate a total of $95 billion retail sales-equivalent in 2008 (Technomic, 2008 as cited by Bright, Kwon, Bednar, & Newcomer, 2009). Because of the significant industry size, ensuring the safety of food served to its customers is deemed critical. Moreover, onsite foodservices such as health care and school are more likely to serve high-risk populations including young children, elderly, and individuals with compromised immune systems.

Foodservice employees play an essential role in ensuring the safety of food served. Hedberg et al. (2006) found employees' food safety practices (e.g., bare hand contact and handling by infected person) were the main contributing factors to foodborne illness incidents in operations implicated with outbreaks. In the U.S. foodservice industry, the changing demographic profile of employees (e.g., age, ethnicity, language, and literacy) is becoming a major challenge that may impact food safety (Sneed & Strohbehn, 2008). A number of studies have investigated the role of knowledge and attitudes on employees' safe food handling practices in the foodservice industry (Abdul-Mutalib et al., 2012; Bas, Ersun, & Kivanc, 2006; Choi & Rajagopal, 2013; Ko, 2012; Martin, Hogg, & Otero, 2012; Tokuc, Ekuku, Berberoglu, Bilge, & Dedeler, 2009). Knowledge about and attitudes toward food safety are important, yet factors affecting employees' practices are multidimensional and extend beyond these two constructs (Clayton & Griffith, 2008; Mitchell, Fraser, & Bearon, 2009; Neal, Binkley, & Henroid, 2012). Barriers and motivators to perform safe food handling practices in foodservice operations have been studied (Ellis, Arendt, Strohbehn, Meyer, & Paez, 2010; Green & Selman, 2005; Pragle, Harding, & Mack, 2007; Strohbehn et al., in review). Various factors, in addition to knowledge, affect employees' practices including time constraints, availability of resources, and behavioral issues (e.g., management and coworkers' attitudes) have been reported (Green & Selman, 2005; Howells et al. 2008; Pragle et al., 2007).

Observational research conducted in onsite foodservice facilities has found that even when foodservice employees demonstrate sufficient knowledge of food safety, their practices may not always be consistent with required standards (Giampaoli, Cluskey, & Sneed, 2002; Sneed & Henroid, 2007; Sneed, Strohbehn, & Gilmore, 2004; Strohbehn, Sneed, Paez, & Meyer, 2008; Strohbehn, Paez, Sneed, & Meyer, 2011). Lack of resources (e.g., financial, supplies, and

time) and issues related to employees' motivation, turnover, and training have been frequently cited as some of the barriers to ensure safe food handling practices (Giampaoli et al., 2002; Sneed & Henroid, 2007; Sneed et al., 2004; Strohbehn et al., in review). These findings indicate that a variety of environmental, organizational and human factors contribute to the success of food safety practices in onsite foodservice organizations.

Researchers underscore the role of food safety culture in influencing employees' safe food handling practices. Food safety culture has been defined as "the way do we do things [food safety] around here" (Yiannas, 2009, p. 12). Poor food safety culture is increasingly recognized as a risk for foodborne illness outbreaks in the food industry (Griffith, Livesey, & Clayton, 2010a; Powell, Jacob, & Chapman, 2011). Management commitment, organizational priority and support, and communication policy are some of the organizational factors that have been found to influence food safety practices among individual employees and at the organization level (Griffith, Livesey, & Clayton, 2010b; Powell et al., 2011; Yiannas, 2009). Research has investigated the impact of food safety culture on inspection scores (Frash & MacLaurin, 2010); employees' motivation to follow safe food handling practices (Arendt et al., 2011); employees' self-reported practices (Sarter & Sarter, 2011; Strohbehn et al., in review), employees' attitude and behavioral intention (Lee, Almanza, Jang, & Ghiselli, 2012); as well as behaviors (Chapman, Eversley, Fillion, & MacLaurin, 2010). Some studies have also analyzed employees' demographic backgrounds to understand the influence of organizational culture on practices (Ellis et al., 2010; Ungku Fatimah, Arendt, & Strohbehn, in press; Neal et al., 2012).

Food safety culture is a similar concept to organizational culture in the management literature, which describes how employees see their organization as "a system of shared meaning" (Chatman, 1998, p. 333) and the view that members of an organization hold that distinguishes one organization from another. Organizational culture is also viewed as a concept that encompasses a range of individual evaluations of the work environment (James & James, 1989). Based on some of the cultural elements found in the occupational safety and health literature, researchers have proposed that food safety culture can be assessed as employees' perceptions toward the management system, style and process, leadership, communication, sharing of knowledge and information, accountability, risk perception, and work environment (Griffith, Livesey, & Clayton, 2010b; Powell et al., 2011; Yiannas, 2009). To date, none of these elements have been empirically tested for application in the onsite foodservice sector.

The onsite foodservice sector is different than commercial retail foodservices in that this sector typically provides extended service, serves a high volume of meals, is part of a public entity receiving some form of taxpayer support, and has a fairly consistent workforce. There is an increasing interest in the role of food safety culture on employees' safe food handling practices. However, limited studies have explored food safety culture in onsite foodservice operations using perceptual measures. While some studies have adapted measures from different research fields (Neal, et al. 2012), others have evaluated culture as a single construct (Frash & MacLaurin, 2010; Lee et al., 2012; Ungku Fatimah et al., in press). The current study used a measurement of food safety culture developed and validated specifically in the context of onsite foodservices, and captured multidimensional aspects of culture. The specific objectives of this study were to determine: 1) the extent to which employees' perceptions of food safety culture differed based on demographic variables (age, gender, work status, years of foodservice experience, training, and completion of food safety certification), and 2) whether employees' perceptions of food safety culture differed based on the operation characteristics (management system, size, and type of operation).

2. Methodology

2.1. Questionnaire design

A paper survey questionnaire containing two sections was developed as the research instrument for this study. The first section consisted of food safety culture measurement, which assessed respondents' agreement on 47 statements (positively and negatively worded) describing food safety practices in their current workplace using a seven-point Likert scale (1 = Strongly Disagree to 7 = Strongly Agree). The development and validation of the food safety culture measurement was based on a focus group study and a review of literature on safety culture surveys and related food safety studies. The areas and number of questions on the food safety culture measurement included: 1) Leadership (5 items) - the extent to which leaders visibly demonstrate their commitment to food safety; 2) Communication (7 items) - the quality of the transfer of food safety messages and knowledge among management, supervisory staff and coworkers; 3) Self-commitment (5 items) - employees' values and beliefs about food safety practices; 4) Management system and style (5 items) - coordinated activities or policy and procedure to direct or control food safety; 5) Environment support (5 items) - the availability and quality of infrastructure that support the food safety culture; 6) Teamwork (5 items) - coworkers

support with regard to practicing safe food handling in the workplace; 7) Accountability (5 items) - checks and balances in place that make certain desired outcomes are being achieved; 8) Work pressure (5 items) - various aspects of pressure associated with food preparation and service that affects safe food handling practices; 9) Risk perception (5 items) - organizational risk awareness and risk judgment decisions with regard to food safety. The second section of the survey contained questions on participant's demographic and foodservice operation information.

2.2. Pilot testing

Prior to pilot testing, the questionnaire was reviewed in terms of content validity and clarity of wording by experts in the area of food safety. Pilot testing of the questionnaire was conducted with nonsupervisory employees from onsite foodservices located in one Midwestern U.S. state, Iowa. A total of 41 foodservice employees from hospital organizations (n = 2) and schools (n = 4), not included in the final sample, participated in the pilot study. Thirty-one pilot questionnaires were usable after responses from employees with supervisory responsibilities were excluded. The questionnaire was distributed along with an evaluation form for respondents' feedback regarding clarity and understanding along with suggestions for improvement. Minor modifications were made to improve the questionnaire based on comments and suggestions from the pilot test.

2.3 Populations and sample

The targeted population of this study was hourly foodservice employees in hospital and school foodservices. Only employees who held nonsupervisory job positions and were age 18 years or older were included in the sample. Employees selected had job tasks involving food-handling activities such as preparation or serving. These onsite foodservice employees were in located in three Midwest states: Iowa, Minnesota, and Kansas. Higher response rates have been demonstrated with the use of mail surveys in restricted geographical areas compared to national surveys (Unger, 2002).

Cluster sampling technique was employed for selecting the sample of hourly foodservice employees. This technique involved the selection of groups of study units (e.g., foodservice organizations) instead of individual study units (e.g., employee). The technique was used because it is very difficult or almost impossible to identify a complete sampling frame due to: 1) inability to create a current list of employees in licensed facilities, 2) privacy issues for the employees, and 3) turnover within the foodservice industry. Because one of the study objectives

was to compare food safety culture based on operation size, a quota-sampling technique was used to select onsite foodservice organizations.

A sampling list of hospital foodservices was developed based on bed capacity. Each state hospital association website was used as a reference to develop the list. The sample of hospitals for each state consisted of three sizes based on bed capacity: 1) fewer than 25 beds, 2) 25 –100 beds, 3) more than 100 beds. The school foodservices sampling list was developed based on number of students. To generate a sampling list, the Department of Education's National Center for Education Statistics website was referred. A sampling list for each state included four sizes of school: 1) fewer than 1000 students, 2) between 1,000 – 4,999 students, 3) 5,000 – 10,000 students, and 4) more than 10,000 students.

Foodservice directors were initially contacted via telephone or email to seek assistance in distributing the questionnaires to their hourly employees. The study purpose, confidentiality and questionnaire distribution procedure were explained. To motivate participation, a donation of 50 cents was made to a local food pantry for every questionnaire completed. If foodservice directors agreed to participate, they were asked the number of questionnaires they were willing to help distribute. Foodservice directors from 37 hospital and 24 school foodservices agreed to participate and distribute a total of 2,030 questionnaires, including 1,010 for hospital and 1,020 for schools.

2.4. Data Collection

The research protocol and questionnaire was approved by the University Human Subjects Institutional Review Board prior to data collection. The paper questionnaire was printed in a booklet format and color-coded by type of operation. A cover letter and donation form were included as part of the booklet. A packet containing a cover letter and the requested copies of questionnaire was mailed to foodservice directors. Explanation regarding the selection criteria of employees and how the questionnaire should be distributed was provided in the cover letter.

Each employee received a questionnaire with a cover letter explaining the purpose of the study, the participant's rights and confidentiality, and a modified clause of consent to participate. The donation of 50 cent to local food pantries for completed questionnaires was also mentioned in the cover letter. Employees were asked to identify the food pantry where they would like their donations to go selecting from three options. A self-addressed prepaid business reply was used on the questionnaire to facilitate the return process and allow employees to send their completed

questionnaires directly to the researchers. As recommended by Dillman (2007), a post card was sent to foodservice directors after two weeks to remind those who had not distributed the questionnaire to do so. The foodservice directors were also asked to encourage employees to complete and return the questionnaire as soon as they could.

2.5. Data Analysis

Statistical analysis was performed using the Statistical Program for Social Science SPSS (Version 18.0). Descriptive statistics including mean, standard deviation, frequency, and percentage were used to summarize the data. Negatively worded items were reverse coded. Internal consistency (Cronbach alpha) was calculated to evaluate the reliability of the research instrument. Mean comparison analysis (i.e., independent *t*-tests and one-way analysis of variance [ANOVA]) were conducted to examine significant differences in perceptions of food safety culture based on respondents' demographic (gender, age group, years of foodservice experience, time work at current operation, work status, job title, participation in food safety training, and completion of food safety certification) and operation characteristics (management system, operation size, and type of operation). A parametric *F*-test was conducted when there were equal variances between groups while the nonparametric Welch test was run for unequal variances between groups. Post-hoc tests were conducted to determine within group differences.

3. Results

A total of 675 (33.6% response rate) completed questionnaires were returned from respondents in health care (31.7% response rate) and schools (35.5% response rate). Five hundred and eighty two questionnaires were useable after excluding respondents with supervisory or managerial responsibilities position as well as respondents who had non-foodservice related job titles (e.g., janitor, cashier, and driver). Between one and 77 useable surveys were obtained from the participating foodservice locations (n = 51; ten of the 61 locations did not return any questionnaires).

3.1 Profile of respondents

Respondents' demographic characteristics are presented in Table 5.1. The majority (89.6%) of the respondents were female. More than half (55%) of respondents were above 50 years old, whereas less than 20% were between 18 and 29 years old. Respondents were considered experienced employees with 54.4% reporting having worked at least 8 years in the foodservice industry and 36.6% indicating they had stayed more than 8 years in the current

operation. Slightly more respondents had part-time (56.6%) than full-time (43.2%) work status. Respondents' job titles varied from cook to server, including 16.6% who reported having more than one job title. Almost all respondents (95.2%) had received some kind of food safety training with face-to-face and printed materials reported as the most common training mode. About 70% of the respondents indicated they had completed formal food safety certification with a Yes response to the question: Have you completed any formal certification (e.g., ServSafe® certification or other equivalent certification)?

3.2 Food safety culture in onsite foodservices

Respondents' responses to the 47 items measuring nine areas of food safety culture were subjected to principal-components analysis with varimax rotation. This analysis was carried out to group correlated items and summarize the information in a reduced number of factors, which is capable of explaining an expressive part of the variation observed in the set of items. Six factors were extracted, which explained 64.6% of the total variance (results not shown). The six factors were termed as "management and coworker support", "communication", "self-commitment", "environment support", "work pressure", and "risk judgment" based on the items that constituted them. Mean agreement scores were computed for each of these food safety culture factors (Table 5.2). Reliability estimate for each factor was above 0.70, which suggested good reliability (Kline, 1998; Nunnaly & Bernstein, 1994). All food safety culture factors had overall mean agreement scores of 5.0 or above on the 7.0 scale (7 = Strong Agree). Self-commitment had the highest mean score (M = 6.54, SD = 0.75). Respondents also indicated high agreement on the environment support factor (M = 6.31, SD = 0.91). The lowest overall mean agreement scores were reported on factors related to risk judgment (M = 5.51, SD = 1.43) and management and coworker support (M = 5.62, SD = 1.17). .

3.3 The influence of demographic profile on perceptions of food safety culture

Table 5.3 provides the mean agreement scores for food safety culture based on respondents' demographic characteristics. Further analysis of the data showed that the level of agreement toward several factors of food safety culture was significantly different among respondents of different gender, age, work status, years of foodservice experience, time worked at current operation, employment status, and training received. The level of agreement toward the factor of risk judgment was significantly different between female and male respondents (F = 2.796, p = 0.042); female respondents (M = 5.57, SD = 1.40) perceived risk judgment in their

current work place as higher than males (M = 5.07, SD = 1.56). Respondents' perceptions on risk judgment in the workplace were also significantly different among respondents of different age groups (F= 3.801, p =0.010). Bonferroni post-hoc test showed that agreement scores for the risk judgment factor for the older age group (between 50 and 60 years old) (M = 5.73, SD = 1.30) was significantly higher than the youngest age group (between 18 and 29 years old) (M = 5.07, SD = 1.69) with mean difference = 0.6616 (p = 0.005). In other words, female and older generation respondents were unlikely to perceive their organization involved in risk-taking behaviors such taking shortcuts with food safety to save cost or meet production demand than their counterpart.

One-way ANOVA results showed that the level of agreement scores for factors of management and coworker support were statistically different across respondents' years of foodservice experience ($Welch$ = 3.998, p = 0.002). Games-Howell post-hoc test showed that food safety culture agreement scores for management and coworker support among inexperienced respondents (i.e., less than a year work experience) (M = 6.17, SD = 0.84) was significantly higher than respondents who had more years of foodservice experience: 1-2 years (M = 5.72, SD = 1.10); 4-7 years (M = 5.63, SD = 1.29); 8-12 years (M = 5.49, SD = 1.18); 13-20 years (M = 5.51, SD = 1.10); and over 20 years (M = 5.53, SD = 1.14). Similarly, respondents' perceptions toward this factor were significantly different based on the time they had worked at the current operation (F = 2.207, p = 0.050). The level of agreement scores for this food safety culture factor were significantly higher among new employee respondents (i.e., less than a year) (M = 5.95, SD = 1.08) as compared to their coworkers who had worked longer in a particular operation: 8-12 years (M = 5.46, SD = 1.19); 13-20 over 20 years (M = 5.49, SD = 1.10); and over 20 years (M = 5.46, SD = 1.14).

Respondents who worked part-time reported a significantly higher agreement score than full-time respondents on four aspects of food safety culture in their workplaces. Communication (t = -1.930, p = 0.054), management and coworker support (t = -4.115, $p < 0.000$), environment support (t = -2.550, p = 0.011), and work pressure (t = 2.908, p = 0.004) were rated higher among part-time workers than full-time workers. Respondents who had received food safety training rated all factors of food safety culture higher than those without training, except for the factor of self-commitment. The result of t-test analysis showed factors related to significance of others and management practices (t = 3.102, p = 0.002), communication (t = 2.930, p = 0.004),

environment support ($t = 3.242$, $p = 0.001$), work pressure ($t = 3.665$, $p < 0.000$), and risk judgment ($t = 3.885$, $p < 0.000$) had a significantly higher mean agreement score among trained respondents compared to untrained. Mean comparisons for food safety culture scores among respondents with different job titles and completion of food safety certification showed insignificant results, thus findings are not shown. Respondents who provided more than one job title (n = 96) were grouped in a category separate from the other job title category to enable mean comparison analysis of multiple response data. Thus, all individual actual job titles provided could not be analyzed.

