2016

Investigating child care food safety culture and barriers & motivators to safe food handling practices

Joel Reynolds
Iowa State University

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Investigating child care food safety culture and barriers & motivators to safe food handling practices

by

Joel A. Reynolds

A dissertation submitted to the graduate faculty
in partial fulfillment of the requirement for the degree of

DOCTOR OF PHILOSOPHY

Major: Hospitality Management

Program of Study Committee:
Lakshman Rajagopal, Major Professor
Susan Wohlsdorf-Arendt
Robert H. Bosselman
Stephen G. Sapp
Christine N. Lippard

Iowa State University
Ames, Iowa
2016

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DEDICATION

This dissertation is dedicated to my remarkable wife and children:

Emily    Isla    Piper

Their encouragement, support, and enduring love was unceasing throughout my doctoral studies and without it this dissertation would not be possible. Also, to my parents for making me the man I am, and supporting me through this journey. I love you all.
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ABSTRACT

Young children are considered a high risk population for foodborne illness. Furthermore, children attending child care facilities are four times more likely to contract a foodborne illness than other children. Research has shown that increased food safety knowledge and training alone are not enough to mitigate foodborne illnesses. Researchers have begun to assess food safety through the lens of organizational culture. It has been shown that food safety practices are partly influenced by prevailing cultural norms within work environments. The aim of this study was two-fold: 1) to assess food safety culture and social system factors effect on child care food handler’s self-commitment to perform safe food handling practices in licensed center-based facilities, and 2) to identify perceived important barriers and motivators to following recommended food safety practices. Two paper-based questionnaires were utilized, the first for directors gathering facility demographics, the second for child care food handling employees to assess their perceptions of food safety culture in their facilities, and barriers and motivators to following recommended food handling practices. A total of 99 director and 990 employee questionnaires were sent, 71 directors and 287 employee questionnaires were returned. Of the employee questionnaires returned 271 were useable, for response rate of 27.4%; all director questionnaires were usable for a response rate of 71.7%. Results identified three factors, manager/coworker support, the ability to speak freely, and communication from managers to staff, had the highest correlations with self-commitment. However, speak freely and communication were the only factors with statistically significant effects on self-commitment. Additionally, food handling employees’ perceived six important barriers and 14 key motivators to following recommended food safety practices. Important barriers pertained to too much work to do; the work pace; too busy; lack of time, being afraid of coworkers reaction, and don’t think I
need to follow food safety practices. Key motivators were focused on children’s safety, available supplies, communication, and food safety training/information. Conclusions and implications of the importance of providing clear instructions to staff and creating an atmosphere where staff feel comfortable in speaking freely are given. The mitigation of identified barriers and inclusion of key motivators is also discussed.
CHAPTER 1. INTRODUCTION

Introduction

The proliferation of foodborne illness (FBI) outbreaks has become a global concern. FBIs affect developing and developed countries alike (World Health Organization, 2015). In the United States (U.S.) alone, the Center for Disease Control and Prevention (CDC) estimates that each year 48 million Americans become ill due to FBIs. Of those, 128,000 Americans are hospitalized and 3,000 more die from FBIs (Scallan, Griffin, Angulo, Tauxe, & Hoekstra, 2011a; Scallan et al., 2011b). The majority, an estimated 38.6 million, were caused by unspecified agents (Scallan et al., 2011a). However, 31 major pathogens are known to cause 20% of FBI outbreaks or 9.4 million illnesses resulting in 55,961 hospitalizations and 1,351 deaths (Scallan et al., 2011b). Annually, FBIs create an estimated economic burden of over $15.5 billion, and cause over 112,000 disability-adjusted life years in the U.S. (Scallan, Hoekstra, Mahon, Jones, & Griffin, 2015). “Economic burden is a measure of the tradeoffs that people are willing to make to reduce illness” (Hoffmann, Maculloch, & Batz, 2015, p. 2).

Griffith (2010) recognized that the list of food-related pathogens has increased significantly in the past 30 years and will continue to increase unless measures are taken to combat this issue. It was estimated that a new pathogen transmitted by food was discovered every 16 months (Tauxe, 2009). However, the four pathogens identified most often in foodborne illness are Norovirus (5.5 million, 58%), Nontyphoidal Salmonella spp. (1.0 million, 11%), C. Perfringens (1.0 million, 10%), and Campylobacter spp. (0.8 million, 9%) (Scallan et al., 2011b). Norovirus outbreaks result in approximately 5.5 million cases annually with 149 cases resulting in death and costing over $2.2 billion in economic burden (Hoffmann et al., 2015). Among American children under five years of age, Norovirus has been the leading cause of
medical visits for acute gastroenteritis (Payne et al., 2013) and costs an estimated $273 million due to 14,000 hospitalizations, 281,000 emergency room visits, and 627,000 outpatient visits annually. It has also been estimated that acute gastrointestinal illnesses associated with child care facilities cost over $2.3 billion annually (Snowdon, Buzby, Roberts, Cliver, & Riemann, 2002).

In 2010, the CDC reported the five most common risk factors of FBI outbreaks include purchasing food from unsafe sources, poor personal hygiene, improper cleaning and sanitizing, time-temperature abuse, and cross-contamination. In the final phase of a ten-year study the U.S. Food and Drug Administration (FDA) observed within foodservices a low level of compliance with food safety policies (2009). Within these foodservice establishments, the three factors with the highest non-compliance rates were time-temperature abuse, poor personal hygiene, and cross contamination (FDA, 2009).

Foodborne illness can lead to severe short-term and long-term health consequences, such as vomiting, diarrhea, organ failure and, in some cases, death. Certain populations are more susceptible to foodborne illness than others. These populations include the elderly, pregnant women, immunocompromised individuals, and young children (FDA, 2016). Research on reported foodborne illness outbreaks has shown that children under the age of five are disproportionately affected by foodborne illnesses compared to other groups, with 69.5 infections per 100,000 children (Scallan et al., 2011b). Only an estimated 5% of these infections are associated with recognized foodborne outbreaks. This population also experiences the highest rates of laboratory-confirmed infections from eight of the ten major foodborne pathogens, partly because children’s immune systems are not fully developed, and also because children have low body mass, and reduced stomach acid production (Pew Health Group, 2014). Additionally, children have a lack of control over food handling practices (CDC, 2013). Cremon et al. (2014)
found that children with *Salmonella*-induced gastroenteritis had a higher likelihood than adults to develop long-term health consequences such as irritable bowel syndrome.

Children are also 3.5 times more likely to contract FBIs in child care facilities compared to children cared for in their own homes (Lu et al., 2004). The American Academy of Pediatrics (AAP) notes the close proximity of children in child care facilities and their natural curiosity to touch a wide range of objects and surfaces only heightens their risk of infection (Aronson & Shope, 2013). Additionally, transmission of enteric pathogens in child care facilities occurs from person-to-person contact due to the close interaction necessary in the care of children, particularly in diapering and toileting (Lee & Greig, 2008). An example of this form of transmission has been *Rotavirus*, which can be easily transmitted from person-to-person if poor hand hygiene practices occur. Among U.S. children, those in child care centers are most at risk for *Rotavirus* and *Norovirus* infections (Medeiros & LeJeune, 2013). An estimated 15,000 cases of *Rotavirus* occur annually in the United States (CDC, 2016). Furthermore, Fraser et al. (2015) observed the two most frequently touched surfaces by child care providers were children’s clothes and food contact surfaces; while children’s hands were the most touched bare skin surface. Handwashing by child care employees has been identified as the single most important preventative measure to avoid infecting themselves and children with harmful pathogens (Brady, 2005; Medeiros, & LeJeune, 2013; Pickering, Baker, Kimberlin, & Long, 2012).

Wohlgenant et al. (2014) examined hygiene and sanitation practices of child care employees during food preparation in the kitchen as well as during food service in the classrooms to identify pathogen dissemination points. Researchers found the most out of compliance practices were: food handlers wearing effective hair restraints, food handlers wearing gloves, sanitizer test kit available for facilities that wash dishes by hand, and availability of a
food thermometer. Staskel, Briley, and Curtis (2007) also observed child care cooks (n=35) out of compliance with food safety practices including: lack of thermometer use (71% did not use) and lack of proper handwashing (only 57% used proper technique). Microbial analysis showed child care facilities without a written food preparation policy had significantly higher aerobic plate counts on all surfaces (e.g., faucet and refrigerator handles, toys, diaper changing areas, and eating tables) (Li et al., 2014). Additionally, Kotch et al. (2007) identified that proper equipment in diapering, handwashing, and food preparation areas designed to reduce the spread of infection had a significant effect on reducing diarrheal illness among the children.

The need for child care workers to follow correct procedures to protect children from any harm, including foodborne illness, remains extremely important (Aronson & Shope, 2013). According to the 2013 U.S. Census, over 15.6 million children under the age of five are in licensed center-based child care facilities (i.e., commercial, church, and preschools) or home-based child care facilities in the United States (U.S. Census Bureau, 2013). Therefore, ensuring the safety of food served to children in all establishments, including those that specifically cater to young children, may be critical for reducing serious health consequences and associated costs (Pew Health Group, 2014).

Researchers identified barriers to following safe food handling practices such as lack of motivation (Arendt, Paez, & Strohbehn, 2013; Arendt et al., 2014; York et al., 2009a, 2009b), time limitations (Brannon, York, Roberts, Shanklin, & Howells, 2009; Meysenburg, Albrecht, Litchfield, & Ritter-Gooder, 2014), lack of knowledge (Enke, Briley, Curtis, Greninger, & Staskel, 2007; Meysenburg et al., 2014), and lack of resources (Enke et al., 2007; Howells et al., 2008; Webb & Morancie, 2015). Additionally, researchers identified the ever-changing demographic profile of foodservice employees as a major challenge to safe food handling
practices (Ellis, Arendt, Strohbehn, Meyer, & Paez, 2010; Sneed & Strohbehn, 2008). Research findings indicate that knowledge and training alone are not enough to remove these barriers and improve safe food handling practices (Roberts et al., 2008; York et al., 2009b). Food safety practices are influenced by more than just proper knowledge and attitudes; food safety practices are partly influenced by the prevailing cultural norms found within their work environments (Yiannas, 2009; 2015).

Within the last two decades there has been a shift in emphasis in safety literature, moving away from individual-level accident antecedent factors (e.g. error or non-compliance with safety procedures), and moving towards broader organizational factors (e.g. safety climate) (Zohar, 2010). However, only in the last few years has food safety research started to examine safety through the organizational lens.

First introduced by Zohar in 1980, safety climate has become a highly researched measure for understanding variables and antecedents of injury and accidents in the workplace. “In safety culture the concept of organizational culture is taken and applied to one specific area of a business’ activities, i.e. the safety of people working within a business or people who could be adversely affected by its existence, products or services” (Griffith, Livesey, & Clayton, 2010a, p.429). Yiannas (2009) discussed how an organization’s safety culture reflects the attitudes, beliefs, perceptions, and values of its employees.

To mitigate barriers for performing food safety practice, Medeiros, Cavalli, and Proenca (2012) identified specific managerial and organizational behaviors including providing supervisory and peer support, adequate resources, training, and a positive management culture. In addition to those supports, motivational factors also had a significant impact on organizational
culture, itself (Contiu, Gabor, & Oltean, 2012). Therefore, instilling a safe food culture within all employee levels is crucial to any foodservice organization.

One proposed definition of food safety culture was 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, 2008). Griffith et al. (2010) described food safety culture simply as beliefs shared by members in an organization. Ungku Fatimah, Arendt, and Strohbehn (2014) identified six factors of food safety culture: management and coworkers support; communication; self-commitment; environment support; work pressure; and risk judgment. Food safety culture is evident in every foodservice organization, and can be assessed on a continuum between positive and negative (Yiannas, 2015).

**Purpose and Objectives of the Study**

The purpose of this study was two-fold: 1) to assess food safety culture and social system factors effect on child care food handler’s self-commitment to perform safe food handling practices in licensed center-based facilities, and 2) to identify perceived important barriers and motivators to following recommended food safety practices. The specific research objectives for the study were:

1. Assess child care food handlers’ perceptions of food safety culture and social system factors.
2. Identify which food safety culture and social system factors affect child care food handling employee’s self-commitment to perform safe food handling practices.
3. Identify important barriers and motivators to following food safety practices in child care facilities.
4. Compare child care food handling employees’ perceptions on barriers and motivators to following food safety practices in child care facilities based on demographic and operational characteristics.

**Significance of the Study**

Limited research on food safety in licensed center-based child care facilities has been conducted. In child care facilities, researchers have previously investigated food safety knowledge, attitudes toward safe food handling practices, food handling practices, as well as microbial analysis of food contact surfaces and hand hygiene. For example, Fraser et al. (2015) used observations to identify frequency of surfaces touched by child care providers. Cosby et al. (2008) surveyed bacteriological contamination on selected food contact and non-food contact areas in child care centers. Li et al. (2014) combined observational and microbiological analysis showing facilities without a written food preparation policy had significantly higher microbial contamination on all surfaces than facilities with a written food preparation policy. Kinnula, Tapiainen, Renko, and Uhari (2009) investigated the use and safety of alcohol-based hand gels (AHGs) among children in child care centers; Zomer et al. (2013a) observed child care employees’ compliance to hand hygiene guidelines and identified environmental determinants of hand hygiene behavior.

Surprisingly, no known research has been conducted in regards to food safety culture within child care facilities. Thus, the current study builds upon previous food safety research in child care facilities through the lens of organizational culture. Once an organization has assessed the food safety culture, gaps can be identified and tailored interventions can be implemented. Barriers and motivators to following food safety practices in child care facilities will be identified. Results from this study will provide practical guidelines for changing food safety
practices in child care facilities. Results should be useful in creating tailored training programs and interventions designed to improve employees’ food safety practices. In turn, creating an appropriate food safety culture in child care facilities will improve the health and safety of children in child care.

**Definition of Terms**

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

**Foodborne illness (FBI):** illness carried or transmitted to people by food (National Restaurant Association Educational Foundation, 2014).

**Foodborne illness outbreak:** an incident in which two or more people experience the same illness symptoms after eating the same food (National Restaurant Association Educational Foundation, 2014).

**Food safety culture:** the aggregation of the prevailing, relatively constant, learned, shared attitudes, values and beliefs of employees in an organization; contributing to the hygiene behaviors used within a particular food handling environment (Griffith, 2008).

**High-risk population:** people susceptible to foodborne illness due to the effects of age or health on their immune systems, including infants and preschool-age children, pregnant women, older people, people taking certain medications, and those with certain diseases or weakened immune systems (National Restaurant Association Educational Foundation, 2014).

**Licensed center-based child care facility:** a facility that provides care and education to 13 or more children in a non-residence setting, operating more than four hours a day and more than two days a week (South Carolina Child Care, 2016).
**Organizational culture:** the pattern of basic assumptions that a given group has invented, discovered, or developed in learning to cope with its problems of external adaptation and internal integration, and that have 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 other problems (Schein, 1985, p.9).

**Safety culture:** the concept of organizational culture is taken and applied to one specific area of a business’ activities, i.e. the safety of people working within a business or people who could be adversely affected by its existence, products or services (Griffith, et al., 2010a, p. 429).

**Social system:** A social system consists in a plurality of individual actors interacting with each other in a situation which has at least a physical or environmental aspect, actors who are motivated in terms of a tendency to the ‘optimization of gratification’ and whose relation to their situations, including each other, is defined and mediated in terms of a system of culturally structured and shared symbols (Parsons, 1951, p. 5-6).

**Dissertation Organization**

The remainder of this alternate format dissertation contains five chapters. The second chapter presents the review of literature. Chapter 3 outlines the methodology for the study. Additionally, Chapters 4 and 5 are manuscripts written for journal submission. Chapter 4 presents a manuscript targeted for *The Journal of Foodservice Management and Education*, while chapter 5 presents a manuscript targeted for *The Journal of Child Nutrition & Management*. Each manuscript was written to correspond with journal submission requirements. Finally, chapter 6 concludes the dissertation with a summary of results, implications of the
findings, limitations of the study, and recommendations for future research. Reference lists are provided at the end of each chapter.

**References**


Tauxe, R.V. (2009). Overview of emerging obscure and less well-recognized foodborne pathogens or should we lose sleep. Paper presented at IAFP Conference, July 12-15, Grapevine, TX.


CHAPTER 2. REVIEW OF LITERATURE

In the second chapter, a review of literature of related topics that support the current study is discussed. This chapter begins with an overview of child care facilities and food safety issues. Relevant literature pertaining to child care employees’ safe food handling practices including hand hygiene and food safety behaviors are reviewed. Barriers influencing food safety practices are analyzed following the review. A synopsis of organizational culture and safety culture is also provided. Finally, previous literature on the concept and factors which influence food safety culture are reviewed.

**Child Care Facilities**

On average, children under 5 who attend child care spend 33 hours per week in some type of child care facility (U.S. Census Bureau, 2013). Child care facilities can be divided into two general categories; relative care and non-relative care. Relative care takes place in homes and this type of arrangement accounts for more than 8.2 million children (U.S. Census Bureau, 2013). Non-relative care, which includes over 7.4 million children, was further classified by type of setting, number of children in care, age, and health status of the children (Aronson & Shope, 2013). Non-relative care includes center-based facilities (2.6 million children), nurseries or preschools (1.2 million children), Head Start programs/school-based programs (1 million children), and non-relative in-home care (2.6 million children). Licensed center-based child care facilities (i.e., commercial, church, and preschools) provide care and education to 13 or more children in a non-residence setting, operating more than four hours a day and more than two days a week (South Carolina Child Care, 2016). Age groupings include infants (birth through 12 months of age); toddlers (13 through 35 months of age); preschoolers (36 through 59 months of age); and school-aged children (5 through 12 years of age) (Aronson & Shope, 2013).
Many child care facilities provide breakfast, lunch, and snacks. Some facilities had designated foodservice employees, while others utilize teachers or parents to supply or prepare food. Each of these methods may be susceptible to unsafe food handling practices resulting from poor personal hygiene, time temperature abuse, improper cleaning or sanitizing, cross-contamination, and other possible factors. The size of the facility also impacts the frequency of infectious disease occurring within child care facilities (Brady, 2005). In 2010, the Center for Disease Control and Prevention (CDC), using population-based surveillance for laboratory-confirmed cases of infection, found that children ages four years and younger had 4.5 times the number of infection incidents transmitted through food than adults aged 20-49 years.

The American Academy of Pediatrics (AAP) found prevention and control of infection in out-of-home child care settings to be influenced by eight factors: health status of children, practice of personal hygiene, and immunization status of care providers; environmental sanitation; food handling procedures; age and immunization status of children; ratio of children to care providers; physical space and quality of facilities; frequency of use of antibiotics in children in child care; and adherence to standard precautions for infection control (Pickering, Baker, Kimberlin, & Long, 2012).

**Child Care Foodborne Illnesses**

Over the last fifteen years, there were over 86 FBI outbreaks in U.S. child care facilities (Table 2.1), accounting for approximately 2,463 illnesses, 65 hospitalizations, and one death. These FBI outbreak numbers could be drastically higher as many FBI outbreaks go unreported. Brady (2005) identified many common infectious diseases which may be mild or subclinical, or may not be recognizable despite their ability to be transmitted to other young children.
Table 2.1: Child care foodborne illness outbreaks

<table>
<thead>
<tr>
<th>Year</th>
<th>Outbreaks</th>
<th>Illnesses</th>
<th>Hospitalizations</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>3</td>
<td>250</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1999</td>
<td>9</td>
<td>406</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>2000</td>
<td>4</td>
<td>35</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>2001</td>
<td>6</td>
<td>160</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>2002</td>
<td>4</td>
<td>65</td>
<td>3</td>
<td>0</td>
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<tr>
<td>2003</td>
<td>6</td>
<td>110</td>
<td>19</td>
<td>0</td>
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<td>2004</td>
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<td>2005</td>
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<td>0</td>
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<td>5</td>
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<td>6</td>
<td>0</td>
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<td>2007</td>
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<td>0</td>
</tr>
<tr>
<td>2008</td>
<td>14</td>
<td>797</td>
<td>41</td>
<td>0</td>
</tr>
<tr>
<td>2009</td>
<td>5</td>
<td>49</td>
<td>6</td>
<td>0</td>
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<tr>
<td>2010</td>
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<td>2012</td>
<td>4</td>
<td>111</td>
<td>7</td>
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</tr>
<tr>
<td>2013</td>
<td>4</td>
<td>121</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Sources. Adapted from “Center for Disease Control and Prevention, Foodborne Outbreak Online Database (CDC)” (2015). Adapted from “Foodborne Illness Outbreak Database” (2015).

Food handlers carrying pathogens such as *Hepatitis A*, *Salmonella*, and *Escherichia coli* (*E. coli*) *O157:H7* were associated with FBI outbreaks in child care facilities (CDC, 2015). *E. coli* *O157* has been responsible for approximately 800 years of life loss, annually. This is primarily due to the high proportion of deaths associated with young children (Scallan et al., 2015).

This was the case in a 2010 outbreak of *E. coli O157:H7* at a child care facility in Vancouver, Washington (Jung & Rojas-Burke, 2010). The outbreak included 19 cases, four hospitalizations and one death, and was confirmed to have spread via person-to-person contact. The child was first hospitalized on March 19, 2010, however, the facility remained open until April 2, 2010. This delay was due to a lack of identification of a potential FBI outbreak and was mistaken as symptoms of flu, which are very similar to symptoms of FBI. Painter et al. (2013) identified that many small FBI outbreaks are not detected or investigated. A negative food safety culture was established with a lack of handwashing practices and disregard of potential risks.
involved with caring for a high risk population of young children. In June of 2010, the child care facility’s license was permanently revoked due to a pattern of non-compliance with minimum state food safety licensing requirements. With an improved food safety culture, this outbreak, along with many others, might have been avoided.