3.3 The influence of operation characteristics on perceptions of food safety culture

Table 5.4 presents respondents' mean agreement scores for food safety culture by operation characteristics. Independent t-test and one-way ANOVA were conducted to determine if respondents' operation characteristics (as described by respondents) have an impact on their perceptions toward food safety culture. Comparisons were made based on management system, operation size (i.e., number of staff per shift and estimated total meal served per day), and type of operation. Respondents in self-operated foodservices ($M = 6.46$, $SD = 0.81$) rated environment support significantly higher ($t = 2.10$, $p = 0.037$) than those who worked in contract-managed operations ($M = 6.26$, $SD = 0.98$). Results also showed a significant difference in respondents' mean agreement scores based on number of staff per shift (lunch shift) ($F = 3.238$, $p = 0.022$). Bonferroni post-hoc test results showed that factors management and coworkers support were rated significantly higher among respondents in operations with fewer than five staff per shift ($M = 5.82$, $SD = 1.13$) compared to operations with 11 – 20 staff per shift ($M = 5.37$, $SD = 1.24$). The mean comparison test also indicated the communication factor was rated significantly higher ($F = 2.859$, $p = 0.036$) among respondents in operations that served fewer than 100 total meal per day ($M = 6.04$, $SD = 1.00$) compared to respondents in operations that served between 500 and 1000 meals per day ($M = 5.97$, $SD = 1.19$).

Mean agreement scores for food safety culture by type of operation are presented in Table 5.4. Results of t-test analysis showed that mean agreement scores for factors of management and coworker support among respondents in school ($M = 5.74$, $SD = 1.18$) were significantly higher ($t = -2.592$, $p = 0.010$) than those in hospital foodservice operations ($M = 5.49$, $SD = 1.14$). Respondents in schools also reported significantly higher agreement scores for

factors of work pressure (t = -2.595, p = 0.010) and risk judgment (t = -2.238, p = 0.026) compared to respondents in hospital.

4.0 Discussion

To the best of our knowledge, this study is the first to empirically investigate the current state of food safety culture in onsite foodservices using perceptual measure. Survey respondents were employed in hospital and school foodservices in three Midwest states. Using an instrument developed to understand "the way do we do things [food safety] around here" (Yiannas, 2009, p.12), the current study identified factors that shaped food safety culture within onsite foodservice as perceived by nonsupervisory employees. The results showed that, foodservice employees generally perceived food safety was being practiced within their organizations. Factors describing food safety culture with the highest agreement score were self-commitment and environment support while those factors with the lowest scores included risk judgment and management and coworkers support. From the perspectives of employees in onsite operations, the accessibility to adequate and quality infrastructure as well as employees' internal motivation to follow food safety practices were found to be areas of strength. The significant role of management and coworkers in supporting food safety practices and organizational risk judgment were perceived as areas for potential improvement. To enhance employees' safe food handling practices in the workplace, the findings suggested several targeted intervention strategies: 1) increase visible and tangible leader and management support, 2) develop and ensure consistent enforcement of food safety policies and procedures among all managers and across all management levels, 3) encourage teamwork across multiple departments and multi-generation workforces, 4) create an accountability system using reward and punishment, and 5) communicate risk effectively.

This study identified the influence of demographic variables on employees' perceptions of food safety culture. The findings indicated that some demographic characteristics did affect how employees perceived certain factors associated with their workplace food safety culture. In other words, sub-groups for food safety culture can exist within an organization. Previous research (Glendon & Litherland, 2001; Vinodkumar & Bhasi, 2009) had a mixed conclusion regarding how the measure of organizational culture is independent of demographic variables. On one hand, a good measurement of organizational culture could reflect employees' perceptions regardless of individual backgrounds (e.g., age, educational level, work experience). Yet,

identification of sub-group differences toward organizational culture could help in designing specific intervention programs for each group. Based on the latter view, the current study intended to clarify some advantages of comparing food safety culture among sub-groups.

In this study, employees' evaluations toward factors related to management and coworker support differed based on their years of foodservice experience and duration of employment at the present operation. Unlike new employees, experienced employees tended to have less favorable perceptions on managers' visible commitment to food safety, management consistency in enforcing food safety, and coworkers support to ensure safe food production. These differences seem quite reasonable, as employees improved their own practices by virtue of experience; it is possible they tended to have higher expectations of others (e.g., current managers, management or coworkers) with regard to food safety practices. The finding that inexperienced employees had more positive agreement scores on this factor may be because the new employees or those with shorter lengths of service begin on a relatively positive note with regards to food safety perceptions and then, over time, adopt the operation norms. Also, factors such as management and coworker support are more prevalent when an employee first starts a job through orientation program and assimilation process. Similar results have been reported when comparing junior and senior perceptions in other organizational culture studies (Lu & Shang, 2005; Vinodkumar & Bhasi, 2009). Identifying differences in the food safety culture profile of new and experienced employees can help organizations target intervention strategies based on such differences.

Findings of this study indicated that younger employees (18-29 years old) provided a less favorable response when reporting their organization risk judgment (e.g., taking shortcuts with food safety to save cost or meet production demand) compared to the older workers (50-60 years old). This result could be justified by a possible biased response among the older generation. Studies have shown that employees from the "boomer generation" are extremely loyal toward their employers (Glass, 2007; Karp, Fuller, & Sirias, 2002), and such loyalty might have encouraged respondents to be protective of the organization's reputation when disclosing risk-taking behavior. About 50% of respondents in this age group had stayed more than 8 years at their current organizations. On the other hand, research has also shown that millennial employees value organizational philanthropy and social awareness (Glass, 2007; Hershatter & Epstein, 2010). According to a study on generational differences, millennial age workers (those born

between 1979 and 2001) see themselves as accountable for the betterment of society and perceive that employers should join their altruistic causes (Cone Inc., 2006). Younger employees in the current study were less likely to provide a biased response regarding organization risk-taking behavior, especially when the risk taken on food safety is not aligned with their personal values regarding social responsibility. Further research is needed to support findings on the differences between male and female perceptions of risk judgment because the male sample was relatively small compared to females (n = 60 and 517, respectively).

An interesting finding is that part-time employees had more favorable perceptions on all factors of food safety culture compared to full-time employees except for self-commitment and risk judgment. The differences in perceptions may be related to part-time awareness of food safety practices within their organization. Ferber and Waldfogel (1998) found that many part-time workers intentionally choose and preferred less involvement in relationships with their organizations due to other interests or demands of their time. As expected, employees who had received food safety training showed a more positive view regarding food safety culture than untrained employees. Trained employees may have been more receptive to food safety rules and regulations as they were more aware of hazards and consequences. Thus, it is not surprising they reported higher agreement with respect to all food safety culture factors than those who had not received training. A previous study indicated that employees who had foodservice experience and had formal food safety training were more aware of the importance of food safety practices (Brannon, York, Roberts, Shanklin, & Howells, 2009). According to Brannon et al. (2009), employees' foodservice experiences help them recognize issues associated with performing food safety practices (e.g., advantages, disadvantages, and difficulties). The differences in perceptions between employees with training and those without were significant for all food safety culture factors except self-commitment. However, this finding warrants further investigation, as the number of untrained respondents was very small (n = 28) compared to trained respondents (n = 554). In addition, the amount of training or content of training received was not evaluated in this study. Further research can investigate optimum training inputs in contributions to the food safety culture, given frequently cited barriers of time and resources to provide training.

Employees' perceptions on the factor of self-commitment to follow food safety practices showed no difference regardless of demographic backgrounds. Previous studies also found that internal self-motivation is a significant impetus to perform safe food handling, and it is not

influenced by employees' demographic characteristics (Arendt, Ellis, Strohbehn, Meyer, & Paez, 2011; Ellis et al., 2010). Surprisingly, employees' perceptions of food safety culture were not influenced by whether or not they had completed food safety certification. This result is inconsistent with previous study that suggested restaurant employees' perceptions of organizational culture were different between those with and without food safety certification (Lee et al., 2012). Lee et al. (2012) found restaurant employees' food safety certification moderated the relationship between organizational culture and attitudes toward food safety practices. Current findings were also inconsistent with Neal et al. (2012) study on restaurant employees' assessment of food safety culture based on demographic characteristics. Adapting a Food Safety Climate tool developed from a meat processing plant study (Ball, Wilcock, & Colwell, 2010), Neal et al. (2012) found no significant differences in culture perceptions among restaurant employees with different years of foodservice experience, time worked at the present job, prior food safety training, and food safety certification, whereas in this study of noncommercial foodservice employees, significant differences were found on demographic variables of age, years of foodservice experience, time worked at current operation, and prior food safety training . The difference in findings between the two studies supports the contention that food safety culture in commercial restaurant is dissimilar with noncommercial foodservices, perhaps because employees of different backgrounds are motivated by different aspects of the workplace culture (Ungku Fatimah et al., in press).

Overall, this study has determined that sub-groups for food safety culture exist within an organization based on employees' demographic characteristics. Assessment of food safety culture can help management gain valuable employees feedback, which is useful in establishing baseline and benchmark data points. Organizations' specific findings can allow for sub-group programmatic interventions targeting each factor accordingly. For example, an organization could provide training using customized delivery methods to meet employees of different age groups learning preferences. There have been some supports found for customization of food safety messages to employees of different ages, genders, literacy levels and spoken languages as a way to improve safe food handling (Ellis et al., 2010; Rajagopal & Strohbehn, 2011; Roberts. Arendt, Strobehn, Ellis, & Paez, 2012; Sneed & Strohbehn, 2008).

The current study further explored how food safety culture was different depending on management system and operation size. Employees in self-operated organizations exhibited

more favorable perceptions on environment support than did those in contract-managed operations. Because this result was based on a small sample size, as many respondents did not know their management system, such findings warrant further investigation. Operations of different sizes, as distinguished by number of staff per shift and estimated number of meals served, were different in respect to factors of management and coworker support and communication. The general trend observed was that the scores for these factors reduced and then increased with the size of operation. In other words, favorable perceptions were reported in small and big operations as opposed to medium operations. This result implied there is some interconnection between operation size and employees' perceptions on both factors (i.e., management and coworker support and communication). As demonstrated in a communication study on foodservice employees conducted by the Environmental Health Specialist Network, an effective communication of food safety is supported by good interaction among members of an organization (Beegle, 2004). Beegle (2004) reported that foodservice employees perceived communication methods that had a positive impact on food handling behaviors as follows: 1) demonstrated in an encouraging way by role models, and 2) transferred using understandable words by people who had developed relationships with the receiver. This explained why employees in medium size operations had less favorable perceptions on communication also perceived lack of support from management and among coworkers. Such findings moreover support the importance of employees' awareness for "team-like nature" in the foodservice workplace to effectively communicate and share food safety information and ensure safe food handling practices followed (Chapman et al., 2010, p. 1105).

Finally, food safety culture was compared between hospital and school foodservice operations. Employees in school foodservices exhibited more positive perceptions about management and coworker support, work pressure, and risk judgment compared to those in hospital. Employees in both operations were expected to show different perceptions, due to variations in their food safety management system (FSMS) implementation and activities. School foodservice operations are required by federal law to have implemented food safety plans based on hazard analysis and critical control point (HACCP) principles, while hospitals, particularly small operations, may not have FSMS in place. Luning, Chincilla, Jacxsens, Kirezieva, and Rovira (2013) found that foodservice organizations with different levels of FSMS performance had different levels of context riskiness. Thus, an organization could identify potential risk in

food safety practices by evaluating problematic areas of food safety culture. Griffith et al. (2010b) suggested that assessment of food safety culture could be used to evaluate the likelihood of an outbreak occurrence. Ineffective communication, poor management commitment, and inadequate facilities (characteristics of a poor food safety culture) have been identified as the risk factors in operations implicated with foodborne illness outbreak (Powell et al., 2011). It is suggested that foodservice organizations rank their food safety culture scores by factors and those factors with the lowest score can be targeted for improvement.

5.0 Conclusion

Several limitations are recognized in the design of the study. The sample of the study did not include other types of onsite foodservice such as college and university foodservice or assisted living facilities. Thus, generalization cannot be inferred to all types of onsite foodservice as some operations might feature different characteristics that contribute to an organizational food safety culture. Also, the study sample was selected only in the U.S. Midwest, namely in the states of Iowa, Kansas and Minnesota. Findings may not be generalized to the general population of onsite foodservices throughout the nations because regulations and the enforcement of food safety laws are not the same for all states and employee characteristics may be different as well. The use of a self-reported measurement of food safety culture could have produced a biased result as respondents may have provided socially desirable responses. Despite the guarantee of confidentiality and anonymity, respondents may have been concerned that providing a true response pertaining to the culture of food safety practices in their organization could possibly affect respondents' workplace reputation and business. These limitations should be taken into account and interpretation of the findings must be made with some cautions. Finally, the use of cross-sectional survey design could only provide a snapshot of the prevailing food safety culture in an organization; thus results of this study may not capture a comprehensive view of employees' perceptions across time.

In conclusion, this study indicated that onsite foodservice employees generally perceived a positive food safety culture in their organizations with some room for improvement in the areas of management and coworker support and risk judgment. Specific information about how sub-groups exist and differ has been obtained from this study. Evaluation of food safety culture among sub-groups helps organizations focus on where and what food safety programs or interventions should be targeted to benefit each group of employee the most. Organizations can

assess their food safety culture and establish a benchmark score, which can be used to compare food safety culture among departmental units within an organization system. For instance, a school district with multiple food preparation and service buildings may find similarities and differences when culture is assessed by building. This comparison help identify areas or units requiring special attention. Comparing food safety culture between similar segments of the industry could provide organizations with the impetus to improve food safety outcomes and better understand risk. The measure developed for this study may be used in future research to investigate the impact of food safety culture on organizational food safety outcomes such as inspection results using organization-level analysis. Finally, future research could pay more attention on the extent to which culture factors affecting individual and organization food safety performances are interrelated and change over time.

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Table 5.1 Respondents profile (*n* = 582)

Variables	n	%
Gender		
Female	517	89.6
Male	60	10.4
Age		
18-29 years	71	12.2
30-49 years	190	32.6
50-60 years	184	31.6
Over 60 years	137	23.5
Time worked in foodservice operations		
Less than 1 year	43	7.4
1-3 years	84	14.4
4 -7 years	138	23.7
8 – 12 years	114	19.6
13 – 20 years	84	14.4
Over 20 years	119	20.4
Time worked in current operation		
Less than 1 year	91	15.6
1-3 years	131	22.5
4 -7 years	147	23.5
8 – 12 years	95	16.3
13 – 20 years	54	9.3
Over 20 years	64	11.0
Employment status		
Full-time	250	43.2
Part-time	328	56.6
Job title		
Cook/line cook	142	24.6
Food prep	69	12.0
Foodservice assistant	108	18.7
Dishwasher	22	3.8
Server	52	9.0
Other	88	15.3
More than 1 job title provided	96	16.6
Received food training[a]	554	95.2
Training mode[b]		
Face-to-face	439	75.4
Video	318	54.7
Computer/Internet	227	39.0
Printed material	374	64.3
Demonstration/on-the-job	286	49.1
Job orientation	262	45.0
Completion of formal food safety certification[a]	396	68.9

[a] Yes responses
[b] Percentage calculated based on number of response

Table 5.2 Mean agreement scores for food safety culture as perceived by nonsupervisory employees (n = 582)