Lee and Greig (2008) conducted a systematic review of enteric outbreaks in child care centers between January 1996 and November 2006. For bacterial outbreaks, the modes of transmission were person-to-person (43%), food (29%), animal contact (11%), and unknown (17%). The mode of transmission was largely unknown (51%) for viral outbreaks. The most frequently identified effective management practices included management of symptomatic cases (35 practices), enhanced hand hygiene (24), safe food handling practices (19), and enhanced environmental cleaning (17).

Lyman et al. (2009) investigated the etiology of outbreaks of acute gastroenteritis in children enrolled in child care centers in North Carolina between October 2005 and March 2007. Evaluation of 29 acute gastroenteritis outbreaks revealed that 45% were caused by a single virus, including *Rotavirus* (17%), *Norovirus* (10%), *Astrovirus* (10%), and *Sapovirus* (7%). Multiple viruses were detected in an additional 10% of the outbreaks. Environmental swabs from 13 of 22 outbreaks (59%) tested positive for at least one virus, and confirmed finding the same virus in fecal specimens for 10 outbreaks (45%). These results show the need for proper safety policies and procedures to prevent spread of these viruses. Specifically, while sick with *Norovirus*, a person can shed billions of microscopic viral particles in their stool and vomit. However it only takes as few as 18 viral particles to make another person sick (Teunis et al., 2008). Moreover, foodborne viruses are difficult to kill and can survive on countertops and equipment for up to
two weeks, as well as be resistant to many common disinfectants and hand sanitizers (CDC, 2014).

Todd, Greig, Bartleson, and Michaels (2007) reported four separate large outbreaks in child care facilities associated with *Salmonella non-typhoidal, Norovirus, Shigella sonnei*, and *Shigella flexneri*. The largest outbreak affected 195 children in 30 child care facilities in Sweden. *Norovirus* was the pathogen associated with the outbreak from pumpkin salad made by a catering company. In a recent FBI outbreak, the European Centre for Disease Control and Prevention (ECDC) identified over 11,000 people, mostly children, from over 100 kindergartens and schools in Germany, were infected with *Norovirus* discovered in strawberry jam from a central kitchen (ECDC, 2012).

A study of 314 food safety professionals identified knowledge gaps pertaining to *Norovirus* (Kosa, Cates, Hall, Brophy, & Fraser, 2014). Nearly two-thirds (n=186) of all respondents answered fewer than 75% of questions correctly. Limited knowledge on food handling practices was shown, specifically restricting sick workers. Additionally, nearly one-third of respondents did not know that person-to-person was the most common mode of transmission for *Norovirus*.

In October of 2008, a large outbreak of *Salmonella javiana* affected 28 preschool facilities in Los Angeles County. There were 594 FBI cases including 428 children, 144 staff members and volunteers, and 12 kitchen employees. Thirty cases resulted in hospitalization, including 26 children (Reporter, et al, 2008). On October 16, 2008, the local Department of Public Health was notified by a local hospital of a cluster of patients with similar gastrointestinal symptoms including diarrhea, fever, nausea, cramps, vomiting, headache, chills, and body aches. A central kitchen was used to prepare all food served at the preschool facilities.
On October 17, 2008, a site visit and interviews were conducted at the central kitchen. Employee stool samples, food samples, and pest feces cultures were taken and analyzed. Samples were also taken from all employees at each preschool facility. Watermelon prepared on October 14, 2008 was confirmed as the vehicle for FBI transmission. It was further identified that the watermelon was prepared by a central kitchen food worker who came to work sick (Reporter, et al, 2008). Even more troubling, other central kitchen food workers became sick after eating the watermelon yet continued to come to work, furthering the spread of the illness. Food workers had a benefits package that included sick leave, yet supervisors allowed the sick employees to continue to work. This investigation showed a negative food safety culture, in which management allowed sick employees to continue to work knowing they were preparing food for a high-risk population.

**Child Care Affiliations**

Child care facilities generally fall into one of three nutrition policies: a) Child and Adult Care Food Program (CACFP) funded; b) Head Start; or c) programs that only fall under the state’s licensing requirements (Dev et al., 2014). CACFP, a state run federally-funded program, provides aid to more than 3.3 million children and 120,000 adults in care institutions and family or group child care homes daily (CACFP, 2012). CACFP provides aid to child and adult-care institutions and family or group child care homes for provision of nutritious foods that contribute to wellness, healthy growth, and development of young children, and health and wellness of older adults and chronically-impaired or disabled persons (United States Department of Agriculture Food and Nutrition Service (USDA FNS), 2014). CACFP meals must meet USDA nutritional guidelines. In 1977, CACFP had over 480,000 participants and served over 292,000,000 meals annually with a total cost of over $124 million. By 2013, CACFP had over
3,675,000 participants and served over 1.337 billion meals annually, costing nearly $3 billion (USDA, 2014).

In South Carolina, CACFP has been a key source of support for improving the nutritional quality of meals and snacks served to children in child care. In 2013, over 1,300 child and adult care programs in South Carolina participated in CACFP. CACFP adds over $28 million into South Carolina’s economy annually, which accounts for approximately 19 million meals served annually to child and adult-care programs (South Carolina Department of Social Services, 2016).

The National Association for the Education of Young Children (NAEYC) (2014), a leading organization in child care and early childhood education, recommends annual training for directors and employees based on program needs and pre-service requirements. NAEYC recommends training in the following areas: a) health and safety; b) poison prevention and poison safety; c) child growth and development, including motor development and appropriate physical activity; d) nutrition and feeding of children; e) planning learning activities for all children; f) guidance and discipline techniques; g) linkages with community services; h) communication and relations with families; i) detection and reporting of child abuse and neglect; j) advocacy for early childhood programs; and k) professional issues (NAEYC, 2010). However, Crowley, Jeon, and Rosenthal (2013) found only 15% of child care centers surveyed were accredited by the NAEYC. Additionally, the AAP also recommends food handlers, including teachers/caregivers, should receive instruction from a nutrition consultant on food selection, food inspection and storage at the point of receipt from a supplier, food preparation, food holding and storage after preparation, and service (Aronson & Shope, 2013). However, most child care employees do not receive food safety training, often only the director receives formal food safety
training. These results show the need for more unified national policies on food safety training & practices for child care settings, as this setting caters to a high risk population.

**Food Safety Inspections and Child Care Facilities**

Unlike restaurants, licensed center-based child care facilities are not inspected for food alone each year (National Association for Regulatory Administration [NARA], 2013). Child care facilities are inspected prior to receiving a license, and inspections are scheduled with the facility during the re-licensing process which occurs every two years. Unannounced visits are made annually with food safety being part of the general inspection. To be in compliance with U.S. Food and Drug Administration (FDA) and state and local standards, child care facilities must conform to applicable portions of the FDA 2013 Food Code for food safety and sanitation standards (FDA, 2013), as well as all applicable state and local foodservice regulations for centers and large and small family child care homes regarding safe food handling and sanitation practices. However, child care facilities are state-regulated and states often vary in child care policies (American Public Health Association (APHA) and American Academy of Pediatrics (AAP), 2011). If the FDA Food Code was in conflict with local regulations, the health authority with jurisdiction should determine which requirement the facility must meet. A national study conducted by the NARA (2013) found that many states had inconsistent guidelines that dictate food handling and preparation in child care facilities.

In South Carolina, the Department of Social Services (SCDSS) (2016) oversees child care facilities and conducts inspections. The policy for South Carolina-licensed center-based child care facilities on food safety consists of food storage, preparation, service, personal hygiene (handwashing, uniform, hair restraint, and gloves), time and temperature control (cooking, cooling, and reheating of food), and utensils and equipment (cleaning, handling, and storage)
SCDSS (2016) also requires anyone who has signs or symptoms of illness, including vomiting, diarrhea, and infectious skin sores that cannot be covered, or anyone who is infected with bacteria, viruses or parasites that can be transmitted to food, should be excluded from food preparation and handling.

**Food Safety and Child Care Facilities**

AAP recommends training focusing on the prevention of FBI contamination during food preparation and family-style meal service. Unlike restaurant foodservice workers, child care employees face other challenges such as diaper-changing and toilet training during meal service, and handling of food brought from home which sometimes does not arrive at the facility at a safe temperature and should not be served (Aronson & Shope, 2013).

A study measured temperature of foods in preschool-aged children’s sack lunches shortly before consumption at child care centers (Almansour et al., 2011). Lunch sacks (n=705) were assessed from nine central-Texas private child care centers. On three random, non-consecutive days, sack lunches and temperatures were recorded approximately 1.5 hours before lunches were served to children. Less than 12% (n=83) of lunches were stored in refrigerators while the remainder (n=622) were stored at ambient classroom temperature. 91% of lunches were packed in thermally insulated plastic lined bag. Of the 705 lunches, 39.1% contained no ice packs, 45.1% contained one ice pack, and the remainder contained multiple ice packs (2–4). Results showed only 22 (1.6%) of 1,631 perishable food items were found to be in an acceptable temperature range. Overall, 97.4% of meats (n=385), 99.0% of dairy (n=582), and 98.5% of vegetables (n=394) were not in an acceptable temperature range (Almansour et al., 2011). Additionally, only four (0.9%) of the 458 items in 83 sack lunches located in refrigerators were in an acceptable temperature range.
In a similar study, extension nutrition and health specialists investigated best practices for preparing children’s lunch bags to ensure food safety (Strohbehn, Litchfield, & Salow, 2015). The researchers investigated multiple approaches to preparing, packing, and storing food in the lunch bag to ensure safe food temperatures. A calibrated digital thermometer was used with temperatures checked at 7:30 a.m., 9 a.m., and each subsequent hour until noon. Results identified the best practice to ensure safe food temperature was to: make sandwiches the evening before and refrigerate or freeze until morning; use freezer gel packs, frozen juice boxes, or frozen fruit items; and carry in an insulated lunch box (Strohbehn, et al, 2015). These results indicate an urgent need for parents and child care employees to be educated on safe packing and storing of school lunch sacks.

For example, Hedin, Petersson, Cars, Beckman, and Hakansson (2006) conducted a study in Swedish child care facilities on the effect of an educationally oriented intervention program and parents awareness of contagious diseases. An experimental design was used, and intervention child care facilities (n=3) received educational training for parents on: infectious diseases and contagion, use of antibiotics to cure infections, and risk of developing resistance through overuse. Posters with information on respiratory tract infections and contagion were also given to the experimental group. Control group facilities were informed of the aim of the study, but no additional information was provided to this group. During the nine month study period parents reported every episode of sickness absence from child care. Upon completion of the experiment intervention group parents reported greater understanding of infectious diseases and when to keep an infected child home. Furthermore, infectious diseases accounted for 96% of sickness absence, and specifically gastroenteritis illness accounted for 17.7% and 13.9%, for the intervention and control groups, respectively. This result shows a higher understanding from
intervention parents on when to keep their children home. Thus, with training and poster reminders improvement in parental understanding of the spread of infections can help decrease the spread of these diseases in child care facilities.