Factor and items	Mean[a] ± SD
Factor 1: Management and coworker support (α = 0.948)	
Management inspires me to follow safe food handling practices	5.83 ± 1.32
My manager is actively involved in making sure safe food handling is practiced	5.80 ± 1.39
There is good cooperation among departments to ensure that customers receive safely prepared food	5.76 ± 1.33
New employees and experienced employees work together to ensure food safety practices are in place	5.75 ± 1.26
Management enforces food safety rules consistently with all employees	5.74 ± 1.47
When lots of work needs to be done quickly, employees work together as a team to get the tasks completed safely	5.61 ± 1.54
My manager always watches to see if employees are practicing safe food handling	5.55 ± 1.45
My coworkers are always supportive of each other regarding food safety	5.54 ± 1.45
Employees remind each other about following food safety practices	5.42 ± 1.42
Employees are disciplined or reprimanded when they fail to follow food safety practices	5.26 ± 1.43
Overall mean	**5.62 ± 1.17**
Factor 2: Communication (α = 0.923)	
I can freely speak up if I see something that may affect food safety	6.09 ± 1.33
My manager generally gives appropriate instructions on safe food handling	5.95 ± 1.28
All of the necessary information for handling food safely is readily available to me area	5.93 ± 1.22
Management provides adequate and timely information about current food safety rules and regulations	5.86 ± 1.25
I am encouraged to provide suggestions for improving food safety practices	5.68 ± 1.42
All managers give consistent information about food safety	5.67 ± 1.45
Overall mean	**5.82 ± 1.12**
Factor 3: Self-commitment (α = 0.915)	
I follow food safety rules because it is my responsibility to do so	6.59 ± 0.80
Food safety is a high priority to me	6.58 ± 0.83
I follow food safety rules because I think they are important	6.58 ± 0.84
I am committed to following all food safety rules	6.53 ± 0.89
I keep my work area clean because I do not like clutter	6.43 ± 1.00
Overall mean	**6.54 ± 0.75**
Factor 4: Environment support (α = 0.903)	
Equipment items needed to prepare food safely (e.g., hand washing sinks) are readily available and accessible	6.42 ± 1.03
Adequate supplies are readily available to perform safe food handling practices	6.36 ±0.10
Facilities are of adequate quality to follow safe food handling practices	6.30 ±1.01
I am provided with quality supplies that make it easy for me to follow safe food handling practices	6.18 ±1.09
Overall mean	**6.31 ± 0.91**
Factor 5: Work pressure (α = 0.878)	
My work load does not interfere with my ability to follow safe food handling practices	5.84 ±1.28
I always have enough time to follow safe food handling procedures, even during rush hours	5.73 ±1.31
The number of staff scheduled at each shift is adequate for me to get my work done and handle food safely	5.64 ±1.41
Overall mean	**5.74 ± 1.19**

Factor 6: Risk judgment ($\alpha = 0.756$)	
I believe that written food safety policies and procedures are nothing more than a cover-up in case there is a lawsuit [b]	5.39 ± 1.80
I am sometimes asked to cut corners with food safety so we can save costs when preparing food [b]	5.46 ± 1.73
When there is pressure to finish food production, managers sometimes tell us to work faster by taking shortcuts with food safety[b]	5.71 ± 1.66
Overall mean	**5.51 ± 1.43**

[a] 7-point Likert scale used with 1 = Strongly Disagree; 7 = Strongly Agree
[b] Item was reversely coded

Table 5.3 Mean agreement scores for food safety culture by demographic characteristics (n = 582)

Characteristics	n	Mean[a,b] ± SD					
		Management and coworkers support	Communication	Self-commitment	Environment support	Work pressure	Risk judgment[c]
Gender							
Female	517	5.63 ± 1.17	5.82 ± 1.12	6.56 ± 0.74	6.34 ± 0.91	5.76 ± 1.19	5.57 ± 1.40^{A}
Male	60	5.59 ± 1.14	5.87 ± 1.11	6.40 ± 0.82	6.13 ± 0.89	5.61 ± 1.20	5.07 ± 1.56^{B}
Age							
18-29 years old	71	5.68 ± 1.01	5.99 ± 0.82	6.50 ± 0.74	6.35 ± 0.81	5.83 ± 1.10	5.07 ± 1.69^{A}
30-49 years old	190	5.49 ± 1.24	5.69 ± 1.15	6.50 ± 0.79	6.25 ± 0.94	5.64 ± 1.24	5.49 ± 1.39^{AB}
50-60 years old	184	5.71 ± 1.09	5.91 ± 1.08	6.59 ± 0.64	6.38 ± 0.86	5.85 ± 1.14	5.73 ± 1.30^{B}
Over 60 years old	137	5.64 ± 1.23	5.81 ± 1.27	6.56 ± 0.82	6.29 ± 0.97	5.69 ± 1.26	5.49 ± 1.44^{AB}
Years of foodservice experience							
Less than 1 years	43	6.17 ± 0.88^{A}	6.26 ± 0.84	6.66 ± 0.65	6.53 ± 0.79	6.10 ± 0.93	5.78 ± 1.44
1-2 years	84	5.72 ± 1.10^{B}	5.91 ± 1.01	6.68 ± 0.61	6.35 ± 0.87	5.76 ± 1.16	5.39 ± 1.53
4 -7 years	138	5.63 ± 1.29^{B}	5.86 ± 1.10	6.53 ± 0.74	6.33 ± 0.89	5.72 ± 1.15	5.51 ± 1.45
8 -12 years	114	5.49 ± 1.18^{B}	5.74 ± 1.15	6.45 ± 0.88	6.20 ± 1.06	5.69 ± 1.26	5.43 ± 1.42
13-20 years	84	5.51 ± 1.10^{B}	5.67 ± 1.27	6.45 ± 0.85	6.26 ± 0.90	5.64 ± 1.21	5.46 ± 1.30
Over 20 years	119	5.53 ± 1.14^{B}	5.76 ± 1.16	6.57 ± 0.65	6.35 ± 0.84	5.74 ± 1.28	5.63 ± 1.42
Time worked at current operation							
Less than 1 years	91	5.95 ± 1.08^{A}	5.99 ± 1.02	6.58 ± 0.70	6.42 ± 0.91	5.94 ± 1.13	5.80 ± 1.24
1-2 years	131	5.61 ± 1.14^{AB}	5.88 ± 1.02	6.60 ± 0.81	6.33 ± 0.81	5.80 ± 1.10	5.39 ± 1.52
4 -7 years	147	5.63 ± 1.24^{AB}	5.86 ± 1.10	6.34 ± 0.88	6.34 ± 0.88	5.72 ± 1.13	5.50 ± 1.48
8-12 years	95	5.46 ± 1.19^{B}	5.74 ± 1.21	6.14 ± 1.12	6.14 ± 1.12	5.63 ± 1.36	5.40 ± 1.43
13-20 years	54	5.49 ± 1.10^{B}	5.65 ± 1.29	6.33 ± 0.83	6.33 ± 0.82	5.55 ± 1.16	5.58 ± 1.21
Over 20 years	64	5.46 ± 1.14^{B}	5.64 ± 1.24	6.33 ± 0.88	6.33 ± 0.88	5.69 ± 1.36	5.52 ± 1.52
Work Status							
Full-time	250	5.39 ± 1.21^{A}	5.72 ± 1.16^{A}	6.48 ± 0.81	6.20 ± 0.95^{A}	5.58 ± 1.26^{A}	5.38 ± 1.50
Part-time	328	5.79 ± 1.11^{B}	5.90 ± 1.09^{B}	6.60 ± 0.68	6.40 ± 0.87^{B}	5.86 ± 1.13^{B}	5.61 ± 1.36
Received food safety training							
Yes	554	5.65 ± 1.15^{A}	5.85 ± 1.12^{A}	6.55 ± 0.74	6.34 ± 0.89^{A}	5.78 ± 1.18^{A}	5.55 ± 1.44^{A}
No	28	4.96 ± 1.28^{B}	5.22 ± 1.17^{B}	6.38 ± 0.81	5.78 ± 1.03^{B}	4.94 ± 1.33^{B}	4.77 ± 1.01^{B}

[a] 7-point Likert scale used with 1 = Strongly Disagree; 7 = Strongly Agree

[b] Means within a column with different capital letters indicate significant differences at p-value < 0.05 (e.g., mean agreement score for risk judgment among female was significantly higher than male)

[c] Items were reversely coded

Table 5.4 Mean agreement scores for food safety culture by operation characteristics (n = 582)

Characteristics	n	Mean[a,b] ± SD					
		Management and coworkers support	Communication	Self-commitment	Environment support	Work pressure	Risk judgment[c]
Management system							
Self-operated	270	5.77 ± 1.11	5.99 ± 0.10	6.65 ± 0.58	6.46 ± 0.81^{A}	5.85 ± 1.15	5.77 ± 1.33
Contract management	101	5.56 ± 1.30	5.90 ± 1.07	6.49 ± 0.84	6.26 ± 0.98^{B}	5.64 ± 1.39	5.48 ± 1.56
Number of employees per shift (lunch)							
Less than 5	137	5.82 ± 1.13^{A}	6.01 ± 0.98	6.62 ± 0.63	6.41 ± 0.88	5.80 ± 1.20	5.78 ± 1.41
6 -10	248	5.66 ± 1.14^{AB}	5.81 ± 1.14	6.54 ± 0.77	6.34 ± 0.89	5.77 ± 1.17	5.47 ± 1.41
11-20	117	5.37 ± 1.24^{B}	5.71 ± 1.18	6.44 ± 0.83	6.15 ± 0.98	5.62 ± 1.17	5.42 ± 1.43
More than 20	51	5.58 ± 1.15^{AB}	5.77 ± 1.23	6.74 ± 0.53	6.39 ± 0.82	5.83 ± 1.32	5.30 ± 1.52
Estimated total meal served							
Less than 100	81	5.76 ± 1.04	6.04 ± 1.00^{A}	6.52 ± 0.72	6.46 ± 0.86	5.86 ± 1.15	5.72 ± 1.26
101 to- 500	273	5.58 ± 1.17	5.84 ± 1.09^{AB}	6.56 ± 0.67	6.28 ± 0.89	5.69 ± 1.23	5.55 ± 1.39
501 to- 1000	123	5.55 ± 1.14	5.60 ± 1.19^{B}	6.51 ± 0.87	6.27 ± 0.96	5.62 ± 1.19	5.35 ± 1.45
More than 1000	95	5.71 ± 1.23	5.90 ± 1.17^{AB}	6.59 ± 0.78	6.37 ± 0.90	5.98 ± 1.10	5.58 ± 1.47
Type of operation							
Hospital	287	5.49 ± 1.14^{A}	5.83 ± 1.06	6.53 ± 0.72	6.32 ± 0.84	5.61 ± 1.23^{A}	5.38 ± 1.48^{A}
School	295	5.74 ± 1.18^{B}	5.82 ± 1.18	6.55 ± 0.78	6.31 ± 0.97	5.87 ± 1.15^{B}	5.64 ± 1.36^{B}

[a] 7-point Likert scale used with 1 = Strongly Disagree; 7 = Strongly Agree

[b] Means within a column with different capital letters indicate significant differences at $p < 0.05$ (e.g., mean agreement score for risk judgment among school employees was significantly higher than hospital employees)

[c] Items were reversely coded

CHAPTER 6: GENERAL CONCLUSIONS

This study was designed to gain insights into food safety culture using a perceptual measure developed and validated for onsite foodservice operations. Data were collected from foodservice employees who held nonsupervisory positions in hospital and school foodservice using qualitative and quantitative approaches. This chapter summarizes the key findings from qualitative and quantitative research phases. Implications of the findings, limitations of the study, and recommendation for future research are also presented in this chapter.

Summary of Results

A two-phase research was employed. In phase 1, which used a qualitative approach to data collection, relevant factors of food safety culture were identified from focus group discussions. Participant's constituted 93.5% female and slightly more than half (54.8%) reported their age were 30 years old or older. Participants' experience in foodservice ranged from less than a year (19.4%) to more than 20 years (12.9%). Most of the participants were part-time employees (64.5%) and had received food safety training (93.5%) and certification (71.0%). Close to three-fourths of participants (71.0%) worked in self-operated as opposed to contract-manage foodservices (29.0%). During the focus group, participants were asked to describe aspects that influenced their safe food handling practices in the workplace. Nine main themes emerged from the focus groups data: 1) leadership and leader's role, 2) communication, 3) self-commitment, 4) management system and style, 5) environment support, 6) teamwork, 7) accountability, 8) work pressure, and 9) risk perception (see Appendix L). A measurement scale of food safety culture was developed based on the focus group results; the scale had 47 items representing the nine themes and 34 subthemes.

In the second phase of the study, the food safety culture measurement scale was tested to establish its psychometric properties. A total of 2030 questionnaires were administered to 61 locations of onsite foodservice operations in three Midwest states, Iowa, Kansas and Minnesota. A total of 582 useable surveys were obtained from employees in 37 hospital (n = 287) and 24 school foodservice (n = 295) operations, which represented a 31.7% and 35.5% response rate, respectively. Respondents consisted of 89.6% female and more than half (55.1%) were 50 years old or older. Respondents were comprised of experienced employees with 54.4% reporting having worked at least eight years in the foodservice industry and 36.6% indicating they had been with the current operation for more than eight years. Slightly more respondents had part-

time (56.6%) than full-time (43.2%) work status. Respondents' job titles varied from cook to server, including 16.6% who reported having more than one job title. Almost all respondents (95.2%) had received some kind of food safety training and about 68.9% of the respondents reported they had earned food safety certification.

The survey data were subjected to factor analysis to identify the underlying factors of food safety culture and confirm the nine factors found in the qualitative phase. Six factors were extracted, which explained 64.6% of the total variance. Based on the items that constituted them, the six factors were termed as "management and coworkers support", "communication", "self-commitment", "environment support", "work pressure", and "risk judgment". The internal-consistency coefficient value (Cronbach's alpha) of each factor ranged from 0.756 to 0.948, which was above the acceptable limit of 0.60 (Nunally & Beistein, 2004) (Appendix M). Confirmatory factor analysis with maximum likelihood estimation was performed to validate the measurement scale. The CFA result indicated good fit statistics: $\chi^2/df = 3.914$, normed fit index [NFI] = 0.916, incremental fit index [IFI] = 0.940, Tucker Lewis fit coefficient [TLI] = 0.929, comparative fit index [CFI] = 0.940, and root-mean-square error of approximation [RMSEA] = 0.057). Convergent validity was satisfactory as evident by significant confirmatory factor loadings ($p < 0.001$) as shown in Appendix M and N. The average variance extracted was all greater than the corresponding inter-construct squared correlation (except for inter-construct squared correlation for "communication" and "management and coworkers support") which provided evidence of discriminant validity. These results suggested a good set of measures for assessing employees' perceptions of organizational food safety culture. Additionally, the findings provided empirical support for the multi-dimensional nature of food safety culture, particularly in the onsite segment of the foodservice industry.

Further analysis of the survey data was performed to determine employees' perceptions on food safety culture in onsite foodservice, and how these perceptions differ based on employees demographics as well as the characteristics and type of operation they work in. In general, respondents had strong agreement regarding food safety practices in their workplaces. The highest mean agreement scores were reported for factors self-commitment ($M = 6.54$, $SD = 0.75$) followed by environment support ($M = 6.31$, $SD = 0.91$) and communication ($M = 5.82$, $SD = 1.12$). The lowest agreement scores were for factors risk judgment ($M = 5.51$, $SD = 1.43$) and management and coworker support ($M = 5.62$, $SD = 1.17$). These results suggested factors of

management and coworker support and organizational risk judgment were potential areas for improvement.

To determine differences in employees' perceptions about food safety culture based on their demographic characteristics, t-test and one-way ANOVA were conducted. Statistically significant differences ($p < 0.05$) were found in mean scores for risk judgment among employees of different gender and age groups. Mean scores for management and coworkers support were significantly different ($p < 0.05$) among employees with different years of foodservice experience and time worked at current operations. T-test results also showed perceptions about factors of communication ($p = 0.054$), management and coworker support ($p < 0.001$), environment support ($p = 0.011$), and work pressure ($p = 0.004$) differed significantly between full-time and part-time employees. Finally, employees who had received food safety training had a significantly higher mean score ($p < 0.05$) than untrained employees for all factors except self-commitment. No significant differences were found based on employee's job titles and completion of food safety certification for all food safety culture factors.

Further investigation of food safety culture showed operations with different management systems had significantly different mean scores for environment support factors. Employees in self-operated organizations rated environment support significantly higher ($t = 2.10$, $p = 0.037$) than those who worked in contract-managed foodservices. Operations of different size (based on number of staff per shift and estimated total meals served per day) also had significantly different mean scores for management and coworkers support as well as the factor of communication. Specifically, management and coworker support was rated differently across operations with different numbers of staff per shift ($F = 3.238$, $p = 0.022$). Results also indicated communication factor was rated significantly different across operations that varied in the estimated total meals served per day ($F = 2.859$, $p = 0.036$). Food safety culture was also compared between hospital and school foodservice operations. Results indicated factors of management and coworker support, work pressure, and risk judgment were rated significantly higher in school compared to hospital foodservice operations.

Implication of the Findings

Findings of this study may have several implications from a practical standpoint. Onsite foodservice employees in general perceived a positive food safety culture in their organizations. Some rooms for improvement in the areas of management and coworker support as well as risk

judgment however were identified. To enhance employees' safe food handling practices in the workplace, the findings suggested that organizations would benefit from providing greater management support through: 1) increased visible and tangible leader and management support, 2) consistent enforcement of food safety policies and procedures among all managers and across all management levels, and 3) creation of an accountability system using reward and punishment. Organizations could also increase support among coworkers by encouraging teamwork across multiple departments and multi-generational workforces. To demonstrate organization risk awareness, food safety culture should be built on a strong foundation of a clearly defined value organization attached to food safety, which is reflected in organization policies and procedures. Additionally, organizations can assess their food safety culture and establish a benchmark score, which can be used to compare food safety cultures among operational units within an organization system. This comparison can identify areas or units requiring special attention.