A study explored food safety perceptions, beliefs, and practices of primary food preparers (n= 72) in families with children ten years of age and younger using the Health Belief Model (Meysenburg, Albrecht, Litchfield, & Ritter-Gooder, 2014). Food-handlers perceived children and older adults as primarily susceptible to FBI’s with severity of an FBI being gastrointestinal discomfort. Perceived barriers to practicing safe food handling included child care duties, time limits, and lack of proper food handling knowledge. Though a high level of self-efficacy in preventing FBI’s among family members was shown; a false sense of confidence emerged as unsafe food handling practices were reported on limited handwashing and lack of thermometer usage.

Child care employees play a crucial role in children’s health and safety (Bronfenbrenner, 1998), and must actively work to prevent FBI outbreaks (Alkon & Cole, 2012). Brady (2005) suggested prevention of infection within a child care facility could be categorized as follows: 1) antimicrobial treatment and/or prophylaxis; 2) exclusion or cohorting of ill/infected children; 3) infection prevention through immunization; and 4) environmental controls. Child care employees are often involved in food preparation, serving, and cleanup which makes the need for safe food handling practices throughout flow of food of the utmost importance (Todd et al., 2007). Previous research in child care facilities investigated food safety knowledge, attitudes toward safe food handling practices, and conducting safe food practices, as well as microbial analysis of food contact surfaces and food-handlers.
Alkon et al. (2009) investigated the effect of child care health consultation on child care facilities’ health and safety policies and practices. A three-year experimental study was conducted with 127 child care centers (82 intervention, 45 comparison). Child care health consultant topics covered during consultations were written policies, infection control, sanitation and hygiene, children with special needs, and inclusion/exclusion of ill children. Results showed health consultant intervention significantly increased the number of written policies as well as enhanced quality of the policies. Hanna et al. (2012) found children’s health and safety screenings and assessments were significantly associated with employment of a child care health consultants by child care facilities. Findings showed potential for increased child health promotion and disease prevention through health screenings and use of a paid child care health consultant. However, Gaines, Wold, Spencer, and Leary (2005) identified several barriers to hiring child care health consultants, specifically: lack of funds, time and staffing constraints, and a lack of expert volunteers. Survey results showed 71% of Head Start centers directors, and only 39% of non-Head Start centers directors believed paying for a child care health consultant was financially possible.

The APHA and AAP (2011) identified eight factors that could decrease acquisition and transmission of communicable diseases in child care facilities: 1) periodic review of facility-maintained child and employee illness records, including current immunization status; 2) hygienic and sanitary procedures for toilet use/training and diaper-changing; 3) review and enforcement of hand-hygiene procedures; 4) environmental sanitation; 5) personal hygiene for children and staff; 6) sanitary preparation and handling of food; 7) communicable disease surveillance and reporting; and 8) appropriate handling of animals in the facility. Child care employee knowledge of potential risk factors for introduction, transmission, and challenges in
managing enteric diseases and outbreaks had been explored (Taylor, Adams, & Ellis, 2008). A purposive sample was used to conduct five focus groups, utilizing open-ended inquiry to identify staff priorities, knowledge, definitions, and practices in regards to enteric diseases. Content analysis identified five major themes based on common categories: *Eyes and Ears: Tools for Surveillance; First Response and Action-oriented; Definition Dilemma; Using Experience to Respond; and Conflict in Care (caused by challenges)* (Taylor, et al, 2008).

*Eyes and Ears: Tools for Surveillance* was identified as informal surveillance, ensuring health safety through observation, as staff detailed an intimate level of knowledge about each child. This was further explained with “changes in behavior, eating or sleeping patterns, additional symptoms, as well as a change in the frequency, color, and consistency of a child's bowel movement,” (Taylor, et al, 2008, p. 4).

*First Response and Action-oriented* was explained as ensuring a safe environment through thorough cleaning, handwashing, and utilizing a restricted play area. Staff identified this topic as especially important for the stop of further transmission of disease.

*Definition Dilemma* identified a common theme due to lack of consistency of two major definitions: diarrhea and outbreak. This lack of consistency was shown further through multiple child care staff’s attempts to clearly define the two terms, though the groups did agree that a clear definition was needed.

The theme *Using Experience to Respond* reiterated that experienced staff could use personal judgment in their response to a situation (Taylor, et al, 2008). Inexperienced staff members need further training from more vested employees to assist in decision-making. Policies regarding control of enteric illness came from the center’s management, however experienced staff helped modify these policies on a situational basis.
The final theme, *Conflict in Care (caused by challenges)*, was broken down into four subparts: money, time, staffing, and parents. Money was a recurring issue as staff identified there was never enough funds for cleaning products. Staff identified that they were always pressed for time, especially during an outbreak, as cleaning time was increased and restricted areas were implemented. During these outbreaks, additional staffing for cleaning and containment was shown to be lacking from a staffing perspective. Staff also viewed their health as an issue, as most did not receive sick leave; therefore, they weighed the financial need to work over possible contamination. Staff also identified this financial issue with empathy for parents in the similar situation of needing to pick-up a sick child (Taylor, et al, 2008).

Fraser et al. (2015) used observations to identify frequency of surfaces touched by child care providers in 37 child care facilities (30 centers and seven homes). Observations lasted 45 minutes as researchers recorded type of surface touched (porous, nonporous, bare skin) and location in the room. Over 80% of centers reported providing initial training on hygiene and sanitation practices compared to below 60% of homes. Over 10,000 provider hand contacts were recorded: 4,536 on porous surfaces; 4,054 on nonporous surfaces; and 1,544 on bare skin or hair. The top two most frequently touched surfaces were children’s clothes (34.2 contacts per observation) and food contact surfaces (18.6 contacts per observation); while children’s hands were the most touched, bare skin surface (9.8 contacts/ observation). Children’s clothing were the most frequently touched surface in infants (629 contacts), toddlers (630 contacts), and combined rooms (382 contacts). Pathogen spread was common in child care programs and highest in infant and toddler areas (APHA and AAP, 2011; Fraser et al., 2015).

The next most frequently touched surfaces were porous cleaning items (594 contacts). In preschool classrooms, the most frequently touched surface was the clothing of care-providers (85
contacts). However, some of the least touched surfaces were labeled high-touch surfaces such as door knobs, switches, and handrails. Results showed a need for reclassification of high-touch surfaces for cleaning and sanitizing purposes, as well as proper written policies on when and how to clean all types of surfaces including porous, nonporous, and bare skin (Fraser et al., 2015).

Rusin, Maxwell, and Gerba (2002) aimed to determine transfer efficiency of microorganisms from fomites (an object or substance capable of carrying infectious organisms) to hands, then subsequent transfer from fingertip to lip. Results showed highest bacterial transfer rates from fomites to the hands were hard, non-porous surfaces. The numbers of bacteria transferred to the hands were shown to be high; in turn high transfer rates from fingertip to lip from hard surfaces was also shown. Furthermore, the study suggested that Gram-positive bacteria are transmitted most readily from environmental surfaces followed by viruses and Gram-negative bacteria. Therefore, commonly used hard surfaces such as kitchen preparation tables or mealtime serving table can serve as reservoirs of foodborne pathogens that can easily transfer to hands and lips through direct contact with these surfaces.

Cosby et al. (2008) surveyed bacteriological contamination on selected food contact and non-food contact areas in child care centers to develop a baseline. Samples were taken at three different times: pre-opening, lunch, and post-cleanup. Of the positive E. coli coliform samples detected, 48.4% were in food preparation areas and 26.9% in the food serving area. The diaper changing area had the lowest percentage (24.7%) while 43.8% were detected during lunchtime. The results of this microbiological survey indicated frequency of E. coli detection were relatively low. However, pre-opening and lunchtime coliform samples were significantly higher than post-cleanup samples. It was recommended that child care facilities develop standard sanitary operating procedures similar to the commercial foodservice industry.
Li et al. (2014) combined observational and microbiological data to investigate the relationship between concentrations of microbiological indicators and hygienic conditions in child care facilities. A questionnaire was administered to center directors to collect demographic and food safety training information. Environmental samples were collected from \((n=31)\) child care centers and \((n=9)\) home-based child care facilities. Samples were taken from high-touch surfaces including handles, toys, diaper-changing areas, and workers’ hands. Facility directors reported that 94% of child care centers provided initial food safety training compared to only 56% of home child care.

Child care centers reported written procedures for handwashing (83%), diaper changing (88%), surface washing (80%), and cohorting of sick children (98%). However, only 45% reported written procedures for food preparation. Microbial analysis showed facilities without a written food preparation policy had significantly higher aerobic plate counts on all surfaces (irregular surfaces, \(p = 0.00\); regular surfaces, \(p = 0.02\)) (Li et al., 2014). Similar results were shown for facilities without written surface cleaning policies except coliform counts were higher on all surfaces (regular and irregular, \(p = 0.02\)).

The lack of written procedures for food preparation was shown to be a potential reason for high-microbial contamination. Findings show the need for written policies as well as ongoing training to ensure these policies are being followed. These findings align with the APHA and AAP’s (2011) recommendation for written food handling policies, as these policies can decrease the spread of foodborne microorganisms due to increased compliance with proper food handling policies. Griffith and Redmond (2009) reported that food safety was not just a microbial problem, but it also contains a behavioral component.
Wohlgenant, et al. (2014) examined hygiene and sanitation practices of child care employees to identify pathogen dissemination points in center-based and home-based child care environments. Surveys of child care facility directors, and kitchen and classroom audits (N=51) were collected. Most center-based facilities (74.1%) served food sent by parents, while (87.5%) of home-based facilities prepared meals for children. Training in safe food handling, hygiene, or sanitation was provided for new employees (91.4%) and continuous (88.6%). Additionally, most facilities had written sanitation and hygiene policies, however less than half had written policies for food preparation. Results identified the majority of facilities were not in compliance with the following items: food handlers wearing effective hair restraints, food handlers wearing gloves, sanitizer test kit available for facilities that wash dishes by hand, and a food thermometer available. It was identified that improved written policies for food preparation and increased education for employees focusing on gaps identified can potentially prevent the spread of FBIs to children.

Alkon, To, Wolff, Mackie, and Bernzweig (2008) developed the California child care health program health and safety checklist to assesses key areas of compliance with national health and safety standards in child care programs, but also to measure change in health and safety compliance over time. Observations showed compliance in specific areas: food preparation and eating areas, emergency preparedness, and infant/toddler sleep conditions, while areas with low compliance were outdoor/indoor equipment and handwashing routines.

A study focused on reliability of the Indiana’s child care health program’s health and safety checklist, which was modified from the previously mentioned California child care health program’s health and safety checklist. Results showed that only 30% of 82 facilities’ food preparation and eating areas, including counters and table tops, were cleaned (soapy water and
rinsed) and sanitized (bleach solution) before, during, and after food preparation and meals. Only 62% stored food in a safe manner (Alkon & Cole, 2012). These results contradict previously reported finding of food preparation and eating areas. Strohbehn, Paez, Sneed, and Meyer (2011) observed cross-contamination opportunities in four foodservice settings: restaurants, assisted-living, child care, and schools. Food safety pre-test scores in child care facilities were 68%, with the highest observed cross-contamination issue occurring with preparing and thawing foods, and lack of standard operating procedures. Post-training intervention showed increased knowledge levels, however, food safety practices were not significantly changed.

**Child Care Hand Hygiene**

The U.S. Food Code (2013) states employees must wash their hands: a) immediately before engaging in food preparation; b) after touching bare human body parts other than clean hands; c) after using the toilet room; d) after coughing, sneezing, using a handkerchief or disposable tissue; e) using tobacco, eating, or drinking; f) after handling soiled equipment; g) when changing tasks; h) when switching between raw and ready-to-eat foods; i) before applying gloves; and j) after engaging in any activity that soils the hands. To wash hands foodservice employees must rinse hands under clean running warm water, apply soap and rub vigorously for at least 15 seconds, rinse again, and dry immediately with a single use towel or hand drying machine (FDA, 2013). Proper hand hygiene was a key factor in controlling spread of FBIs by poor personal hygiene and cross-contamination (FDA, 2013).

Hand hygiene practices have received attention in child care facilities as causation of FBI outbreaks and have been linked to person-to-person transmission (Fraser et al., 2015). Roberts et al. (2000) showed through a hand hygiene intervention that proper handwashing in child care facilities greatly reduced rates of respiratory and diarrheal illness. Handwashing by child care
employees has been identified as the single most important preventative measure to avoid infecting themselves and children with harmful pathogens (Brady, 2005; Pickering et al., 2012). Furthermore, Kotch et al. (2007) identified that proper equipment in diapering, handwashing, and food preparation areas designed to reduce spread of infection had a significant effect on reducing diarrheal illness among the children.

In a similar study in Jerusalem, Israeli preschool researchers conducted a hand hygiene intervention for both teachers and children to improve hygienic practices (Rosen, Zucker, Brody, Engelhard, & Manor, 2009). The intervention included two 3-hour training sessions for teachers on hand hygiene, as well as experiential learning with petri dishes and presentation of various games. The games, posters and puzzles were techniques used to educate children on proper hand hygiene practices. Findings were similar to previous studies in which attitudes toward hand hygiene were high with both teachers and children. Modeling of hand hygiene techniques and ongoing education for staff and children were shown to increase intervention outcomes. Additionally, knowledge on proper hand hygiene practices increased from the intervention with both teachers and children. Results showed hand hygiene policies need to be well planned and executed to be effective as well as continually be monitored and reinforced. Important to note was knowledge was higher in the intervention group several months after program implementation ended, showing that properly planned interventions have lasting effects.

A study showed the effects of a hygiene intervention at 30 Icelandic child care facilities on the rates of febrile, respiratory, and gastrointestinal illnesses in preschool children (Gudnason, Hrafnkelsson, Laxdal, & Kristinsson, 2013). Half of the child care facilities were selected for a hygiene intervention, while the other half received no intervention. During the intervention education was conducted on both hand and environmental hygiene for both staff and children.
Liquid soap and hand antiseptic were used as well as glove use during diaper changing and toileting. Toys, furniture, floors, and other high touch surfaces were cleaned and disinfected at least once a day. Contrary to similar child care hygiene studies results showed no significant effective in reducing febrile, respiratory, or gastrointestinal illnesses in preschool age children. The researchers attributed insignificant results to hand hygiene intervention only affecting the probability of transmission. Moreover, the researchers detailed FBI outbreaks in child care facilities are also affected by contact rates of infectious children with susceptible children, duration of infectiousness of infected children, and the number/proportion of the infected children at the child care facility (Gudnason et al., 2013).

Lennell et al. (2008) aimed to determine if use of alcohol-based hand-disinfection in addition to regular handwashing at Swedish child care facilities would reduce the childhood rate of absenteeism. The intervention consisted of children and staff using alcohol-based disinfectant gel after regular handwashing. Results showed hand hygiene intervention significantly reduced the rate of child absenteeism by 12% compared to a child in a control child care facility who only used soap and water to clean their hands.

Similarly, Kinnula, Tapiainen, Renko, and Uhari (2009) investigated use and safety of alcohol-based hand gels (AHGs) among children in child care facilities. An experiment on safety of AHGs on children was conducted with 82 children (mean age of 5.7 years). Forty seven children applied 1.5 mL of AHG and 35 children applied 3.0 mL of AHG to their hands. Alcohol absorption on hands was measured before application of AHG and after 15 minutes and 60 minutes by an alcometer. All alcometer readings were shown to be below the measurement limit of 0.01%. These results showed little to no alcohol absorption of AHGs, hence safe to use with children. One hundred and twenty-eight directors in 68 child care facilities also completed a
questionnaire that evaluated use and perceptions of AHGs in child care facilities. Every facility indicated AHGs were used, 16% by adults only and 74% by children as well, with the remainder having children use AHGs in time of diarrheal epidemics only (Kinnula et al., 2009). The majority, 77% of all respondents understood the use of AHGs were to prevent the spread of infectious disease or to improve hand hygiene. Most child care facilities stated AHGs were useful for keeping hands clean and easy to use, however 20% of respondents believed AGHs to be dangerous or harmful to children’s health. Tung, Macinga, Arbogast, and Jaykus (2013) compared efficacy of three commonly used disinfectant active ingredients against Norovirus strains. Results indicated that the use of alcohol-based hand sanitizers may not be an effective substitute for handwashing with soap and water.

Zomer et al. (2013a) observed child care employees’ compliance with hand hygiene guidelines and identified environmental determinants of hand hygiene behavior in The Netherlands. Observations of child care employees (n=350) revealed over 2,000 hand hygiene opportunities with an overall compliance of Dutch national hygiene guidelines of only 42%. The highest child care employee compliance (50%) was associated with after toilet/diapering activities. Additionally, least compliance (21%) was after contact with bodily fluids. Hand hygiene associated with food handling scored very low with: before food handling, before caregivers assisted children with eating, and before caregivers themselves ate, 31%, 27%, and 20% compliance, respectively. It was demonstrated that hand hygiene practice was associated with the type and number of towel facilities. Results showed hand hygiene compliance when only paper towels or when only fabric towels were available were 48% and 41%, respectively. These results were alarming as risk of food contamination can be increased when staff members
who assist with toilet use and diaper-changing activities also prepare or serve food (APHA and AAP, 2011).

In another hand hygiene study, Zomer et al. (2013b) assessed sociocognitive determinants of Dutch child care employees’ hand hygiene practices using both observed and self-reported hand hygiene compliance. Child care facilities (n=122) overall observed hand hygiene compliance was 42%; while self-reported compliance was much higher at 87%, which show self-reported hand hygiene compliance to be an overestimate to observed hand hygiene compliance. Results showed child care employees’ hand hygiene practices were positively associated with the following sociocognitive determinants: knowledge and awareness of hand hygiene guidelines, child care employees’ perceived behavioral control, perceived importance of performing hand hygiene, and hand hygiene habit formation.

Furthermore, Zomer et al. (2013c) designed a cluster randomized controlled trial to evaluate effectiveness of a hand hygiene intervention. The intervention consists of four components: 1) products necessary for hand hygiene; 2) training to educate about the Dutch national hand hygiene guidelines; 3) two team training sessions aimed at hand hygiene goal setting; and 4) reminders and cues to action. The aim of the intervention was to potentially reduce gastrointestinal and respiratory infections through the formation of hand hygiene compliance habits. Larson (2013) also identified that elective hand hygiene does not come naturally and requires a sustained motivation.

Wood and Neal (2009) defined habits as, automatic responses to contextual cues acquired through repetition of a behavior. Furthermore, context cues can be the environment in which the habit typically occurs or completing a preceding step in the habit (Wood & Neal, 2009). Thus a behavior can potentially become an unconscious habit if a specific response was triggered. As
the behavior becomes more habitual, the need for continuous training decreases, thus an
emphasis on behavioral interventions should be employed (Pellegrino, Crandall, O’Bryan, & Seo,
2015). However to reinforce formed habits that bridge two contexts, cues may need to be
developed. Context-bridging is defined as “A cognitive mechanism to associate one context to
another as a way to decrease the perceived difference between two habits” (Pellegrino et al.,
2015, p. 451). Forming and maintaining a proper hand hygiene habit was a long-term
intervention that could decrease FBI outbreaks. Soon, Baines, and Seaman’s (2012) meta-
analysis of food safety training on hand hygiene knowledge and attitudes among food handlers
showed studies implementing both training and behavioral interventions were more effective at
altering hand hygiene behaviors. However, food safety behaviors are difficult to alter.

**Child Care Food Safety Behaviors**

In a study of caretakers’ food safety knowledge, attitudes and behaviors, Bermudez-
Millan et al. (2004) surveyed and observed food safety knowledge was significantly higher than
food safety behaviors. Only 10% of participants washed their hands properly, whereas 97% self-
reported using the proper technique. Additionally, none of the participants used a thermometer to
check the cooking temperature. Finally, 89% of participants were observed using the same
cutting board for meats and vegetable, potentially cross-contaminating the food. Staskel, Briley,
and Curtis (2007) also investigated child care food handler’s (n=35) food safety knowledge, with
a mean score of 71%. Attitudes toward food safety were shown to be very high with all
participants agreeing that “safe food handling is an important part of my job responsibilities.”
Again, lack of thermometer use (71% did not use) and lack of proper handwashing (only 57%
used proper technique) were observed.
A mixed methods approach was used to explore food safety knowledge, beliefs, and practices of Native American and Hispanic food handlers (n= 55) caring for young children (Siebert et al., 2014). The four food safety educational constructs of the USDA FightBac!® campaign (cook, clean, chill, separate) were used to identify gaps in food safety knowledge. Results showed Native American and Hispanic food handlers scored 66% and 65% on the knowledge assessment, respectively. Furthermore Native American food handlers scored lowest in the cook and separate constructs, while Hispanic food handlers scored lowest in cook and clean constructs. The main barrier to proper food handling practices was time. Self-efficacy to cook, store, prepare, and purchase was high, however coupled with low knowledge score a false sense of security was detected. More troubling was food handlers did not perceive being susceptible to FBI in their home, and did not perceive FBIs to be a serious issue. These studies show a stark contrast between food safety knowledge and proper food safety behaviors.

Enke, Briley, Curtis, Greninger, and Staskel (2007) investigated the influence of demographic characteristics and food safety practices used by directors in child care facilities on training assessments and planning for training. One hundred and eighteen child care facility directors completed the survey (55% for profit & 45% nonprofit). Most facilities provided breakfast, lunch, a morning snack, and an afternoon snack five days a week. Only 31% of facilities offered training on safe food handling, portion control, food storage, sanitation, and food program regulations. Furthermore, center directors learned food safety topics from health departments (64%), health inspectors (67%), child care meetings (56%), internet websites (15%), colleagues (14%), dietitians (13%), and magazines (9%) (Enke et al., 2007). Barriers to increased food safety practices were shown as lack of resources (42% of the directors reported either losing money or just breaking even) and lack of knowledge (directors consistently reported child care
employees did not know how long to properly wash hands, with answers ranging from 10 to 180 seconds) (Enke et al., 2007).