Organizations should be aware that there are variations in perceptions toward food safety culture among employees of different backgrounds. The measurement of food safety culture can be used to evaluate the state of food safety culture in organizations at any point of time to design food safety interventions targeting sub-groups based on age, years of foodservice experience, time worked at the current operation, or work status. Comparing food safety culture between similar segments of the industry could provide organizations with the impetus to improve food safety outcomes and a better understanding of risk.

Findings of this study also have contributions to the body of knowledge on food safety culture. This study presents evidence that food safety culture perceptions in onsite foodservice settings can be reliably measured on six factors: management and coworkers support, communication, self-commitment, environment support, work pressure, and risk judgment. Most of the factors are consistent with previously identified or proposed factors (Ball, Wilcock, & Colwell, 2010; Griffith, Livesey, & Clayton, 2010; Neal, Binkley, & Henroid, 2012; Taylor, 2011; Yiannas, 2009) with slight differences in the number of factors that are specifically relevant for onsite foodservice. Although the significance of organizational culture on employees' safety performance has been widely documented in other fields of study, only recently has this concept received attention in the foodservice and hospitality research arenas. Most published works were at a conceptual level and only limited studies have been carried out in the aforementioned research field. Furthermore, little is known about research that has

developed a quantitative measure to assess food safety culture in onsite foodservice. An important feature of the food safety culture scale obtained in this study is its high degree of reliability and construct validity. The measure could potentially be used in future research to investigate the impact of food safety culture on organizational food safety outcomes such as inspection results using organization-level analysis.

This study demonstrated that food safety culture is partly shaped by some elements that require soft skills (e.g., communication, leadership, and human resources management). Thus, educators are recommended to introduce the concept of food safety culture into the hospitality and dietetics curricula, and emphasize the significance of these skills in managing food safety. Several researchers have stressed the importance of soft-skills in food safety education (Roberts, Arendt, Strohbehn, Ellis, & Paez, 2012; Scheule, 2000), and the use of lecture–style approach to teach this skill may be inadequate (Roberts et al., 2012). To help educators prepare future foodservice managers with such skills, the measurement scale developed in this study can potentially be used in courses such as quantity food production or fine dining management to evaluate and improve students' soft skills required for managing food safety in a practice production setting. Students who hold managerial positions in each class event are charge with developing food safety culture among their classmate and will receive feedback from instructor based on the result of food safety culture survey conducted in class.

Limitations of the Study

This study is not without limitations. The use of a convenience quota sampling technique in selecting onsite foodservice operations for data collection in phase two may not have resulted in a representative sample of the population, thus limiting generalization of the findings. Sample of the current study also did not include other types of onsite operations such as college and university foodservice, childcare center, or assisted living facilities. Thus, generalization cannot be inferred to all types of onsite foodservice as some operations might feature different natures of operation that shaped an organizational food safety culture. Another limitation of this study is the sample was drawn from foodservices in Midwest areas only, namely the states of Iowa, Kansas and Minnesota. Findings may not be generalized to general population of onsite foodservices throughout the nations because regulations and the enforcement of food safety laws are not the same for all states.

The use of a self-reported measurement of food safety culture could have produced a biased result as respondents may have provided socially desirable responses. In addition, respondents may have been concerned that providing a true response pertaining to the culture of food safety practices in their organization could possibly affect respondents' workplace reputation and business. These limitations should be taken into account and interpretation of the findings must be made with some cautions. Finally, the use of cross-sectional survey design may not capture a comprehensive view of employees' perceptions across time and only provide a snapshot of the prevailing food safety culture.

Recommendation for Future Research

Because the current study focused only on nonsupervisory employees to identify relevant food safety culture factors, future research could gain insight into a broader view about food safety culture from managerial and policy maker perspectives. The inclusion of multiple informants holding different roles and responsibility with regard to food safety will provide a triangulation and increase the trustworthiness of the findings

Further research is needed to confirm and validate the application of the food safety culture measure in other types of onsite foodservice operations (e.g., college/university dining, childcare center, assisted living, etc.). In addition, to validate the current findings, future research should be directed toward using a larger and more generalizable sample. Research conducted with a national sample selected using random sampling technique could also be conducted. The use of a larger sample and a more rigorous sampling method would enable findings to be generalized to a broader population. The picture could be different if the sample had been drawn in states with different regulations and enforcement of food safety laws.

Future research could also test the extent to which food safety culture correlates with organizational food safety performances (e.g., inspection scores) and determine key factors that significantly contribute to these performances. Investigating the relationship between employees' perceptions on food safety culture and individual actual food safety practices can be another avenues for future endeavor. By knowing which factors significantly affect safe food handling practices, organizations could focus their improvement efforts and resources to maintain or enhance a positive food safety culture. Findings of this study suggested training influenced perceptions of food safety culture, but it is not known what type or method of training or length and frequency of training determine these perceptions. Therefore, further exploration of training impact on food

safety culture can be done. Finally, future research could address how culture factors affecting individual and organization food safety performances are interrelated and change over time.

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APPENDIX A: HUMAN SUBJECTS APPROVAL

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Institutional Review Board
Office for Responsible Resear
Vice President for Research
1138 Pearson Hall
Ames, Iowa 50011-2207
515 294-4566
FAX 515 294-4267

Date: 1/19/2012

To: Zainal Abidin Ungk Ungku
62C Schilletter Village
Ames, IA 50010

CC: Dr. Susan Wohlsdorf Arendt
9E MacKay Hall
Dr. Catherine H Strohbehn
31 MacKay Hall

From: Office for Responsible Research

Title: Measuring Food Safety Culture: Insight from Onsite Foodservice Operations

IRB ID: 12-019

Study Review Date: 1/18/2012

The project referenced above has been declared exempt from the requirements of the human subject protections regulations as described in 45 CFR 46.101(b) because it meets the following federal requirements for exemption:

- (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey or interview procedures with adults or observation of public behavior where
  - Information obtained is recorded in such a manner that human subjects cannot be identified directly or through identifiers linked to the subjects; or
  - Any disclosure of the human subjects' responses outside the research could not reasonably place the subject at risk of criminal or civil liability or be damaging to their financial standing, employability, or reputation.

The determination of exemption means that:

- **You do not need to submit an application for annual continuing review.**

- **You must carry out the research as described in the IRB application.** Review by IRB staff is required prior to implementing modifications that may change the exempt status of the research. In general, review is required for any modifications to the research procedures (e.g., method of data collection, nature or scope of information to be collected, changes in confidentiality measures, etc.), modifications that result in the inclusion of participants from vulnerable populations, and/or any change that may increase the risk or discomfort to participants. Changes to key personnel must also be approved. The purpose of review is to determine if the project still meets the federal criteria for exemption.

  Non-exempt research is subject to many regulatory requirements that must be addressed prior to implementation of the study. Conducting non-exempt research without IRB review and approval may constitute non-compliance with federal regulations and/or academic misconduct according to ISU policy.

  Detailed information about requirements for submission of modifications can be found on the Exempt Study Modification Form. A Personnel Change Form may be submitted when the only modification involves changes in study staff. If it is determined that exemption is no longer warranted, then an Application for Approval of Research Involving Humans Form will need to be submitted and approved before proceeding with data collection.

APPENDIX B: HUMAN SUBJECTS MODIFICATION APPROVAL

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Institutional Review Board
Office for Responsible Research
Vice President for Research
1138 Pearson Hall
Ames, Iowa 50011-2207
515 294-4566
FAX 515 294-4267

Date: 4/11/2012

To: Zainal Abidin Ungk Ungku
62C Schilletter Village
Ames, IA 50010

CC: Dr. Susan Wohlsdorf Arendt
9E MacKay Hall

From: Office for Responsible Research

Title: Measuring Food Safety Culture: Insight from On-site Foodservice Operations

IRB ID: 12-019

Study Review Date: 4/9/2012

The project referenced above has been declared exempt from the requirements of the human subject protections regulations as described in 45 CFR 46.101(b) because it meets the following federal requirements for exemption:

- (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey or interview procedures with adults or observation of public behavior where
  - Information obtained is recorded in such a manner that human subjects cannot be identified directly or through identifiers linked to the subjects; or
  - Any disclosure of the human subjects' responses outside the research could not reasonably place the subject at risk of criminal or civil liability or be damaging to their financial standing, employability, or reputation.

The determination of exemption means that:

- **You do not need to submit an application for annual continuing review.**

- **You must carry out the research as described in the IRB application.** Review by IRB staff is required prior to implementing modifications that may change the exempt status of the research. In general, review is required for any modifications to the research procedures (e.g., method of data collection, nature or scope of information to be collected, changes in confidentiality measures, etc.), modifications that result in the inclusion of participants from vulnerable populations, and/or any change that may increase the risk or discomfort to participants. Changes to key personnel must also be approved. The purpose of review is to determine if the project still meets the federal criteria for exemption.

  Non-exempt research is subject to many regulatory requirements that must be addressed prior to implementation of the study. Conducting non-exempt research without IRB review and approval may constitute non-compliance with federal regulations and/or academic misconduct according to ISU policy.

  Detailed information about requirements for submission of modifications can be found on the Exempt Study Modification Form. A Personnel Change Form may be submitted when the only modification involves changes in study staff. If it is determined that exemption is no longer warranted, then an Application for Approval of Research Involving Humans Form will need to be submitted and approved before proceeding with data collection.

Please note that you must submit all research involving human participants for review. **Only the IRB or designees may make the determination of exemption**, even if you conduct a study in the future that is exactly like this study.

Please don't hesitate to contact us if you have questions or concerns at 515-294-4566 or IRB@iastate.edu.

APPENDIX C: STANDARD E-MAIL SCRIPT

Script to Seek Permission for Focus Group Voluntary Participation

Dear Foodservice Director,

I am a graduate student in the Hospitality Management Program at Iowa State University. I am conducting a study exploring foodservice employees' perceptions toward the influence of workplace on their safe food handling practices, which is funded by the Foodservice Systems Management Educational Council. I am writing this email to seek your permission to recruit your foodservice employees who hold nonsupervisory positions for this study.

Foodservice employees will be invited to participate in focus group discussions off work-site and they will receive a monetary thank you gift for participation. Thus, I would like to request if participant recruitment flyers could be posted in your operation. Below is a proposed date and time that I will come to post the flyers:

Date Time

If you are willing to allow me to post the recruitment flyers, please reply back to this email. Should you have any difficulties, or you are OK with the date, I would very much appreciate if you could kindly notify me. I will do a follow up through phone to see if you are interested.

Please do not hesitate to contact me or my major professors, Dr. Catherine Strohbehn and Dr. Susan Arendt, should you have questions. Our contact information is listed below. I look forward to hearing back from you soon. Thank you in advance for your time and consideration.

Best regards,

Ungku Fatimah Zainal Abidin
Graduate Student
Hospitality Management
Iowa State University
515-572-4077
ufuza@iastate.edu

Catherine H. Strohbehn
Professor, Extension Specialist
Hospitality Management
Iowa State University
515-294-3527
cstrohben@iastate.edu

Susan W. Arendt
Associate Professor
HospitalityManagement
Iowa State University
515-294-7575
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APPENDIX D: INFORMED CONSENT DOCUMENT

Title of Study: **Measuring Food Safety Culture: Insight into Onsite Foodservice Operation**

Investigators: **Ungku Fatimah Ungku Zainal Abidin, PhD Candidate; Catherine Strohbehn, PhD; Susan Arendt, PhD**

This is a research study. Please take your time in deciding if you would like to participate. Please feel free to ask questions at any time.

INTRODUCTION
The purpose of this study is to obtain hourly employees' perceptions about the influence of workplace on their safe food handling practices in onsite foodservice organizations. You are being invited to participate in this study because you are an hourly employee at an onsite foodservice organization. You should not participate if you are an employee with supervisory responsibility.

DESCRIPTION OF PROCEDURES
If you agree to participate in this focus group, your participation will last approximately two hours. During the study you may expect the following procedure to be followed: you will be asked to participate in the focus group and verbally express your thoughts and feelings about safe food handling practices. We will be asking questions related to the role of your organization in influencing your safe food handling practices. You will also be asked to complete a short survey about your demographic information.

Digital recorders will be used to audio record the focus group session. Please do not refer to yourself or others by their true name so that we may keep responses anonymous. The recordings will be erased upon study completion and publication of results.

RISKS
There are no foreseeable risks at this time from participating in this study.

BENEFITS
If you decide to participate in this study there will be no direct benefit to you. (A benefit is defined as a "desired outcome or advantage."). It is hoped that the information gained in this study will benefit society by providing valuable information that might assist onsite foodservice organizations in the design and evaluation of interventions to enhance food safety outcomes.

COSTS AND COMPENSATION
You will not have any costs from participating in this study. You will be compensated for participating in this study. You will receive $40 as a token of appreciation for your participation. You will need to complete a form to receive payment. Please know that payments may be subject to tax withholding requirements, which vary depending upon whether you are a legal resident of the U.S. or another country.

PARTICIPANT RIGHTS
Your participation in this study is completely voluntary and you may refuse to participate or leave the study at any time. If you decide to not participate in the study or leave the study early, it will not result in any penalty or loss of benefits to which you are otherwise entitled.

CONFIDENTIALITY
Records identifying participants will be kept confidential to the extent permitted by applicable laws and regulations and will not be made publicly available. However, federal government regulatory agencies, auditing departments of Iowa State University, and the Institutional Review Board (a committee that reviews and approves human subject research studies) may inspect and/or copy your records for quality assurance and data analysis. These records may contain private information.

To ensure confidentiality to the extent permitted by law, the following measures will be taken: 1) focus group responses will remain completely anonymous and no identifiers will be used; 2) only identified researchers will have access to the research records; 3) research records will be kept in a locked filing cabinet and password protected computer files. If the results are published, your identity will remain confidential.

QUESTIONS OR PROBLEMS
You are encouraged to ask questions at any time during this study.

- For further information about the study contact:
  Ungku Fatimah Ungku Zainal Abidin, 515-572-4077
  Catherine Strohbehn, 515-294-3527
  Susan Arendt, 515-294-7575
- If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, (515) 294-3115, Office for Responsible Research, Iowa State University, Ames, Iowa 50011.

****

PARTICIPANT SIGNATURE
Your signature indicates that you voluntarily agree to participate in this study, that the study has been explained to you, that you have been given the time to read the document, and that your questions have been satisfactorily answered. You will receive a copy of the written informed consent prior to your participation in the study.

Participant's Name (printed) _____

_____ _____
(Participant's Signature) (Date)

APPENDIX E: FOCUS GROUP QUESTIONNAIRE

Thank you for your participation in this focus group. We would like to know about you and the current foodservice operation where you work. Please complete the following questionnaire, providing only one answer for every question.

1) **What is your age? _____**

2) **What is your gender?**
   □ Female
   □ Male

3) **How long have you worked in any type of foodservice?**
   □ Less than 1 year
   □ 1-3 years
   □ 4-7 years
   □ 8-12 years
   □ 13-20 years
   □ Over 20 years

4) **How long have you been working at this current school foodservice operation?**
   □ Less than 1 year
   □ 1-3 years
   □ 4-7 years
   □ 8-12 years
   □ 13-20 years
   □ Over 20 years

5) **What is your employment status at this operation?**
   □ Full-time
   □ Part-time

6) **What is the average number of hours you work at this operation?**
   □ Less than 40 hours each week
   □ 40 hours each week
   □ More than 40 hours each week

7) **What is your job title? _____**

8) **Have you received any job training about food safety?**
   □ Yes
   □ No

9) **Have you completed any formal food safety certification (e.g., ServSafe® Certification or other equivalent certificate)?**
   □ Yes
   □ No

10) What is the type of management at this operation?

□ Self-operated
□ Contract management

11) What is the usual number of hourly employees at this operation on the following shifts?

Breakfast

□ Less than 10
□ 11 - 20
□ 21 - 30
□ More than 30

Lunch

□ Less than 10
□ 11 - 20
□ 21 - 30
□ More than 30

12) What is the estimated number of total meals served daily at this foodservice operation?

□ Less than 2000
□ 2001-4000
□ 4001-6000
□ 6001-8000
□ 8001-10,000
□ More than 10,000

13) Does your school have a breakfast program?

□ Yes
□ No

APPENDIX F: FOCUS GROUP GUIDE

Opening Questions

1) Tell us your pseudonym and how long you have been working with your current operation or had worked in the most recent [type of operation] foodservice operation.

Introductory Questions

1) What comes to mind when you hear the word "food safety"?
2) Within your job, what role do you play related to food safety?
3) Tell us about some of the food safety programs or systems in your organization.

Key Questions

1) What does your workplace do to help you follow safe food handling practices?
2) What do you believe are the main factors in the workplace that prevent you from following safe food handling practices?

Follow-up Questions

3) What is the role of your supervisor/manager in influencing you to follow safe food handling practices?
4) How do your coworkers influence you to follow safe food handling practices?
5) How do food safety policies and procedures in your workplace influence you to follow safe food handling practices?
6) How do the facilities provided by the workplace help you to follow safe food handling practices?
7) How do the tools provided by the workplace help you to follow safe food handling practices?
8) Would you give example of situations when you were asked (by your organization or supervisor) to do a task, but you felt it was risky in terms of food safety? Please share with us some of these situations.

Ending Questions

9) What last comments or questions do you have before we wrap up this session?

APPENDIX G: SURVEY QUESTIONNAIRE

Assigned IRB ID: 12-019

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

College of Human Sciences
Department of Apparel, Educational Studies,
and Hospitality Management
31 MacKay Hall
Ames, Iowa 50011-1121
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FAX 515 294-6364
e-mail aeshm@iastate.edu

Dear Foodservice Employee,

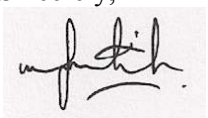
As researchers in the Hospitality Management Program at Iowa State University, we are currently conducting a study to identify workplace factors that influence foodservice employees' safe food handling practices. We are inviting you to participate in this study by completing the enclosed questionnaire as a non-supervisory foodservice employee.

This questionnaire will take about 15 minutes to complete. We will donate 50 cents to local food pantries for every questionnaire completed by our targeted study sample. You can select a local food pantry you would like the donation to go to from a list provided on the next page.

Your participation in this study is very important to us, which also helps others in your community. Participation is strictly voluntary. Return of a completed questionnaire indicates your willingness to participate. You are free to withdraw consent at any time. To ensure confidentiality to the extent permitted by law, the following measures will be taken: 1) questionnaire responses will remain completely anonymous and no identifiers about you will be used; 2) the completed questionnaire should be sealed and mailed back directly to the researchers (see instructions at the end of the questionnaire); and 3) only the principal investigator and the participating professors will have access to the research records. There are no foreseeable risks at this time from participating in this study.

We hope that the information gained in this study will help foodservice organizations determine their roles in helping employees to follow safe food handling practices. If you have any questions, please contact one of us at the emails and phone numbers provided.
Thank you for your valuable assistance. **Please reply by November 30th, 2012.**

Sincerely,



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Susan W. Arendt
Associate Professor
Hospitality Management
Iowa State University
515-294-7575
sarendt@iastate.edu

Code:

Local Pantry Selection for Donation

For every questionnaire completed by the targeted study sample, the researcher will donate 50 cents to local food pantries. Please mark one local food pantry you would like the donation to go to:

I would like the donation to go to:

_____ Food Bank of Iowa
Address: 2220 E 17th St, Des Moines, IA

_____ Kansas Food Bank
Address: 1919 E Douglas, Wichita, KS

_____ Greater Lake Country Food Bank
Address: 554 8th Ave N, Minneapolis, MN

IOWA STATE UNIVERSITY

FOOD SAFETY CULTURE SURVEY

This survey investigates the role of workplace on food safety practices. Because you work in a foodservice operation, what you have to say is very important for this study. Please take a moment to complete this survey to let us know what you think of food safety practices in your workplace.

SECTION 1

Please read each the following statement regarding food safety practices in your current workplace and indicate whether you: Strongly disagree (1), Moderately disagree (2), Disagree (3), Neutral (4), Agree (5), Moderately agree (6), or Strongly agree (7). If you work in more than one operation unit, please respond based on the unit where you spend most of your work time.

In my workplace:	*Strongly disagree*	*Moderately disagree*	*Disagree*	*Neutral*	*Agree*	*Moderately agree*	*Strongly agree*
1. I can freely speak up if I see something that may affect food safety	1	2	3	4	5	6	7
2. I receive feedback if I do not follow food safety practices	1	2	3	4	5	6	7
3. I am encouraged to provide suggestions for improving food safety practices	1	2	3	4	5	6	7
4. All managers give consistent information about food safety	1	2	3	4	5	6	7
5. Management provides adequate and timely information about current food safety rules and regulations	1	2	3	4	5	6	7
6. My manager generally gives appropriate instructions on safe food handling	1	2	3	4	5	6	7
7. My manager approaches employees nicely when correcting them about unsafe food handling	1	2	3	4	5	6	7
8. Our food safety policies and procedures give detailed guidance for practices	1	2	3	4	5	6	7
9. I believe that written food safety policies and procedures are nothing more than a cover-up in case there is a lawsuit	1	2	3	4	5	6	7
10. All of the necessary information for handling food safely is readily available to me	1	2	3	4	5	6	7
11. Management provides adequate training to improve employees' food safety practices	1	2	3	4	5	6	7
12. Managers' actions show that providing safe food to customers is a top priority	1	2	3	4	5	6	7

SECTION 1 (Continued)							
In my workplace:	*Strongly disagree*	*Moderately disagree*	*Disagree*	*Neutral*	*Agree*	*Moderately agree*	*Strongly agree*
13. Food safety is a high priority to me	1	2	3	4	5	6	7
14. I follow food safety rules because I think they are important	1	2	3	4	5	6	7
15. I follow food safety rules because it is my responsibility to do so	1	2	3	4	5	6	7
16. I am committed to following all food safety rules	1	2	3	4	5	6	7
17. I keep my work area clean because I do not like clutter	1	2	3	4	5	6	7
18. My manager always watches to see if employees are practicing safe food handling	1	2	3	4	5	6	7
19. My manager is actively involved in making sure safe food handling is practiced	1	2	3	4	5	6	7
20. Management follows all food safety rules	1	2	3	4	5	6	7
21. Management enforces food safety rules consistently with all employees	1	2	3	4	5	6	7
22. Management inspires me to follow safe food handling practices	1	2	3	4	5	6	7
23. Adequate supplies (e.g., gloves, thermometers, etc.) are readily available to perform safe food handling practices	1	2	3	4	5	6	7
24. Equipment items needed to prepare food safely (e.g., hand washing sinks) are readily available and accessible	1	2	3	4	5	6	7
25. Facilities (e.g., freezer, warmer, etc.) are of adequate quality to follow safe food handling practices	1	2	3	4	5	6	7
26. I am provided with quality supplies that make it easy for me to follow safe food handling practices	1	2	3	4	5	6	7
27. Food safety training/education provided by management is useful in improving my practices	1	2	3	4	5	6	7
28. My coworkers are always supportive of each other regarding food safety	1	2	3	4	5	6	7
29. When lots of work needs to be done quickly, employees work together as a team to get the tasks completed safely	1	2	3	4	5	6	7
30. Employees remind each other about following food safety practices	1	2	3	4	5	6	7

SECTION 1 (Continued)							
In my workplace:	*Strongly disagree*	*Moderately disagree*	*Disagree*	*Neutral*	*Agree*	*Moderately agree*	*Strongly agree*
31. New employees and experienced employees work together to ensure food safety practices are in place	1	2	3	4	5	6	7
32. There is good cooperation among departments to ensure that customers receive safely prepared food	1	2	3	4	5	6	7
33. Employees are disciplined or reprimanded when they fail to follow food safety practices	1	2	3	4	5	6	7
34. Employees are rewarded for following safe food handling practices	1	2	3	4	5	6	7
35. How well I follow food safety practices is part of my annual work performance evaluation	1	2	3	4	5	6	7
36. Our food safety policies and procedures help to ensure that safe food handling practices are followed	1	2	3	4	5	6	7
37. Food safety inspections by health inspectors help to ensure safe food handling practices are followed	1	2	3	4	5	6	7
38. I always have enough time to follow safe food handling procedures, even during rush hours	1	2	3	4	5	6	7
39. The customers have high expectations for employees to follow safe food handling	1	2	3	4	5	6	7
40. There are adequate resources to prepare food safely	1	2	3	4	5	6	7
41. My work load does not interfere with my ability to follow safe food handling practices	1	2	3	4	5	6	7
42. The number of staff scheduled at each shift is adequate for me to get my work done and handle food safely	1	2	3	4	5	6	7
43. No compromises with safe practices are made when handling food	1	2	3	4	5	6	7
44. Management has a clear picture of the risks associated with improper food handling practices	1	2	3	4	5	6	7
45. Management will not take even a small risk when it comes to food safety	1	2	3	4	5	6	7
46. When there is pressure to finish food production, managers sometimes tell us to work faster by taking shortcuts with food safety	1	2	3	4	5	6	7
47. I am sometimes asked to cut corners with food safety so we can save costs when preparing food	1	2	3	4	5	6	7

SECTION 2

We would like to know about you and the current foodservice operation where you work.

1) **What is your age? Please write:_____**

2) **What is your gender? (Check only one)**
   ○ Female
   ○ Male

3) **How long have you worked in foodservice?**
   Please write:_____ month(s)_____year(s)

4) **How long have you been working at this current foodservice operation?**
   Please write:_____ month(s)_____year(s)

5) **What is your employment status at this operation? (Check only one)**
   ○ Full-time (40 hours or more per week)
   ○ Part-time (less than 40 hours per week)

6) **What is your current job title? If you have more than one title, choose the type of job you do most often. (Check only one)**
   ○ Cook/line cook
   ○ Food prep
   ○ Foodservice assistant
   ○ Dishwasher
   ○ Server
   ○ Other, please specify:_____

7) **What is your current position at this foodservice operation? (Check only one)**
   ○ Employee, I do not supervise other employees
   ○ Employee, but I also supervise other employees
   ○ Manager
   ○ Other, please specify:_____

8) **Have you received any training about food safety from this foodservice operation?**
   ○ Yes
   ○ No
   If Yes, which of the following training methods were used? (Check all that apply)
   ○ Face-to-face session
   ○ Video
   ○ Computer/Internet
   ○ Printed material
   ○ Demonstration/on-the-job
   ○ Job orientation
   ○ Other, please specify:_____

9) **Have you completed any formal food safety certification (e.g.,,, ServSafe® certification or other equivalent certificate)?**
   ○ Yes
   ○ No

10) **What is the type of management at this operation? (Check only one)**
   ○ Self-operated
   ○ Contract management
   ○ Do not know

11) **What is the usual number of employees on the following work shifts at the unit where I work? (Check all that apply)**

Shift	Number of employees				
	Less than 5	6 -10	11-20	21-30	More than 30
a. Breakfast (*If applicable*)	o	o	o	o	o
b. Lunch	o	o	o	o	o
c. Dinner (*If applicable*)	o	o	o	o	o

12) **What is the estimated number of total meals served daily at the unit where I work? (Check only one)**
   ○ Less than 100
   ○ 101-500
   ○ 501-1,000
   ○ 1,001-1,500
   ○ 1,501-2,000
   ○ 2,001-2,500
   ○ 2,501-3,000
   ○ More than 3,000

13) **The foodservice unit where I work is: (Check only one)**
   ○ Onsite production and service
   ○ Satellite unit (minimal preparation of food, mainly a service site)
   ○ Centralized/Commissary unit (food is prepared at central location and shipped to service units)

Please return your questionnaire by folding it in half, making sure the return address is showing. Just tape it shut and place in a mailbox. No stamp is needed.

Safe Food
IOWA STATE UNIVERSITY
Food Safety Project

Please don't forget to indicate where the donation should go.

Thank you for your assistance!

APPENDIX H: PILOT STUDY FORM

Please answer the following questions or make any comments upon the completion of your questionnaire.

1. How long did it take for you to fill out this questionnaire?

_____ minutes

2. Were the questions understandable?

☐ Yes ☐ No

If NO, please indicate the question number and what need to be clarified in the table below or directly by the specific question in the questionnaire.

Question number	Clarification

3. Overall, what suggestions do you have to improve the questionnaire?

_____

_____

_____

_____

_____

_____

APPENDIX I: STANDARD PHONE CALL AND E-MAIL SCRIPT

First script to Seek Permission for Survey Voluntary Participation (via phone call)

Hello, my name is Ungku Fatimah. I am a graduate student in Hospitality Management Program at Iowa State University. Currently, I am completing research to identify workplace factors that influence foodservice employees' safe food handling practices. Specific retail foodservice operations, such as yours, have been selected to seek employee feedback. I would like to seek your assistance in distributing a questionnaire to your employees who hold non-supervisory positions.

The questionnaire should take about 15 minutes for the employees to complete. A donation of 50 cents will be made to local food pantries for every questionnaire completed by the targeted study sample.

Participation is strictly voluntary and all data collected will be kept confidential.
Findings from this research will be used to provide information for foodservice operations to improve employees' safe food handling practices.

Would you be willing to participate and distribute questionnaires to your employees?

(*If the potential participant agrees, the following script will be used)*
About how many questionnaires do you think you would need? I appreciate your interest and support for this study. The questionnaire and instructions on how to distribute it will be mailed to you soon. I will also email you specifics about this study for your review. I have your email address as _____. Is this correct? (*If the researcher does not has the participant's email address, the following script will be used)* Could you provide me with your email address?

Thank you.

Second Script for Follow-up Email Message
(A brief explanation about the study and procedures that will be conducted by the principal investigator)

Dear Foodservice Director,

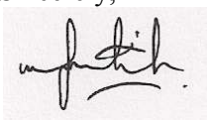
I am a graduate student in Hospitality Management Program at Iowa State University. I would like to thank you for your willingness to help administer questionnaires for my research. This research project has been approved by the Iowa State University Institutional Review Board (IRB #: 12-019). A donation of 50 cents will be made to local food pantries for every questionnaire completed by the targeted study sample.

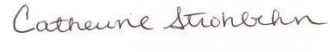
Here are the specifics about the research:

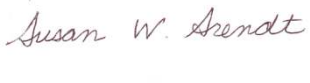
- The goal of the research is to develop an instrument used to assess culture for promoting safe food handling practices among employees in foodservice operations.
- Participants who complete the questionnaire should be **currently working in health care foodservice in non-supervisory role and at least 18 years of age.**
- You will receive a packet of questionnaires to distribute to your employees and a cover letter with instructions on how to distribute the questionnaires**.** The questionnaire will take about 15 minutes to complete.
- You do not have to collect or mail the completed questionnaires after handing them out. Participants are instructed, at the end of the questionnaire, to return it by mail to us (**postage is paid**).
- Participation is strictly voluntary and all data collected will be kept confidential. Only summary data will be used in publications or presentations about this research.
- Findings from this research will be used to provide information for foodservice operations to improve employees' safe food handling practices.

Your help with this research is greatly appreciated. Please do not hesitate to contact me or my major professors, Drs. Catherine Strohbehn and Susan Arendt, should you have questions. Our contact information is listed below.

Sincerely,







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515-294-7575
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Initial Contact to Seek Permission for Survey Voluntary Participation (via email)

Dear Foodservice Director,

I am a graduate student in Hospitality Management Program at Iowa State University. Currently, I am completing a study to identify workplace factors that influence foodservice employees' safe food handling practices. Specific foodservice operations such as yours have been selected to seek employee feedback. I am writing this email to seek your assistance in distributing a questionnaire to your employees for this research. This research project has been approved by the Iowa State University Institutional Review Board (IRB #: 12-019). A donation of 50 cents will be made to local food pantries for every questionnaire completed by the targeted study sample.

Here are the specifics about the research:

- The goal of the research is to develop an instrument used to assess culture for promoting safe food handling practices among employees in foodservice operations.
- Participants who complete the questionnaire should be **currently working in health care foodservice in non-supervisory role and are at least 18 years of age.**
- You will receive a packet of questionnaires to be distributed to your employees and a cover letter with instructions on how to distribute the questionnaires**.** The questionnaire will take about 15 minutes to complete.
- You **do not** have to collect or mail the completed questionnaires after handing them out. Participants are instructed at the end of the questionnaire to return it by mail to us **(postage is paid).**
- Participation is strictly voluntary and all data collected will be kept confidential. Only summary data will be used in publications or presentations about this research.
- Findings from this research will be used to provide information for foodservice operations to improve employees' safe food handling practices.

Would you be willing to participate and distribute questionnaires to your employees?
If you were willing to participate, about how many questionnaires you would need?

Please do not hesitate to contact me or my major professors, Drs. Catherine Strohbehn and Susan Arendt, should you have questions. Our contact information is listed below. I look forward to hearing back from you soon. Thank you in advance for your time and consideration.

Best regards,

Ungku Fatimah Zainal Abidin
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APPENDIX J: COVER LETTER FOR QUESTIONNAIRES DISTRIBUTION

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

College of Human Sciences
Department of Apparel, Educational Studies, and Hospitality Management
31 MacKay Hall
Ames, Iowa 50011-1121
515 294-7474
FAX 515 294-6364
e-mail aeshm@iastate.edu

Dear Foodservice Director,

Thank you for your willingness to assist in distributing questionnaires to foodservice employees in your operation. The instructions for how to distribute the questionnaire and to whom it should be distributed are provided below.

Questionnaire instructions:

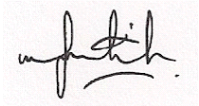
- Please distribute the questionnaire to employees who are **currently working in non-supervisory roles** and **are at least 18 years of age**.

- Participants are instructed at the end of the questionnaire to return it by mail to us (postage is paid). You do not have to collect or mail the completed questionnaires after handing them out.

- **We would appreciate if you could hand out the questionnaires to employees as soon as possible. We would like to have the questionnaires returned one week after its have been received. If additional time is needed, please still encourage employees to complete and return them to us by mail as soon as they can.**

Your help with this study is greatly appreciated. Please do not hesitate to contact me if you have any questions about the study or the instructions.