Riggins and Barrett (2008) aimed to determine beliefs and perceptions of child care foodservice directors and foodservice employees about the benefits, barriers, and intentions to follow HACCP-based food safety programs. Additionally, this study sought to determine the status of nine prerequisite programs on implementation of HACCP-based food safety programs in child care centers and to identify differences in prerequisite program status based on certification status. A survey instrument modeled after the Health Belief Model was developed to determine beliefs and perceptions about HACCP-based food safety programs, and was completed by 131 foodservice directors and foodservice employees. Findings showed respondents believed children were a high risk population, but a foodborne illness would not happen at their facility, nor would there be consequences if an outbreak did occur. These findings illustrate lack of a positive food safety culture, as employees demonstrated a negative approach to risk judgment and negative food safety attitudes. Barriers to implementation of HACCP-based food safety programs were identified as lack of time for employee training, development of new skills and funding for training. Results also showed of the nine prerequisite programs the top three implemented by child care facilities were personal hygiene (94.3%), pest control (87.4%), and chemical storage (90.8%). The least often implemented prerequisite programs were equipment cleaning procedures (80.5%), food safety training (74.7%), and equipment maintenance (60.9%) (Riggins & Barrett, 2008). Education levels were shown to influence respondent’s perceptions of HACCP-based programs as less educated respondents perceived more barriers to implementation, but were more confident in being able to follow HACCP-based programs. Respondents with food safety certification, such as ServSafe®, showed a greater
understanding of the importance and need for HACCP-based programs. Findings from these studies consistently showed that prior food safety knowledge and training does not always translate to safe food handling behaviors (Egan et al., 2007).

Seaman and Eves (2008) used a mixed methods approach to assess impact of food safety training on attitudes and intentions of food handlers in child care settings to perform safe food handling behaviors. A modified Theory of Planned Behavior (TpB) questionnaire based on seven themes: outcome evaluation, attitude, subjective norm, behavioral intention, perceived behavioral control, control belief, and demographic questions; as well as in-depth interviews of food handlers and directors was utilized. Subjective norm had the greatest influence on behavioral intention to practice food safety ($\beta = 0.55, p \leq 0.001$), followed by perceived behavioral control practice food safety ($\beta = 0.24, p \leq 0.001$) (Seaman & Eves, 2008). This suggests that food handlers were most influenced to perform proper food safety practices due to what others thought they should do. In-depth interviews conducted with food handlers and directors found additional food safety training barriers, personal beliefs about food hygiene training and the importance of food safety training. Thirty seven percent of respondents had not received any food safety training; furthermore, 90% (n=9) of untrained employees stated their director did not discuss food safety training. Additionally, interviews with both food handlers and directors detailed director’s lack of support for food handlers to get food safety training. One director stated “I don’t support them; I just expect them to do it once they have learnt it” (Seaman & Eves, 2008, p.371).

Findings suggested a lack of timely food safety training for food handlers in a setting where high risk populations are being served. Both food handlers and directors reported that training course content was relevant and may have changed short-term practices. However,
intention to perform proper food safety practices was not influenced by training, but by subjective norm and perceived behavioral control (Seaman & Eves, 2008). Additionally, other studies have also found that as foodservice employees become tenured in the operation their food safety knowledge levels increase (Roberts et al., 2008; York et al., 2009a).

Fan (2013) measured food safety knowledge and observed food handling behaviors of child care facility foodservice employees and teachers. Similar to previous studies, results showed levels of food safety knowledge were 80.2% and 78.7%, for foodservice workers and teachers, respectively. However, gaps between food safety knowledge and actual food handling behaviors were identified in handwashing and time and temperature control. Foodservice employees were observed for a total of 291 handwashing instances with over 51% of the observations deemed improper. Moreover, only seven of 23 instances used a thermometer correctly. Observations of teachers’ food handling behaviors focused on teachers’ handwashing, sanitation, and use of gloves practices. All teachers observed failed or improperly washed their hands at least once. Furthermore, observations showed that only 29.9% of the handwashing was performed properly. Fan (2013) identified barriers to safe food handling behaviors in child care facilities as time pressure, lack of equipment, and limited space.

**Barriers Influencing Food Safety Practices**

Motivation to follow safe food handling practices has been identified as a barrier in food safety research (Arendt et al., 2014; York et al., 2009a, 2009b). Clayton, Griffith, Price, and Peters (2002) found that food-handlers’ were aware of food safety behaviors they should be carrying out, however, 63% of respondents admitted they did not always carry out these behaviors. Additionally, food-handlers also perceived their business to be of relatively *low risk* for causing a FBI outbreak. Salazar, Ashraf, Tcheng, and Antun (2005) also found no
relationship between self-perceived motivation and food safety knowledge. A person’s (food safety) behaviors are influenced by more than just proper knowledge and attitude. Additionally, Brannon et al. (2009) and Webb and Morancie (2015) found barriers to following food safety procedures including lack of proper equipment (thermometers) and time constraints. Pilling et al. (2008) identified that employees’ food safety attitudes predicted intention to perform safe food handling practices in restaurant employees.

Arendt, Strohbehn, and Jun (2015) used observations and interviews to identify employees’ motivators and barriers to following food safety practices. Observations revealed foodservice employees (n=25) only washed their hands 36% of instances where they should have. Additionally, of the 36% of instances only 18.6% were in compliance with the FDA Food Code. Observed glove use was higher with 63.1%, however again only 9.5% of these instances were in compliance with the FDA Food Code. Furthermore, number of times in compliance were observed for personal hygiene, temperature controls, and cleaning and sanitizing, at 77.9%, 50.3%, and 30.6% respectively. Interviews were conducted to further identify why food employees do and do not followed food safety practices. Nine themes emerge around following food safety practices: do not harm customer; satisfied customer; avoid bacterial growth and cross-contamination; good practices/habit; rewards; knowledge and training; resources; required laws, regulations, and procedures, and culture of workplace. Additionally, six themes emerged around not following food safety practices: forgetfulness/not habit; too busy; consequences of following safe food handling practices; availability and use of resources; lack of knowledge; and culture of workplace. Foodservice managers must understand what their employees perceive as motivators and barriers to target gaps in what was being done and what should be done. Training and increased knowledge alone cannot remove all identified barriers. However, with managers
communicating proper food safety practices along with coworker support and positive employee attitudes and behaviors toward food handling practices, a positive food safety culture can be created.

Howells et al. (2008) aimed to determine restaurant foodservice employees’ perceived barriers to performing three specific behaviors: handwashing, cleaning and sanitizing work surfaces, and use of a thermometer. Barriers identified included: inadequate training, time constraints, inadequate resources, and inconvenience to perform the practices. Though this study was conducted in a commercial setting, results can be generalized to child care foodservice settings as similar food safety behaviors take place. Results also showed employees would be more likely to perform safe food handling practices if fewer barriers were present (Howells et al., 2008). However, most barriers identified are not concerned with food safety knowledge, thus training focused on only food safety knowledge will not eliminate these barriers.

Chapman et al. (2010) observed 47 food handlers’ behaviors between pre- and post- food safety info sheet introduction. Results showed lack of proper hand drying was a leading factor in improper handwashing practices, thus future educational interventions need to focus on practical examples as well as theoretical. Furthermore, indirect cross-contamination was shown to be problematic; the authors observed food handlers acting in a multiuser environment may not see themselves as part of a team (Chapman et al., 2010). Results suggested a need for educating food handlers that their food handling practices influence work environment and their coworkers’ food safety behaviors. Current food safety training focuses solely on an individual foodservice employee’s actions, not how they influence each other.

Brannon et al. (2009) investigated if “basic” or “well-informed” or “no” experience in a foodservice operation would influence participants’ attitudes, subjective norms, and perceived
behavioral controls toward food handling practices. Well-informed participants (44.4%) had completed a food safety certification course and had previous experience in food preparation in a restaurant. Basic experience participants (30.4%) had previous food preparation experience but no formal food safety certification course; additionally, no experience participants (25.2%) had neither formal food safety training nor food preparation experience. Two hundred seventy undergraduate students completed the survey based on the Theory of Planned Behavior (TpB). Results showed well-informed participants had significantly more attitude beliefs as well as more overall perceived control toward performing proper food safety behaviors than both basic and no experience groups. Moreover, little improvement was shown between basic experience and no experience groups, showing food preparation experience in a foodservice setting was not enough to educate on food safety practices. A formal food safety training course would be beneficial in helping participants understand importance of food safety practices. Though food safety training alone does not consistently improve employee behavior, it can be the first step to improving actual behavior.

Similarly, Hislop and Shaw (2009) evaluated food safety knowledge among food handlers (n=630) with (n=399) and without (n=231) formal food safety training, as well as whether length of time since certification or number of years of experience in the foodservice industry influenced food safety knowledge. Results showed noncertified food handlers were on average two to five times more likely to fail (less than 70%) on a food safety practices knowledge test, than their certified food handler counterparts. Specifically, the highest failure rates were found among noncertified food handlers with more than 10 years of experience in foodservice. Furthermore, failure rates were highest among certified food handlers in which
more than 10 years had elapsed since certification. These results show the need for continuous and targeted training programs.

Murphy, DiPietro, Kock, and Leea (2011) explored the relationship between mandatory food safety training certification and inspection results of independent or chain restaurants (n=907) in Orange County, Florida. A median average of 17 violations was found for both restaurant types, with no significant difference between types of restaurants. Results showed mandatory food safety training may help to reduce violations of food safety inspections. However, the authors stated “it must be clear that only conducting restaurant inspections will not mitigate the risks of a foodborne outbreak” (Murphy et al., 2011, p.155), suggesting that a combination of mandatory training and inspection scores would further reduce potential FBI outbreaks.

Roberts et al. (2008) investigated food safety knowledge and behaviors as a result of food safety training based on ServSafe®. Restaurant employees (n=160) completed a pre- post-training knowledge assessment. Results showed a significant increase from pre to post training on knowledge levels. Additionally, general behaviors for performing food safety practices increased from pre to post training. However, general food safety knowledge was shown to be related to general food safety behaviors; but not driven by any individual behavior. Furthermore, future trainings need to tailor educational methods to their specific demographic.

Similarly, York et al. (2009b) conducted a two-year longitudinal study to investigate the effectiveness of ServSafe® food safety training with the addition of a TpB intervention program targeting employees’ perceived barriers and attitudes toward important food-safety behaviors. Restaurant employees (n=33 of 247) completed all three phases baseline, after receiving 4-hour ServSafe® training, and again after exposure to the intervention; measured by knowledge scores
and observed behavioral compliance for handwashing, thermometer usage, and proper handling of work surfaces. The intervention addressed barriers and negative attitudes about food-safety behaviors through use of an incentive program, cues to action, and thermometers for each operation. Compared to baseline, knowledge of handwashing was significantly higher at post-training and post-intervention; however no significant differences were observed for knowledge of thermometer usage, proper handling of work surfaces, or overall food safety knowledge. Combined behavioral compliance scores at post-intervention were significantly higher than at baseline ($p = 0.01$) and post-training ($p = 0.05$). Results showed post-training behavioral compliance was no better than baseline, yet with intervention overall compliance improved (York et al., 2009b).