Best regards,



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Phone: (515) 572-4077
Email: ufuza@iastate.edu

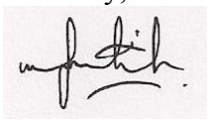
APPENDIX K: QUESTIONNAIRE FOLLOW-UP CARD

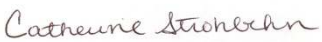
Dear Foodservice Director:

About one week ago, you received a packet of questionnaires for a research on workplace factors that influence safe food handling practices to be distributed to your employees. If you have already distributed the questionnaire, please accept our sincere gratitude. If you have not had the time to distribute the questionnaire, we would appreciate if you could do so as soon as possible. Your employees' feedback is really important for this research. We would like to receive these back by the end of November.

If you have any questions, please contact one of us at the emails or phone numbers listed below. Thank you in advance for helping us with this research.

Sincerely,





Ungku Fatimah Zainal Abidin	Catherine H. Strohbehn	Susan W. Arendt
Graduate Student	Professor, Extension Specialist	Associate Professor
Hospitality Management	Hospitality Management	Hospitality Management
Iowa State University	Iowa State University	Iowa State University
515-572-4077	515-294-3527	515-294-7575

APPENDIX L: THEMES AND CODES FROM FOCUS GROUP DATA

Theme	Quote	Focus Group	Participant	Code
Leadership	My supervisor is very good about making sure that, that things are followed and, um, definitely for, like when they're cooking, to make sure that, you know, they temped it and write down the time and keep a record of it. (p.10)	1	Susie	Monitor
	she's very efficient in doing these things. I, I don't, ah...see anything that she would, you know...she's very good at her job. (p.11)	1	Susie	Role model
	….the supervisor goes around and makes sure that practices are being dealt with everyday. (p.11)	1	Terry	Monitor
	….the supervisors that I've worked for, you know, are usually pretty good about making sure...oversees... (p.20).	1	Susie	Monitor
	They (supervisors) watch us like hawks. (p.16)	2	Margaret	Monitor
	They will (supervisor)….all the time help us set up and they help us prepare food and check the food in. (p.16)	2	Woman	Physical engagement
	She's very adamant about us knowing... what we're doing. And her philosophy is, she never wants any children in this district because, become sick of food because that will ruin the (district name given) if there is an outbreak of anything. (p.28)	2	Margaret	Inspire
	she's very adamant at letting us know…. what she expects from us. (p.28)	2	Woman	Inspire
	Our manager...is very precise. She's a perfectionist. She follows the rules to a T. (p 29)	2	Molly	Role model
	All the way down, from top to bottom. She is a very, very good manager. A very fair manager. Treats everyone equally. But she's tough. (p. 29)	2	Molly	Consistency

	'Cause that's the way she is, has always been, that's the way we like it because she follows the rules and...she does the same thing with one person as the next that comes in the building. (p.31)	2	Bear	Consistency
	I would much rather have someone who is stern, strict, follows the rules, and treats people with dignity and respect and everyone exactly the same way….(p.31)	2	Margaret	Consistency
	She's the toughest...but she runs a very big kitchen. Ahh...and she runs it. … She follows the rules. Straight across the board. (p.33)	2	Molly	Consistency
	She expects if, if someone that is not sure what they're doing that would not be a problem for myself or anybody to ***help***. (p.33)	2	Molly	Inspire
	….if you're doin' somethin' and you're tryin' to slough it off a little bit. "I, I need to go on break in five minutes and...," you know, your cleaning maybe isn't as good or you didn't put the boxes away or you didn't throw the boxes away...she'll come get you! (p.34)	2	Annie	Monitor
	She'll work right alongside you. (p.35)	2	Annie	Physical engagement
	If we're short-handed, she'll be the first one out to, to, throw somethin' in the oven or to go to the dish room if we're short-handed in there. (p.36)	2	Annie	Physical engagement
	We had a manager that, um, she wasn't as strict as this. She, she was strict but then there were rays that you just knew she wasn't gonna push….. You know, but she also, at the same time, if we needed somebody in dirty dishes, she would be there. (p.36)	2	Emily	Physical engagement
	…it's nice to have a couple of exceptions, but when you've got twenty exceptions, you know, that gets...um...people get frustrated. People get hurt. People get angry, you know. And so it's, um, it was kind of a	2	Emily	Consistency

	balancing act sometimes. (p.37)			
	She was not assertive to ma-, to make everyone know it ***had*** to be done. (p.38)	2	Emily	Inspire
	Yeah, if she (manager) doesn't care (about food safety), I don't care.…. Then it may, then it goes, then it trickles down to the people, you know, if your people...(p.66)	2	Margaret	Role model
	If your ***boss*** doesn't care enough to come out and say, "Oh, you know, let's do this or this" and just sit in there on the phone and whatever it is she's doing. (p.67)	2	Annie	Role model
	Well, we have our manager, and then she always is on the floor but she never judges. She just pays attention where you eat your food and the rules. (p.73)	2	Vicki	Monitor
	And she is helping you. And we all work as a team. (p.73)	2	Vicki	Physical engagement
	And she's always work, workin' with us as a team. So she focus more on working as a team and always reminding us…(p.73)	2	Vickie	Inspire
	Um, they're (managers) around but, really, they've got, it just seems like other things to do besides, you know, be lookin' over everybody's shoulder and makin' sure everybody's doin' this and that exactly right. So, that, you know, you don't see them too much pickin' at you. But they notice somethin' sometimes. (p.10)	3	Brian	Monitor
	And then typically there is always some sort of manager or supervisor on duty, and they'll catch you if you come in with nail polish and then...or make you take it off right there. (p.10)	3	Courtney	Monitor
	…he (manager) just kinda makes it a habit to like go around and then kinda say hi to everyone, like at some point. And so, that's when they see like the hairnets and like the nail polish and just things like that. (p.11)	3	Candace	Monitor

	So, if she saw something, sure, she'd say something like you're really bad about doing this. She caught me on that a lot. (p.21-22)	3	Ann	Monitor
	You know, they're pretty...good role models at it. Every once in awhile, um...so our manager is...mostly bald. He's got a little on the sides, but so like to him it's not one of the things that he wears all the time. And once he really gets on us about it, we're like, "Scott, you're not wearing your hairnet." (p.26)	3	Candace	Role model
	….we're not necessarily working with the food and they want us to have a hairnet on so...we'll be like, um, we need that hairnet. I don't care if you're leaving there half an hour. If you want us to have it on full time, so you can have one on too. (p.27)	3	Candace	Role model
	Our manager was really good about following the rules. Um, I just don't think she's very hands-on in enforcing it for other people. But that, that was just her style. (p.27)	3	Woman	Firm
	And the managers watched us. (p.11)	4	Peyton	Monitor
	Actually, everybody at work so far has been really good about it....but...yeah. Otherwise, um, our supervisor, he, you see him every once in awhile walk in the kitchen. (p.11)	4	Sue	Monitor
	But then my other one, ah, there was lots of different rooms, and the manager usually like sat at the computer. And then so we could do like whatever. So, unless they like watch the tape and caught you or I, like someone didn't remind you, I mean, it seemed pretty easy to get away with some things. (p.12)	4	Peyton	Monitor
	...I guess if they're not strict and they don't remind you and they don't really care, it would be a negative 'cause you wouldn't be so concerned about being on top of...(p.13)	4	Emily	Inspire

	So like because we're not supervised, the policies aren't in place as much as they should be. Like it's really obvious stuff like ready-to-eat made with bare hands. And if there's a supervisor there, it would like you would be called out in a second. But there's not as much like...policing, I guess, I don't know, is the word...because of that. (p.15)	4	Emily	Monitor
	….lack of supervision which was kinda mentioned earlier. (p.17)	4	Lauren	Monitor
	I think, like how she said her manager wasn't even there. I think it's because they assume you're practicing on them. So then it's like, OK, well, they ***assume*** I am, just like customers. So then that almost prevents you sometimes from practicing. (p.21)	4	Peyton	Monitor
	And also, um, supervision where, um...our, um, supervisor's office is just right inside the kitchen. And so she is always supervising, so no one's gonna...I mean, do any...I feel like no one really, um, disobeys the food safe handling practices too much. (p.22)	4	Abby	Monitor
Communica-tion	….the manager over there, she, she helps us remember, you know, if we're slackin' off she'll...get us. (p.8)	1	Emmy	Feedback
	…we, at the high school we're supposed to have or (name of manager given) would like to have monthly meetings, ah, just to refresh everybody's memory....(p.6)	1	Terry	Update
	Lots of times we'll have like a meeting, general meeting, just between, you know...our office...and go over this stuff. (p.7)	1	Susie	Update

	….they tell us daily, weekly, ah, i-if we're having an issue or coming close to not meeting the safety regulations, ah...say, the food temperatures are getting low. Ah, they review 'em with us, making sure that, hey, we need to be within this guideline when it's prepared so that way it kills all the bacteria and such. And we need to try to maintain that temperature. (p.7-8)	1	Terry	Feedback
	She (supervisor), ah...helps me, you know, remember. If I forget to clean a certain spot, if I do all three lines and I might forget ***one*** of the three 'cause I'm movin' around. She'll say, "Oh, just when you get a chance..." because, well, everybody forgets somethin'... once in a while. (p.11)	1	Emmy	Feedback
	She's really good about remindin' me and...you know, tellin' me nicely so...(p.11)	1	Emma	Respect
	Ah, if he (supervisor) sees somethin', he points it out, like they mentioned...ah...make, just reminds everybody that he's there and that these are the procedures. (p.11)	1	Terry	Feedback
	My supervisor, he runs (inaudible) very good and he treat me very nice and, and he...he remind me if I miss anything or if I (inaudible) anything. (p.11)	1	Rita	Respect
	Course, we remind each other…. And, you know, sometimes people will get upset if you tell 'em, but...you know, we have to. (p.12)	1	Susie	Openness
	Well, they think that, that you're... that you have to, you're picking out... picking on 'em, point, ah...isolating their situation. (p.13)	1	Terry	Openness

	Ah, like when a new guideline comes out, ah, it'd either be from the State or it would be from the company, ah, it, soon as it's brought to the attention of the immediate supervisor, it's distributed out to the schools so that it can be implemented and, at least, theirs for their knowledge so they can inquire if they have questions about it and that it's going to be goin' into effect. (p.20)	1	Terry	Update
	….the manager explains it (standard operating procedure). Ah, he does have, ah, the guidelines in his office. So if you wanted to pursue it further and look into it, ah, it is there. Ah, we've had, ah, a couple incidents where somebody questioned something and he did go to the book and read up on it. (p.24)	1	Terry	Clarity/Well-inform
	They will also tell you if you're doing something wrong. (p.16)	2	Margaret	Feedback
	"Try this, not that. Work, work smarter, not harder." (p.17)	2	Margaret	Feedback
	And if it's still not followed, we go to the manager. (p. 21)	2	Annie	Bottom-up approach
	Some of 'em do it (remind) nicely. Some of 'em not so nice. (p.21)	2	Woman	Respect
	And when that information (changes in regulation) does come out, our managers do share that...with us. (p.26)	2	Margaret	Update
	And if they don't think that we understand it, they'll bring it our attention and have us r-r-r-r-read. (p.27)	2	Margaret	Feedback
	I won't do it if I'm just told to….. I need to know ***why*** you're... ...telling me this... ...for it to make sense. If you just say, "Just do it,"...ah, no. You're gonna tell me ***why*** I'm doing this….. And if they can't give me a reason, then I'm not gonna do any extra work. (p43-44)	2	Annie	Clarity
	It's...you know...if they don't speak English real well, that might be a little hard to...(p .62)	2	Mary	Clarity

	….if you made a, a mistake, she will correct you but not with a screaming or a very firm position. She will tell you carefully, not to hurt you or to make you feel bad but just to remind you that you have to follow the rules and this is what are the rules. (p.73)	2	Vicki	Respect
	If they're not following the rule, you go say somethin' to the manager and the manager will come out on the floor and say somethin'...(p.74)	2	Bear	Bottom-up approach
	That (ready-to-eat food) requires gloves. You see someone handling that, they'll say, "Whoops! You forgot to put your gloves on," you know. We just kind of give friendly reminders. (p.75)	2	Molly	Openness
	And if they don't listen to you, then you go to the manager to say something. (p.75)	2	Woman	Bottom-up approach
	And so, he's...like the two managers aren't huge on wearing hairnets. Like they will get you for that in like a week or sometimes she'll tell you to, like remind you about it. (p.9)	3	Candace	Feedback
	…we always do a kind of a monthly like staff meeting. And a lotta the times then they'll go into, you know, we've noticed this has been goin' on. Make sure you correct it. (p.10)	3	Courtney	Feedback
	…if it's a big request from the family, we need to check with our supervisors and, um, our head dietitian, she'll go back through and say, "You know, this is OK since the family requested it." Normally, we just communicate with her and we can see what she says. (p.15)	3	Lynn	Bottom-up approach
	….but if we're observed to not be following safe food handling procedures, like we're gonna get called into a meeting with our supervisor and she's gonna correct it pretty...pretty darn fast. (p.20)	3	Courtney	Feedback
	I think it's important for the dietitian or supervisor to be aware of any of these requests. And I think, um, ideally	3	Brian	Bottom-up approach

	they would like to be informed of 'em before any of 'em take place. But it's kinda difficult for that to happen, you know. If they're not in the evenings and what not. (p.15)			
	…. he always asks like, "What do you think we could do for improvements? Like is there equipment that we need? Is this stuff that we need?" (p.30)	3	Woman	Bottom-up approach
	And if you have any questions, you'd just ask somebody with way more experience with….(procedure in-place). (p.19)	3	Brian	Clarity
	I feel like where we work, you know, sometimes...they'll (nurses) like set a dirty dish here or a, but it's not, I mean, we leave notes for 'em where we tell 'em and then it's taken care of. I know it'll be...in our communication system. It's still frustrating when you've got signs up that say, "Hey, dirty dishes don't go here". (p.33)	3	Candace	Openness
	And actually before I got hired, right in my interview, like before I was offered the job, um, our boss told us what was expected of us as far as our being up, no nail polish, no chewing gum, like...basic stuff to expect. (p.11)	3	Courtney	Clarity
	If you have a question about it (cleaning duty), you just ask like the supervisor there how to do it….. you're always available to ask questions if you need to. (p.17)	3	Lynn	Clarity
	Um, well, typically if I have a question with a cleaning duty, I ask our, I mean, the manager of our department….. they came up with the cleaning duties so they probably know how to do it. (p.17)	3	Lynn	Clarity
	And if you don't know it, then you ask some-, there's usually a couple people that have been there a long time that work every night. (p.18)	3	Candace	Clarity

	…also like management would reinforce things, ah, as Molly said, um, if they saw something was wrong they would bring it up to you. (p.8)	4	Lauren	Feedback
	…it (policy and procedure) was definitely stressed from orientation and training. (p.8)	4	Emily	Clarity
	So I feel like even though I was like the new girl, um, after I got comfortable with them I like re-, reminded them more often. (p.12)	4	Peyton	Openness
	I'm not sure if we would really tell each other to like...I don't know. It never really happens but, tell each other to wear gloves when...we should. (p.12)	4	Lucy	Openness
	I think it reflects on who trains you when you are welcomed into the workplace. You have someone, some girls who train you and they follow the rules. They're very particular. But then you also have some who are more lenient, and I think that has a big influence on it as well. (p.12)	4	Woman	Consistency
	…they don't follow the rules as closely as some other girls like...they let things slip more, as in...um...hairnets could be an example. I mean, just thing, different things that they teach you. (p.13)	4	Woman	Consistency
	So I pretty much learned three different ways to do stuff, and like there were some congruencies but then...for a lot of other stuff, it just wasn't, like it's not as uniform as you would hope, across the board. (p.13)	4	Emily	Consistency
	…we might learn some stuff but we didn't, we wouldn't know the reasoning behind it. Like I ***know*** because I learned about it in school, but like you wouldn't, like there's no reason that you wash your hands or like a reason that you sanitize the tables. . They don't really go in-depth at all with that. (p.14)	4	Emily	Clarity

	And like the cook technically is like one higher up than me, but she, like many of the cooks, have bad, um, like...they don't follow any of the rules that they're supposed to. And it's, I don't, like I, probably could say something but it's not like my place. (p.15)	4	Emily	Openness
	…it's not like they are people who would be like, give me, like let me make them sick or something, you know. Like they're not malicious. It's just that they don't understand like the deeper reasoning behind sanitation...kinda lot of...(p.15)	4	Emily	Clarity
	So I think that that's instilled early on and you know why it's doing it even when you're not monitored, it still stands that way. (p.15)	4	Taylor	Clarity
	So even if our main supervisor leaves at four and we're still working 'til later in the evening, we're still following those procedures because it's just been instilled that way, whereas if you didn't know the reasoning behind it, I can see where you're saying like, if you didn't know why you were doing that and, you know, it just starts to slip because no one's watching you. (p.15)	4	Taylor	Clarity
	…like that just seems so pompous to me as like a twenty-one-year-old like who is in college, privileged, compared to what they have to deal with, like telling them...you know, like you need to follow these safety practices when they're fifty years old, work-, working there many years. It's just like...does not seem appropriate, I guess. (p.21)	4	Emily	Openness
	Like everyone's kinda just, kind of open with telling each other like...if I accidentally started cutting fruit without gloves, I feel like one of my coworkers would be like, "Ah, you, shouldn't you put gloves on?" Like it, it's happened to me before and where you might just forget, but...I feel like if there's respect and if there's a good flow	4	Taylor	Openness

	of communication, it's easier for that, to hold each other accountable. (p.22)			
Self-Commitment	I see at home, you know, it, it helps, you know, really. You kind of just automatically, 'cause you're doin' it all the time and, and then it just kinda carries over to your, to everyday dealing with things. (p.13)	1	Susie	Personal practices
	And it just...induces yourself to keep it clean. I mean, I, I myself, I don't like clutter. I like clean. (p.15)	1	Susie	Personal practices
	I think it's for the purpose that you're doing your job too. You know, the food preparation. It's for the kids, you know. That's the ultimate, that's our ultimate goal. And, um, you know, to make sure that they have something decent and, and good and nutritious for them to eat. And I think that's what kind of motivates me as a worker. (p.67)	2	Mary	Internal motivation
	You enjoy coming to work every day and your focus is on the children. Not everyone is like that. And we do work with a couple people at our establishment that have the...I don't care attitude. I could care less. This is a job. (p.68.)	2	Margaret	Personal value
	And we do care about the safety of the children because, to me, this, this is...my way of life. This is what I chose as an occupation, and I enjoy even though it's the ninth grade school that...well...(p.69)	2	Margaret	Personal value
	Another factor I would say is just simply like employee motivation. (p.19)	3	Brian	Internal motivation
	…like because the people don't know wh-, why it would be really bad to prepare ready-to-eat meals with bare hands, like that, there's not enough motivation because they would do it in their own house and they don't see...like they wouldn't understand it. (p.15)	4	Emily	Personal practices
	…just almost like laziness. Like you're just like, "Ohhh, I don't really need to go change my gloves and like walk	4	Peyton	Personal practices

	all the...." I mean, that sounds so lazy, but...it's the truth sometimes, I guess. And, yeah, like if you're busy, you just kinda let it go, don't even think about it 'til after you're done. (p.17)			
	I think it's just somethin' that you, you really don't think about or laziness like she said or lack of supervision, which I think there's a lot of laziness 'cause, I mean, even if you're not supervised, you know, you should wash your hands and put on gloves. (p.18.)	4	Sue	Personal practices
	So, they always say, you know, you have to wash your hands after you touch the meat. And then, like if you're doing it for awhile like...it gets repetitive that way you finally stop washing your hands. (p.18)	4	Lauren	Personal practices
	It's just...in your mind you're just, yeah, like re-, repetition. Just...it gets old. And at the moment you're washing your hands for twenty seconds, it seems to last forever. (p.19)	4	Peyton	Personal practices
Management style and system	…there's also safety regulations printed up. It's on the bulletin board and stuff. (p.7)	1	Susie	Guideline
	….when they designed the kitchens, ah, they made sure that, to incorporate all the guidelines to, so that they could be cleaned on a, fairly easy.(p.14)	1	Terry	Guideline
	We, ah, we had, well, I was told that when I was first hired on. And they also tell you like, you know, for the women, well, of course, sometimes men wear earrings too. But (laugh) you're not supposed to wear dangly earrings. (p.24)	1	Susie	Policy and procedure
	Ah, some of the safety, ah, are, are posted on the walls. Ah, not all of 'em, I think. I don't think all of 'em are posted, but most of the general are posted on the walls somewhere in the facility. (p.24)	1	Terry	Guideline

	It's...called the seven-day rule is where we pull it out of the freezer or fridge or when we prep it. We have seven days to use it or we have to throw it away. (p.13)	2	Bear	Policy and procedure
	We write a label... and that has the, and it's placed on every food that we, we handle. (p.13-14)	2	Mary	Policy and procedure
	We also have signs posted periodically in different places as to how...we wash our hands, what we do before we shut the water off, and, and to, ah, certain equipment, what to clean it with and what ***not*** to clean it with. (p. 15)	2	Molly	Guideline
	We also have to be sure to, ah, if you're going from...one thing, from like maybe fruit to a vegetable or somethin', you gotta be sure to wash your hands, change your gloves ***every*** single time. (p.15)	2	Kay	Policy and procedure
	We have paperwork that we do...every day. When we pull out our food, when is it we take our temperature. Um, at serving time we take our temperature and if we're take, you know, if we're keeping the food, um, we take our temperature to make sure. And it's all on paper. Well, and what….. what food goes out to each school... that we, you know, send out to satellite schools, is documented on its own individual, you know, paper. It's, it's on record. (p.17)	2	Mary	Documentation
	We have a lotta documents everywhere. We have documents on note boards. We have documents on freezers. We have documents everywhere, where we have to sign in, initial, every morning…(p.18)	2	Margaret	Documentation
	…if a child takes, um, a product but then they get it to the cash register and they can't pay for that extra product, they have to leave that product. We cannot, we just...cannot serve that and sell it again. It's thrown away. (p. 19)	2	Emily	Policy and procedure

	…mostly I work in the part of the dishwasher. And we are forbidden to like, if we workin' on the dirty side of the dishwasher, we cannot go to the clean side... and take the dishes outta there...unless we wash our hands and, and put gloves on. (p.24)	2	Vicki	Policy and procedure
	…we have to take the temperature of the dishwashing too. And it has to be in a certain, um, temperature and, um...well, I, and that's it mostly all the time we do that. (p.24)	2	Vicki	Documentation
	…the food code changes every five years so... ...it changes and... We have to change. (p.25)	2	Woman and Bear	Policy and procedure
	Some of 'em in our districts are less strict, but I think West Des Moines is pretty s-, strict about it. I think they're about the strictest...(p.27)	2	Woman	Implementation/Enforcement
	Everything in our, in our kitchens are designed...for that (safe food handling). Our storerooms, the, the temperature in our storerooms. We can't store anything on the floor. It has to be...six inches. (p.28)	2	Margaret	Policy and procedure
	…our managers also, in their office, should have a...SOP book that tells us how to do...to do things…. So if there is a question, we can always go to that book and look. (p.40)	2	Margaret	Policy and procedure
	You know, anything where there's a whole procedure. You write your notes down, you know, and, and everything and how to do it. So it gets very detailed on, on every, in our little aspect...procedure. (p.41)	2	Mary	Policy and procedure
	….it is a detailed thing, but to come in off the street, if you've never done it before, I think it would be very difficult... to follow that. Once you're shown it once or twice, ***then*** the SOPs make sense. (p.42)	2	Annie	Policy and procedure
	They're supposed to straight across the board. They're all supposed to be... run exactly the same. (p.44)	2	Bear and Annie	Implementation/Enforcement

	Um, time temperature logs. We were expected to do that. Otherwise, it was kind of informal in terms of like, um, enforcement. (p.9)	3	Ann	Implementation/Enforcement
	….like by some of the equipment, there's like proper cleaning procedures on there and like checklists that say, "Did you make sure to do this?" Or "Before you leave, did you forget to resanitize this?" So, it's just kind of like little reminders and like step-by-step instructions but...(p.17)	3	Courtney	Policy and procedure
	And we have like posters everywhere saying "Wash your hands" or like temperatures of the meats that need to be or this way or something. (p.8.)	3	Woman	Guideline
	We have a whole, like right outside the office, there's just a collection of binders that are all labeled and say like procedures…..And it's all just in a row. It's where all the employee information is so if you have any questions, you can always refer to those. (p.18)	3	Courtney	Policy and procedure
	….they (workplace) always make sure that you're changing your gloves like constantly. (p.8)	4	Peyton	Policy and procedure
	I got a packet of papers that I had to sign (packets of information that we have to read through like every so often and sign off on it to show that we...read it and know what we're doing). (p.9)	4	Lauren	Policy and procedure
	So they, ah, made sure like floors were clean and everything. But, um, before we could leave we had to make sure our area was cleaned up and sanitized. (p.11)	4	Peyton	Policy and procedure
	...there's policies written down on paper, but the way that they implement them is inconsistent. (p.14)	4	Emily	Implementation/Enforcement
	…they (workplace) have like signs posted everywhere. (p.8)	4	Peyton	Guideline
	…there were a lotta signs posted. (p.8)	4	Lauren	Guideline

	….there are also signs above like every sink, wash your hands for twenty seconds. And just like all these constant reminders of standards and expectations. (p.9)	4	Sue	Guideline
Environment support	…they send their like, ah, supervisor and the manager for the schools, they send them to take some classes for the safety food too. (p.7)	1	Rita	Adequacy of training
	….all of the…the tables and the walls are, ah, of a slick finish so they can be wiped down easily pretty good. (p.14)	1	Terry	Quality of facilities
	...everything's pretty much like a, a flat surface so it just can be wiped off fairly easily. (p.14)	1	Terry	Quality of facilities
	….the surfaces because they're so shiny, it tends to make ***you*** wanna keep 'em shiny. (p.14)	1	Susie	Quality of facilities
	I don't think I could live without my floor scrubber. (laugh). That thing works so slick. It's a lot better than a mop, and it gets everything so nice and clean. It, you just run it and it's, it doesn't take that long. All the dirt comes out. It's so nice. And then, you know, the stainless steel cleaner, that'll make you...loopy. (p.15)	1	Emmy	Quality of supplies
	…we also have, you know, the tools for it like rags and, and the towels and the, the cleaning, like soap... ...and dis-, disinfectant. And, ah, everything's available there. (p.16)	1	Susie	Adequacy of supplies
	I ordered a size glo-, er, three different size gloves because everybody has different size hands so you're not trying to put on a glove that's too small or too big. (p.16)	1	Terry	Adequacy of supplies
	….every year they send some of them to take some classes for the safety food. Like my supervisor, I used to go up with him. Yeah, he has a certificate for the safe, safety food. They send you, take some classes, and after that you get a certificate for that. (p.20)	1	Rita	Adequacy of Training
	That's (training) done every, every, we do that every year...you know. We do get covered every year, ir-,	1	Susie	Adequacy of Training

	irregardless of how many years you've been there. And we sign this certificate every year. And it's usually at the beginning of the year that we do that. (p.21)			
	…we also have, ah, several...sinks just for hand washing…. So that's also a visible reminder to get your hands washed periodically and... That say only for hand washing. (p.15-16)	2	Emily	Availability of facilities
	….everything in our kitchen is designed for the flow of the food, the, the safety and everything in food preparation. (p.28)	2	Margaret	Quality of facilities
	Equipment failure is a big one too. We have freezers that go down all the time. (p.63)	2	Margaret	Quality of facilities
	They (food) need to be refrigerated. So what they're expecting us to do is try and keep the temperature down on stuff, but not giving us the right equipment to do it...(p.64)	2	Annie	Availability of facilities
	I mean, it's been so long probably but there's two sinks within a small area. And so, I mean, it's really easy just to go to, to one of 'em, one or two sinks unless you had to work late. We don't just have one. We have the option out here too, which was really nice I think. It just helps me remember to do that and it doesn't take a lot of time. (p.8)	3	SuzyQ	Availability of facilities
	…. they also installed all of those automatic, um, hand sanitizer dispensers too, just for quick in-between like serving a couple plates and stuff. (p.8)	3	Woman	Quality of supplies
	Access to equipment was really good. Um, there were lots of hand washing stations. (p.8)	3	Ann	Availability of facilities
	….when we do room service, um, they have the automatic hand sanitizer things too. And so, we can just, ah, that's like, an easy reminder as soon as you walk outta the room. And so that's an easy reminder, and it's right there. (p.9)	3	Candace	Adequacy of supplies

	We had to complete like...there's a ton in there like always coming out with new ones that we have to finish, um, and so, at the beginning, I think there was like ten or fifteen that we needed to get, have done by the day that we started. And they covered like a lot of the food safety stuff. (p.11)	3	Candace	Adequacy of training
	I worked with a head chef, so he pretty much went through everything like that's how everything needed to be. (p.8)	3	Woman	Adequacy of training
	… he (supervisor) really tries to make you, um, to train you by two or three different people so that you get like a little bit different each time so that you...'cause some people like focus a lot more on a certain aspect. And so then you get a more thorough training, I guess, and then the more you do it. (p.18)	3	Candace	Adequacy of training
	And we do all the hairnets are provided, gloves, um, band-aids and like finger protectors where if you cut yourself or something, um, aprons when they're needed. I'm tryin' to think. If we need it, it's provided there. It's all in the office. It's all really easily accessible. And that's what you're shown right when you started. (p.13)	3	Courtney	Adequacy of supplies
	They also provide you, you know, with your work uniform. We wear that at work and, I mean, we don't just bring street clothes in and wear those. (p.14)	3	Lynn	Adequacy of supplies
	And we really had a good access to equipment. It's probably the only job I've had ac-, good access to safety equipment...consistently...and quality, so. (p.14)	3	Ann	Availability and quality of facilities
	….now that I'm in school, I understand why you use certain practices and why it's so important and just what the risks are when you don't know them...I wish that was, that we had had that education back then. (p.27)	3	Ann	Adequacy of training

	I feel like even having like a one-day, like a three- or four-hour course, like really focusing on like the hand washing and the equipment and cross contamination (inaudible). I think some kind of formal training would be ***so*** important there. (p.28)	3	Candace	Adequacy of training
	…we have like constantly having like buckets of sanitizin', um, soap everywhere that you go. (p.8)	4	Peyton	Adequacy of supplies
	And also an adequate amount of hand washing stations like when you walk into the kitchen and out of the kitchen, um, as well. (p.8)	4	Lauren	Availability of facilities
	….they provided like extra hair restraints or like nail polish remover, um, just kind of, so there's no excuse to not be following the proper codes. (p.8)	4	Taylor	Adequacy of supplies
	And at our workplace, our management, um, I'd say...once a year or a couple times a year they'll qu-, basically quiz you on hand washing. They'll, you'll read what you have to do and then she'll stand there with a clipboard and mark off to see if you passed the test of hygiene, so... (p.10)	4	Abby	Adequacy of training
Teamwork	…we just, you know, remind each other, for the most part. (p.8)	1	Emmy	Within department
	Everybody tries to help everybody. That way it's all safe and clean and, you know, the kids are OK. (p.8)	1	Emmy	Within department
	… we all kind of work together, tellin' each other, you know. It's, it works out pretty good. (p.12)	1	Susie	Within department
	And then, from the schools, the head custodian over there, he provides me with, ah, floor cleaner…. So, you know, he's real good at helping me out with stuff that ***I*** don't have that he can get me, so...(p.15)	1	Emmy	Between department
	We remind each other because sometimes it does...(doing something that a member wasn't suppose to do or a member missed something) (p.21)	2	Margaret	Within department

	We work as a team. (p.21)	2	Woman	Within department
	New people come in, and we...help them and, ah, it, it's, it's like a little family. (p.21)	2	Woman	Between new and experienced employees
	….sometimes you (new member) don't know when you are supposed to be wearing gloves, when you're n-, when it's OK ***not*** to wear gloves. And it's, it's a hard job to...for, I mean, it's a lot to take in. It's a, a lot to absorb. So... and we do remind each other. (p.22)	2	Margaret	Between new and experienced employees
	...it makes you become a motivator, you know. And you try very, ***very***, you try very...you try very much to be calm and patient and, and motivated in a very nice way, you know. You try. And then if, if it just becomes a little bit more hectic, you just kinda use a different type of voice. "We really need to get this done and, you know, work with all, you know, work a little, you know." (p.69)	2	Mary	Within department
	Environmental Services was in charge of, ah, making sure we had new towels all the time and access to gloves. (p.8)	3	Ann	Between department
	I was...the more I worked there, the more susceptible I got to like infractions by other people, especially new people that are coming in. So we always kinda kept an eye out. It wasn't really management per se. (p.9)	3	Ann	Between new and experienced employees
	A lot of ours is kind of just other employees kind of like keeping an eye out. Like we have a couple newer people who aren't very good about wearing gloves at certain times. (p.9)	3	Candace	Between new and experienced employees
	Like when the supplies aren't effective stocked and stuff …..and like even like sanitation bottles and when you have to refill it, you'll go and do that. But it takes more time. And so, it's just like kinda frustrating, I guess, with that to be able to do it. If you still do it, it just makes it	3	Candace	Between department

	less efficient. (p.26)			
	…if Environmental Services isn't keeping up with everything, you know, the towels and, ah, hand sanitizer's really hard for us to leave in the middle of our shift to bring back more paper towels or soap dispensers when we're serving forty or fifty residents in an hour-long period. (p.25)	3	Lynn	Between department
	And there's no way that every single nurse and every single like CNA and, um, floor staff like that and everyone in dietary connected. You don't have proper communication like, I don't know. (p.34)	3	Candace	Between department
	….at some point everyone's kinda helped like do the, help you get, you know what needs to be done before the, that. (p.18)	3	Candace	Within department
	…..it, it feels like we're kinda voluntary with each other because, like we're real, like they said, they're, you work with your friends or if you do the same thing. It's like eight or nine of us that are really good friends and you just kind of, um...hold each other accountable, I guess, informally but you all do 'cause you don't wanna be the one not doing it also, so...(p.27)	3	Woman	Within department
	…even though you're in different departments, everybody's working for like the same cause. We just want the residents, you know, to be happy and healthy and safe. (p.34)	3	Woman	Between department
	…usually the other people you're working with will just remind you. (p.9)	4	Peyton	Within department
	So we watch, um, not as much the food production itself but making sure that, um, anybody that's serving the food is wearing gloves. So we actually, I mean, being there, we pay attention to it and if we were to see something we would say something. (p.11)	4	Sue	Within department