In a study of university foodservice employees, researchers assessed influence of theoretical and practical food safety training based on microbiological counts on food contact surfaces and handwashing practices (Soares et al., 2013). Foodservice employees received nine hours of food safety training on general theoretical concepts of hygiene and food safety, as well as practical situational applications to reinforce theoretical concepts. Microbial samples of 60 food handler’s hands were taken before training and fifteen days after training. Results showed after training mold and yeast plate counts decreased on average of 50%. Microbial analysis of bare hands showed correct handwashing practices being utilized to decrease microbial counts after training occurred. Furthermore, success in microbiological reduction could be attributed to the tailored practical approach of the training program that do not just focus on theoretical concepts. Yet food safety training cannot be the only intervention for improving food safety behaviors (Yiannas, 2009); a systematic approach to addressing food safety from a scientific, organizational culture and human behavior must be utilized.
Sneed and Strohbehn (2008) identified a major challenge to safe food handling practices was the ever changing demographic profile of foodservice employees. Furthermore, issues related to generational differences, language barriers, and low literacy may have significant implications on success of a food safety intervention, with the need for secondary training or interventions to cater to such a diverse demographic (Sneed & Strohbehn, 2008).

Ravichandran, Cichy, Powers, and Kirby (2015) used focus groups to explore older foodservice worker perceptions of training methods. Findings revealed three overarching themes: 1) leadership influence; 2) training structure including training methods, pace of training, use of technology, training feedback and benefits; and 3) pride and enjoyment at work. Respondents felt unsupported from their supervisors due to lack of input by the respondent on training delivery. In addition, respondents perceived their on-the-job training as insufficient (usually a quick demonstration by a manager, then expected to perform their jobs). Ravichandran et al. (2015) also reported older foodservice employees found the pace of current training programs much shorter compared with previous years. Participants did find value in training as it benefited their job performance, specifically intrinsic values: higher efficiency, better understanding of responsibilities, job advancement, reinvigorated appreciation of the job, and increased finances. Findings showed older foodservice employees desired training opportunities as they are essential to their job performance, but training design and methods must be tailored to allow for the learning styles and experience of older foodservice employees.

Medeiros, Cavalli, Salay, and Proença, (2011) reviewed the methodological strategies of food safety training programs of fourteen empirical studies. Audiovisual resources were present in 71% of studies (n=10): videos (n=4), slides (n=2), posters (n=4), illustrations and cartoons (n=1), and flip charts (n=1). Lectures or presentations were made in half of the training courses
(n=7): reading materials (n=2), booklets (n=2) and leaflets (n=1). Only 29% (n=4) studies reported using hands-on activities. The minimum training program duration was 1 hour and the maximum was 11 hours. Assessments of knowledge gained were conducted in 64% (n=9) of studies reviewed. Hygiene-related practices and attitudes, particularly handwashing, were those most assessed.

Ellis, Arendt, Strohbehn, Meyer, and Paez (2010) examined the extent to which various demographic characteristics affected foodservice employees’ responses to one internal (i.e. desire to not make anyone sick) and three external (communication, reward-punishment, and resources) motivational factors. A 35-item previously validated instrument was used to assess the respondents’ (n=311) likelihood to perform specific food safety behaviors. Internal motivation had the highest mean scores consistently across all demographic factors, thus managers should identify this during the hiring process. Respondents working a part-time foodservice job were in stronger agreement than were those working full time with the effect of communication, reward-punishment, and resources on their motivation to perform safe practices. Additionally, the three external motivators went down as a respondent’s experience in the foodservice industry increased from 1 to 20 years. Non-commercial types of operations significantly disagreed with commercial employees about the influence of communication, reward-punishment, and resources (Ellis et al., 2010). Findings from this research suggest organizations would benefit from incorporating both external and internal motivation, such as targeted food safety messages based on demographics.

Arendt and Sneed (2008) used Expectancy Theory, first introduced by Vroom (1964), to explain foodservice employees’ motivation to perform proper food safety practices. Central to the Expectancy Theory are three variables: valance, expectancy, and instrumentality; antecedents
to job behavior was later added to the theory (Lawler & Porter, 1967). College students (n=169) were surveyed about three specific food handling practices: proper hygiene, temperature taking, and cleaning and sanitizing. Themed areas of motivation emerged: establish policy and standards, expect accountability, serve as a role model, provide training, control rewards and punishment, and provide resources. Results showed more than food safety training was needed to motivate employees to follow food safety practices. The researchers recommend supervisory level training on how to motivate employees to follow food safety practices, instead of general “one-size fits all” food safety training.

Roberts, Arendt, Strohbehn, Ellis, and Paez (2012) further investigated manager’s influence on employee motivation to follow food safety practices using focus groups with current (n=15) and future managers (n=21). Five main issues managers deal with when motivating and training employees to follow food safety practices were identified: customization, human resources, training methods/materials, communication, and operations. Customization referred to the lack of tailored food safety training and inadequacy of the one-size fits all approach. Specific human resources challenges identified were staff turnover, lack of motivation among employees, employees’ attitudes toward the job, and lack of employees understanding the relationship between knowledge and practice. Training content was identified due to its lack of practical applications that help explain the Food Code. Communication pertaining to food safety practices and methods used to facilitate food safety practices within the members of the organization as well as regulatory agencies. Finally, a lack of consequence-based programs to motivate employees to follow food safety practices as well as a lack of consistency in enforcement of policies were identified (Roberts et al., 2012).
Roberts et al. (2012) also investigated employees preferred learning methods; top methods were activity-based training (61%), observation (39%), and question/answer sessions with an expert (36%). Additionally, 83% of participants noted a preference for experiential learning to visual and audio learning alone. Furthermore, the researchers advised that managers should have expertise in both hard and soft skills (e.g. leadership and human resources management) to be effective in managing food safety (Roberts et al., 2012).

Arendt et al. (2014) used a mixed methods approach to obtain foodservice employees’ perspectives and experiences on what impact their supervisors have had, and what their supervisors could do to be more effective in motivating foodservice workers to follow safe food handling behaviors. Purposeful sampling was used to select 32 participants from four distinct age groups (18-25; 26-40; 41-59; ≥60) for focus groups. Participants training preferences showed equal preference of self-directed or by guidance, however 88% preferred on-site training. Preferred training methods included workplace in-service (n = 25, 78%), computer based (n = 19, 59%), workshops (n = 18, 56%), and informal employee meetings (n = 14, 44%). The least-preferred training methods were formal employee meeting (n = 7, 22%), trade show (n = 5, 16%), and webinars (n = 4, 12%). Analysis of focus group discussions revealed four major themes: 1) consistent managers; 2) managers’ behaviors; 3) employees’ behaviors; and 4) training; along with 13 sub themes. The “consistent managers” theme emerged from participants noting managers kept employees’ accountable, had ability to provide food safety information, and were available. Managers’ behaviors contained three sub themes; role model, age differences, and managers’ actions. Employees’ behaviors contained three sub themes; work roles as an employee related to food safety, coworker influence, and level of employee accountability. Finally, training sub themes included length of training, attitude toward training,
and providing and assessment of training (Arendt et al., 2014). Results show the need for managers to continuously monitor food safety behaviors of employees to encourage a positive food safety culture in an organization. Manager consistency on policy enforcement was critical; findings showed frustration with inconsistent enforcement and modeling of food safety policies. Best practices were identified for managers to encourage employees’ food safety behaviors; develop customized training for different-age employees, motivate employees using different strategies, and build on the positives that each generation of employees brings to the workplace (Arendt et al., 2014).

A qualitative approach was used to study managers’ roles in assuring safe food handling practices and their perceptions on food safety (Arendt, Paez, & Strohbehn, 2013). Four focus groups with current (n=15) and future (n=21) foodservice managers were conducted to determine managers’ perspectives regarding their role and reasons for employees’ unsafe food handling practices. Data analysis revealed three major themes and 19 sub themes; 1) manager’s role, 2) manager’s problem with being effective in food safety area, and 3) food safety training (Arendt, et al, 2013). Participants discussed the need for continuous training as well as targeted employee demographics training to tailor training to specific needs of employees, while managers discussed budgetary constraints and lack of equipment often prevented such training.

In a similar study of restaurant managers Medeiros, Cavalli, and Proenca (2012) also identified lack of financial resources, as well as lack of time among employees, perception that it was not necessary, absence of professionals in the restaurant to provide a course, and lack of interest among employees. Barriers identified to employees following safe food handling practices were: lack of motivation, lack of time, high turnover rates and lack of belief in the necessity of the food safety policies (Arendt, et al, 2013). Participants discussed their role as
managers to enforce policies and monitor employees’ safe food handling behaviors. Consequences, both positive and negative, were identified by managers as important for encouraging safe food handling practices. Finally, upper-level management support was identified as important to managers in enforcing safe food handling practices. The authors noted a gap between current manager food safety knowledge and the ability to communicate to employees. Furthermore, to mitigate barriers for performing food safety practice Medeiros et al., (2012) identified specific manager organizational behaviors including: providing supervisory and peer support, adequate resources, training, organizational support, and an acceptable management culture. Moreover, motivational factors have a significant impact on organizational culture itself (Contiu, Gabor, & Oltean, 2012). Therefore, instilling a safe food culture within all employee levels is crucial to any foodservice organization.

**Organizational Culture**

The concept of culture has a long history in the fields of psychology, sociology, and anthropology (Valsiner, 2000). Research on culture attempts to convey meaning to complex social systems of coordinated behavior, social customs, rituals, and symbols used among groups of people (Valsiner, 2000). Organizational culture has been described simply as “the way we do things around here” (Deal & Kennedy, 1982, p. 84) or “beliefs and values” (Davis, 1984, p. 12). Literature on the exact definition of organizational culture has been inconsistent and remains a topic of debate. Kyriakidou and Gore (2005) postulated that organizational culture definitions principally represent two broad categories; those which describe culture as how an organization sets strategy, develops goals, measures progress, and defines products and markets; and those which focus on the underlying system of assumptions with beliefs, symbols, ceremonies, and myths.
Schein (1992) gave a more detailed characterization of organizational culture as “the pattern of basic assumptions that a given group has invented, discovered, or developed in learning to cope with its problems of external adaptation and internal integration which have 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 other problems,” (p. 12). Employees’ verbal statements reflect the cultural norms to which they adapt. However, often employees’ practices contradict what they verbally stated (McAleese & Hargie, 2005). The same results were shown in food safety studies in which the same populations’ self-reported food safety practices were high, yet their food safety practice observations were low (Bermudez-Millan et al., 2004; Zomer et al., 2013b). Therefore, the culture of an organization defines appropriate behavior.

Organizational culture has been researched extensively in many industries emphasizing different combinations of organizational factors such as tradition, shared philosophies, norms, communication, and control systems (Cooper, 2000; Deal & Kennedy, 1982; Schein, 1992). Hofstede (1998) proposed that the organization’s culture was located within the shared values and norms of all the members of the organization. Schein (1992) explains that organizational norms are socially recognized beliefs of acceptable behaviors. Norms derive from organizational values and are manifested in artifacts.