Accountability	Ah, at first it's just verbal, ah, and it becomes a, a repetitive thing that they're having to remind you on a regular basis. Ah, then they go to a write-up procedure. And then there's...if there's an overabundance, then they can terminate you. (p.14)	1	Terry	Reward and Punishment
	We have to have meetings and, you know, talkin' about food safety and especially, you know, making sure that you, you know, have long hair so it's covered and you have to wear a hat or, you know, a...to keep your hair back from your face. (p.5)	1	Susie	Internal rules and regulations
	And that's somethin' that the company always, we have a meeting every year. And we go o-, over the safety regulations and, and everything. (p.5)	1	Susie	External rules and regulations
	Ah…to meet the State guidelines because there's three hours of safe zone, ah, before it becomes technically unsafe, according to the State guidelines. So, make sure it's delivered on time and they have adequate time to put it away. (p.5)	1	Terry	External rules and regulations
	And they also have food inspectors just come around (p.8)	1	Susie	External rules and regulations
	we go to meetings, um, and we have to get points for, you know, we have to be accredited. Um, and, ah, in those meetings, we're, we're taught different varieties of, of foods, you know, safety and, and, ah, things like that (p.7)		Mary	Reward and Punishment
	It (food label) has to be on there when the health inspector shows up (p.14)	2	Woman	External rules and regulations
	We get evaluated each year. (p 30)	2	June	Reward and Punishment
	Your temperatures have to be wrote down. If your health inspector comes in, she's allowed to go through all that paperwork. And if it's not on there...you're gonna catch	2	Kay	External rules and regulations

	the points against you. You're not gonna get a perfect inspection. (p 38)			
	I'd also say like, depending on who's there that night, I mean, if you're not being watched that closely by a supervisor, if they're gone for the weekend or whatever, ah, it's easy to ***not*** wash your hands at certain times or not wear gloves with a certain thing. (p.20)	3	Molly	Internal rules and regulations
	And then like, when there isn't someone watching every time. But I think everyone knows what the proper things are. It's just… well, can we do it every single time? (p.20)	3	Candace	Internal rules and regulations
	I mean, the first couple times it'll be a warning, but I mean, if it keeps happening, they're not gonna let you keep doin' it and you might get put on a probationary period or something. (p.21)	3	Courtney	Reward and Punishment
	But otherwise, ultimate accountability... is somebody gets sick from the food. (p.22)	3	Ann	Internal rules and regulations
	And maybe that's like something that he should...make it, like make us aware that if you ***aren't*** doing what's right, like you're gonna have consequences for it. (p.22)	3	Candace	Internal rules and regulations
	And that's one of the things (immunization) that, um, if you don't have that, they'll take you off the schedule until you get that, like until you get it done. (p.22)	3	Candace	Reward and Punishment
	So she like figured out a way that they could either buy their hairnets or she started wearing like a headband around it so that it held it in place better. So just even like not so much accountability, but like finding ways to help people stay accountable to it. (p.22)	3	Courtney	Reward and Punishment
	….. if you don't get those (TB test) we get taken off the schedule and stuff. So for that, I mean, just like us being safe around the residents and especially around food too. (p.23)	3	Molly	Reward and Punishment

	If we're not up to date on those (ServSafe), we're not on the schedule either. So, you have to keep really up to date. (p23)	3	Lynn	Reward and Punishment
	And that's (flu shot) one of the things that, um, if you don't have that, they'll take you off the schedule until you get that, like until you get it done. (p.23)	3	Candace	Reward and Punishment
	And sometimes like for CBLs (Computer Baseline), like if you're not up to like, they'll give you like a period for each one and then like if you're not to that point, then they're like, they'll remind you or they'll like make you go in during work or even come in an hour early to get it done. (p.23)	3	Candace	Reward and Punishment
	And also lack of incentives or like punishment. So, I'm not gonna ***get*** anything if I follow it, and I wasn't gonna get punished, I didn't feel, as if I didn't. (p.17)	4	Lauren	Reward and Punishment
	And they have like cameras that they watch, so, um, if you do anything like that, like I know people have been fired for like eating food while, um, while they were like making it or something. (p.11)	4	Peyton	Reward and punishment
Work pressure	…. some of the time restraints, ah, ah...cooking it to the adequate temperature, sometimes to, to get it delivered to the store or to the schools, ah, it's gotta be prepared so much in advance, but you don't want it too far in advance. (p.9)	1	Terry	Time
	Sometimes like on, on Satur-, um, Wednesdays, we have, you know, short...we come in late. So lunches are kinda pushed together. (p.10)	1	Susie	Work schedule
	….in this day and age, a lot of the kids and that, they're become more, you know, aware...of, of safety. (p.13)	1	Susie	Customer expectation

	…..you see that it'll (clean surfaces) present a nicer...more appealing to the kids when they see the food array and, and it's, you know, clean and, clean environment. (p.14-15)	1	Susie	Customer expectation
	When people call and say staff was on leave. (p.52)	2	Bear	Adequacy of staffing
	And it's very hard to get all the work done. Like say, on grilled cheese day...ah, we had sixty pans of grilled cheese going out. And that's a, one pan has twenty-four grilled cheese on it. One person cannot do it in one day. (p.53)	2	Margaret	Adequacy of staffing
	If you are shorthanded, if you start hurrying, you know…. And temps don't get taken. (p.56)	2	Woman	Adequacy of staffing
	You know, right at a, at, you know, to the elementary schools th-, the truck drivers come. And everything has to be ready at that time… And that is where accidents do happen, on the cart. Temperatures or... ...or people don't pick up their boxes on the floor and stumble over 'em and...(p.57)	2	Margaret	Adequacy of staffing
	….if you don't have your food, um, coming on the truck and it's for the menu that day, then you get, ah, um, you know, scramble and try to, to substitute... ...and, and change things, which can kind of make a preventing, you know, um, um, you know, things aren't moving smoothly. (p.60) ….there was a resident at a retirement home that asked us to, um, re-puree all of their food after it's already been pureed. And we weren't...heating it back up to temperature at all, which is technically not supposed to happen. (p.14)	2 3	Mary Molly	Adequacy of supplies Customer expectation
	So if you're running low on time or, you know, there's so much to do, sometimes I think that's an easy way to just slough off and not follow exact procedures. (p.19)	3	Lynn	Time

	And they really tried to follow the rules, when you have a high census and there's only two people working patients, there sometimes just wasn't time to follow all the rules. (p.19)	3	Ann	Time
	I mean, resident complaints can obviously influence how you're washing hands and being sanitary. (p.20)	3	Courtney	Customer expectation
	It's, I mean, these patients, they're high risk. So, but we wanna be careful. But sometimes when we put a hundred some jobs on your window, it's like...(p.21)	3	Ann	Time
	I just think it's a very interesting to note, ah, ah, resident satisfaction, ah, has affected food safety in, in different ways. Ah, she, Candace, ah, said, you know, because of time and wanting to make them happy, you rush things and might not do everything right. And then Courtney said, you know, if a resident gets on your case they might fluster you. You might not do things, so it's two different ways...resident satisfaction. (p.21)	3	Brian	Customer expectation
	Like those are policies that are...I mean, I think they're good policies, but they are rarely implemented because people don't really have that 20 seconds. (p.18)	4	Emily	Time
	I think the time factor then, again, is huge like when you are in a hurry. (p.18)	4	Sue	Time
	…I think the fact that we prepare food kinda like behind closed doors, so nobody really sees the process or production or like how it's done. And like customers don't know if you're wearing gloves or not, so those expec-, like expectations almost...aren't really on, like you don't feel that obligated almost, just because...they don't, they don't know. (p.19)	4	Sue	Customer expectation
	So like if patients are out there or like even the people that work out front, um, they always have their hairnets on. They're like, they wear gloves when they serve customers. But it's just...because the customers are right	4	Sue	Customer expectation

	there. (p.20)			
Risk perceptions	…due to the funding, the supervisors and, and most of the people know that, ah, i-if we don't follow the procedures, ah, we can lose the funding for the State and, ah, we lose the funding then creates a big deficit and jobs will be...on the line. (p.19)	1	Terry	Risk awareness
	I was talking to her about our child that had special needs, and he drooled on the chicken nuggets. And she told me to bring them back up to temperature. (p.45)	2	Margaret	Risk taking
	Sometimes we keep food that has been on the line, you know, been out and, you know, keep it as leftovers. And to me, once it's been out it should be gone. (p.48)	2	June	Risk taking
	And the one thing that, ah, was really devastating to us was they set off a smoke bomb in the cafeteria….. Well...our manager said we had to throw away everything that was on the lines. And we did. (p.49)	2	Molly	Risk taking
	Because she was concerned with the....the acid in the smoke, from the smoke bomb. (p.49-50)	2	Molly	Risk awareness
	They don't wanna throw away food. I'm, I'm not sure but I've heard this, that they get, if they stay within their budget they get a bonus. And I ***do not know*** if that's true or not. (p.51)	2	Margaret	Risk taking
	There was one time when another, a different, um, handicapped child came and she put her hands all in the carrots. So the carrots all got thrown away. (p.51)	2	Emily	Risk taking
	…allowing residents to take food back to their rooms. And, um, some of 'em do have refrigerators in their rooms, but, ah, like once it leaves the kitchen, we have no control over it at all. (p.15)	3	SuzyQ	Risk taking
	It's not, I mean...um, so usually, I think...better judgment like, usually the majority of people there, if they saw it, would just throw it away. (p.16)	3	Candace	Risk awareness

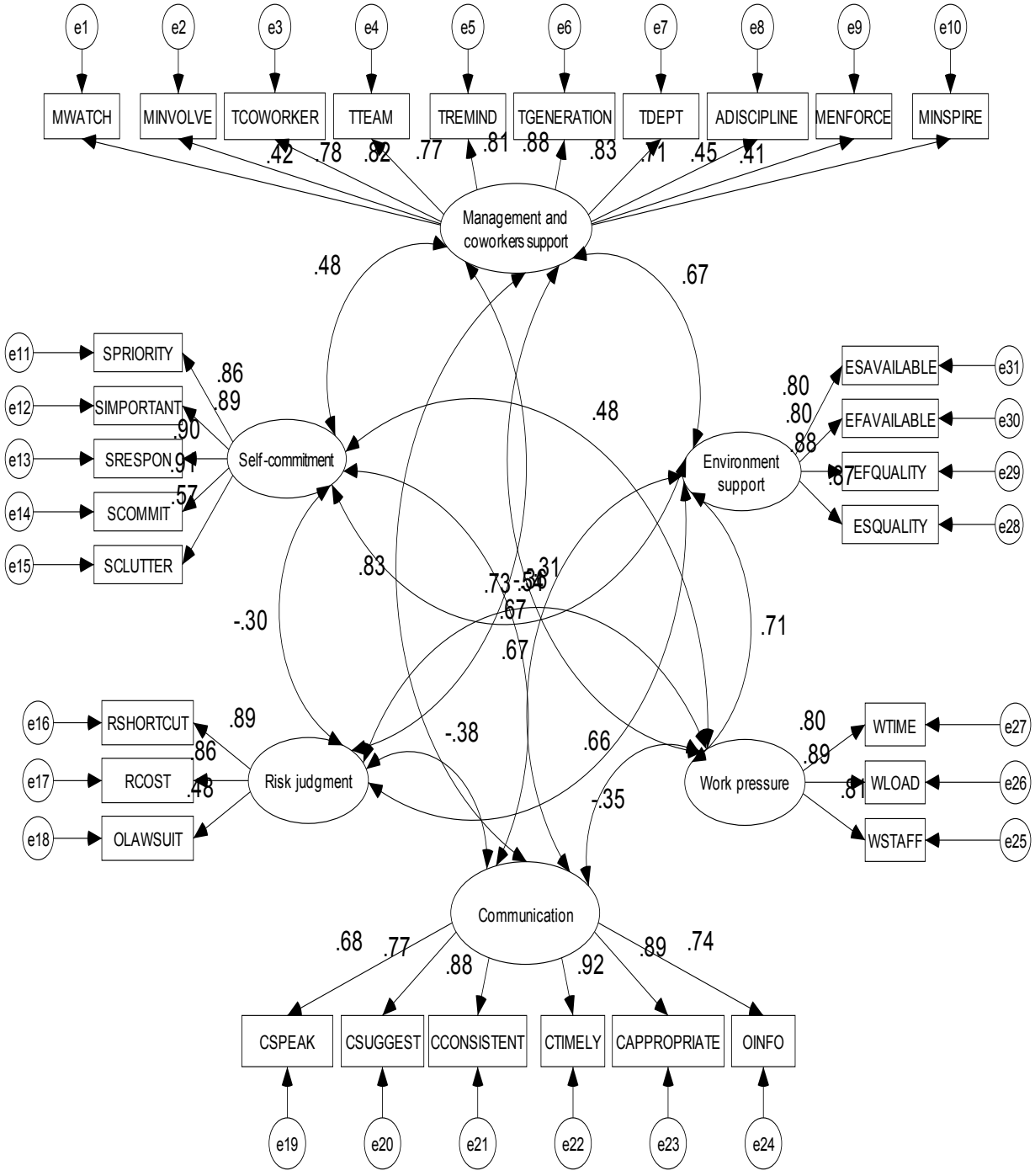
	…we were asked to serve milk that was expired. Like by a day or something, but still not...something I was really not comfortable with (p.16)	4	Emily	Risk taking
	Cost. The only reason. 'Cause I'm, I'm...it's like typically pouring money down the drain when they lose that milk, so...that's the only, I mean, that's the only motivator for cutting corners, I think, in establishments. (p.16)	4	Emily	Risk taking

APPENDIX M: STANDARDIZED FACTOR LOADINGS

Item	Standardized loading	Cronbach's alpha
Factor 1: Management and coworkers support		0.948
Management inspires me to follow safe food handling practices	0.411	
My manager is actively involved in making sure safe food handling is practiced	0.781	
There is good cooperation among departments to ensure that customers receive safely prepared food	0.832	
New employees and experienced employees work together to ensure food safety practices are in place	0.878	
Management enforces food safety rules consistently with all employees	0.447	
When lots of work needs to be done quickly, employees work together as a team to get the tasks completed safely	0.769	
My manager always watches to see if employees are practicing safe food handling	0.424	
My coworkers are always supportive of each other regarding food safety	0.816	
Employees remind each other about following food safety practices	0.811	
Employees are disciplined or reprimanded when they fail to follow food safety practices	0.706	
Factor 2: Communication		0.923
I can freely speak up if I see something that may affect food safety	0.685	
My manager generally gives appropriate instructions on safe food handling	0.888	
All of the necessary information for handling food safely is readily available to me area	0.744	
Management provides adequate and timely information about current food safety rules and regulations	0.915	
I am encouraged to provide suggestions for improving food safety practices	0.774	
All managers give consistent information about food safety	0.879	
Factor 3: Self-commitment		0.915
I follow food safety rules because it is my responsibility to do so	0.904	
Food safety is a high priority to me	0.862	
I follow food safety rules because I think they are important	0.892	
I am committed to following all food safety rules	0.910	
I keep my work area clean because I do not like clutter	0.565	

Factor 4: Environment support		0.903
Equipment items needed to prepare food safely (e.g., hand washing sinks) are readily available and accessible	0.796	
Adequate supplies are readily available to perform safe food handling practices	0.803	
Facilities are of adequate quality to follow safe food handling practices	0.881	
I am provided with quality supplies that make it easy for me to follow safe food handling practices	0.866	
Factor 5: Work pressure		0.878
My work load does not interfere with my ability to follow safe food handling practices	0.886	
I always have enough time to follow safe food handling procedures, even during rush hours	0.803	
The number of staff scheduled at each shift is adequate for me to get my work done and handle food safely	0.814	
Factor 6: Risk judgment		0.756
I believe that written food safety policies and procedures are nothing more than a cover-up in case there is a lawsuit	0.476	
I am sometimes asked to cut corners with food safety so we can save costs when preparing food	0.858	
When there is pressure to finish food production, managers sometimes tell us to work faster by taking shortcuts with food safety	0.888	

APPENDIX N: AMOS GRAPHIC FOR STANDARDIZED FACTOR LOADINGS



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