Elements of organizational culture are layered with values being the least-visible layer, and artifacts being the most-visible layer (Schein, 1992). Artifacts are represented by symbols, rituals, language, and the physical workspace environment. The physical layout of an organization has impact on expected behaviors (Yiannas, 2009). For example, the location of handwashing sinks next to food preparation areas shows encouragement for proper hand hygiene
behaviors. Thus, establishing organizational values was an important foundational mechanism for guiding desired norms.

Many organizations have several subcultures which differ from the overall organizational culture, often due to differing opinions and practices (Trice & Beyer, 1993). Because of the existence of these subcultures, managing organizational culture is crucial for company success. An organization that shows commitment to its employees will strengthen its organizational culture (Lee et al., 2013). Organizational commitment has been defined as the “magnitude of an employee’s relationship with a company” (Upchurch, DiPietro, Curtis, & Hahm, 2010, p. 130).

Organizational culture was also directly correlated with job satisfaction and employee retention. Job satisfaction was found to be an important antecedent in predicting turnover in the hospitality industry (Jang & George, 2012). Job satisfaction can be defined as how people feel about their job and how their contributions to that job are recognized by the organization (Jang & George, 2012). Organizational commitment was a significant factor in increasing employees’ intent to stay with an employer while also increasing their commitment to the organizational culture (Cho, Johnason, & Guchait, 2009). While the work environment itself can drive employee attitude and influence their quality of work, organizational culture has been often cited as a reason for employee turnover (Subramanian & Shin, 2013).

McAleese and Hargie (2005) identified five guiding principles for the effective management of organizational culture; 1) develop culture strategy; 2) develop cultural leaders; 3) communicate culture to employees; 4) measure the cultural performance; and 5) communicate culture to customers. Because they are all interconnected, all five principles must be unified to be truly effective. Communication was not enough to maintain a positive organizational culture or
alter a negative one on its own. Internal communication plays a major role in defining and enabling a relationship between employers and employees. Furthermore, external communication enables employees to develop relationships with customers. Therefore communication was a crucial link in the chain of organizational culture.

Understanding and developing a positive organizational culture, which balances profit objectives and culture principles, will give an organization a competitive advantage (Brown, 1995). “The formulation of a ‘culture strategy’ was a complex process which involves analysis on several layers in order to encapsulate all levels of culture,” (McAleese & Hargie, 2005, p.162). McAleese and Hargie (2005) further this point by stating that the most important parts of organizational culture are intangible including thoughts, feelings, and perceptions of the members living the culture on a day-to-day basis.

Dawson, Abbott, and Shoemaker (2011) attempted to evaluate intangible factors by creating a scale of hospitality principles within organizational culture and personal attributes of those employed in the hospitality industry. The intent was to measure one’s understanding of the culture of hospitality organizations and to determine if a particular individual’s values are in-line with current hospitality employees. Scale development yielded four organizational factors; management principles, customer relationships, job variety, and job satisfaction. Additionally, six personal factors were identified; principles, propitiousness, leadership, risk-taking, accuracy, and composure. The authors concluded that the successful alignment of personal factors with organizational culture will increase employee retention (Dawson et al., 2011).

Attempts to alter or maintain an organizational culture must start with defining and developing a shared understanding of the company’s mission, vision, and cultural values. Zohar and Tenne-Gazait (2008) identified leadership as an antecedent to organizational climate; the
development of cultural leaders is needed from the top of the organization to middle management and filtered down to line-level employees who observe and replicate cultural norms and practices. Transparency is critical as employees need to know current and relevant information. In food safety, for example, updates to the FDA Food Code or local health regulation changes should be communicated to all relevant employees.

Measuring cultural performance is essential in understanding current organizational culture. Measurements can be conducted through continuous reviews and feedback from all levels of organization on the current strategies and performance. Once measurements have been taken and reviewed, modifications should be made that will align current culture with strategic objectives and values. This can be achieved through multiple interventions, but must be constantly reviewed as organizational culture is an ever-changing entity (McAleese & Hargie, 2005).

Zohar and Luria (2010) recognized that “supervisory leaders can act as gatekeepers, with transformational leaders offering better protection against potentially harmful organisation-level priorities. Furthermore, transformational supervisors better informed their members of the organisational priorities as they perceived them, resulting in a stronger relationship between individual supervisors’ perceptions and members’ organisational climate perceptions,” (p.647). Previous research examined whether transformational leadership style (TL) and organizational climate (OC) impacted employees’ attitudes and intentions to follow safe food handling practices (Lee et al., 2013). A questionnaire consisting of four constructs (TL, OC, attitude, and intention) was completed by 235 restaurant employees. Results showed employees’ perceptions of their manager’s leadership style strongly influenced organizational climate. When respondents’ perceptions of organizational climate (policies, practices, and procedures) are understood and
their organization treats them well, they are more likely to have positive attitudes and positive practices toward food safety.

To emphasize importance of a positive organizational climate, results of that same transformational leadership style (TL) and organizational climate (OC) study showed that employees with no food safety certification (training) had a significantly lower intention to follow food safety practices when their manager did not enforce food safety practices. Uncertified employees were more likely to be influenced by the OC. Lee et al. (2013) recommended that “instead of managers’ direct involvement in employees’ food safety practices, managers should establish a favorable safe climate that provides standards of food safety and triggers their employees’ attitudes and intentions,” (p. 291).

Within the last two decades, there has been a shift in emphasis in safety literature, moving away from individual-level accident antecedent factors (e.g. error or non-compliance with safety procedures), towards broader organizational factors (e.g. safety climate). However, only in the last few years has the food industry started to examine safety in this manner. Neal, Griffin, and Hart (2000) examined the impact of general organizational climate on safety climate and the impact of safety climate on knowledge, motivation, and performance of individuals within organizations. Respondents (n=525) from a large Australian hospital completed a survey on different aspects of their work environment including appraisal/recognition, goal congruency, role clarity, supportive leadership, participative decision-making, professional growth, and professional interaction. Results showed organizational climate had a significant impact on safety climate. Additionally, safety climate was in direct correlation with the areas of participation and compliance with safety regulations and procedures within the workplace.
Safety compliance involves adhering to safety procedures and carrying out work in a safe manner. Safety participation incorporates organizational citizenship behaviors such as helping coworkers, promoting the safety program within the workplace, demonstrating initiative, and putting effort into improving workplace safety (Neal et al., 2000). Specifically, knowledge and motivation would predict compliance and participation; the relationship between knowledge and compliance being stronger than the relationship between knowledge and participation.

**Safety Culture**

First introduced by Zohar (1980), the idea of safety climate has become a highly-researched measure for understanding variables and antecedents of injury and accidents in the workplace. “In safety culture, the concept of organizational culture is taken and applied to one specific area of a business’ activities, i.e. the safety of people working within a business or people who could be adversely affected by its existence, products or services,” (Griffith, Livesey, & Clayton, 2010a, p.429). Cox and Cox (1991) discussed how an organization’s safety culture reflects attitudes, beliefs, perceptions, and values of its employees.

Zohar (2003) identified importance of the alignment between espoused and enacted priorities on an organization’s safety climate perceptions. An example of this would be discrepancies between a leaders’ words (espoused priorities) and actions (enacted priorities). Safety climate perceptions relate both to the leader and to organizational processes (Clarke, 2010). It is crucial that leaders not only establish a positive safety climate but also lead by example and adhere to those same guidelines when it comes to safety.

Additionally, Zohar and Luria (2005) identified another attribute as internal consistency, pertaining to potential inconsistencies with the policies, procedures, and practices of an organization. Such inconsistencies can occur when supervisors use personal discretion on
policies, as procedures rarely cover all production scenarios (Zohar & Luria, 2005). Zohar and Tenne-Gazit (2008) added that the safety culture of an organization is strongly based upon leadership - through a manager’s concern for their employees’ welfare. Kouabenan, Ngueutsa, and Mbaye (2015) investigated the factors favoring first-line managers’ (n=63) involvement in managing safety issues in nuclear power plants. Results showed that perception of a positive safety climate affected behaviors and inspired higher involvement in safety-management issues.

The safety culture of an organization will also influence the willingness of employees to discuss and share different opinions as well as increase the overall emphasis that employees place upon safety (Yiannas, 2009). Clarke (2010) showed that the organizational commitment and job satisfaction of an employee partially mediated the relationship between safety climate and safety behavior. It has been shown that a strong commitment to health and safety in leadership has a direct influence on the willingness of employees to participate in such programs (Kelloway, Mullen, & Francis, 2006). More specifically, employee perceptions of a safe climate are related directly to the safety leadership behaviors of their supervisors (Kelloway et al., 2006).

Employees look to their organizational leaders for guidance when a situation arises with production-related policies and procedures conflicting with safety (Zohar, 2010). Consequently, continuous supervisor surveillance of employee safety practices was requisite for safety to verify whether safety training knowledge was being applied. Evaluation was needed to ensure that training information was comprehended and if subsequent employee actions follow safety policies and procedures. Additionally, safety evaluations can be used to plan new or additional training programs and can act as a performance appraisal for benefits and promotions. Christian, Bradley, Wallace, and Burke (2009) found safety knowledge and safety motivation to be the most strongly related antecedents of safety performance behaviors and safety outcomes.
Knowing how to perform safely (e.g. how to wash hands properly) was a precondition to enacting the safe behavior. Therefore, safety training was one of the first steps to enacting safe behaviors.

Kyriakidou and Gore (2005) used benchmarking measures to identify best practices of organizational culture within the hospitality industry. The concept of benchmarking is not new and the resulting best practices have become a reference point for other hospitality organizations. Kyriakidou and Gore (2005) detailed that successful comparison and imitation of organizational cultures is based on two main assumptions; the ability to understand and classify organizational culture, and understanding the link between culture and organizational effectiveness. Results from this study showed short-term benchmarking of organizational culture helped to identify particular elements of culture which most significantly influence performance. Managers can modify these elements to maximize performance. Specifically, four main cultural elements effected organizational performance; teamwork, building the future together, building the ability to learn, and the collaborative setting of strategies.

Feng, Ai Lin Teo, Yean Yng Ling, and Pheng Low (2014) explored the interactive effects of safety investments, safety culture, and project hazard level on safety performance in the construction sector. Results showed safety performance improves with the presence of certain factors; a higher level of safety investments, a higher level of safety culture, or a lower level of project hazard. However, effect of any factor on safety performance varies with the changes in other factors (Feng et al., 2014).

Medeiros et al. (2012) analyzed the management of human resources and food safety culture in commercial restaurants (n = 105) based on the actions of managers. Most restaurants (90%) adopted criteria for hiring employees including a health examination upon admission,
personal presentation, and professional experience. After the hiring of employees, 74.3% of the restaurants trained their employees on food safety. After training, 81.9% of the restaurants conducted periodic evaluations of their foodservice workers. Results showed that human resources management processes in restaurants are important for food safety. In addition, human resources policies should reflect a safety culture focusing on food safety throughout recruiting, selection, evaluation, training procedures, and periodic managerial evaluations.

Studies investigating safety culture have been diverse in their settings. However all have a common theme of high risk and highly regulated environments, such as aviation, trucking & work-related driving, construction, nuclear power, foodservice, and healthcare (Table 2.2). These concepts have been given high priority to investigate as a means to avoid potential accidents. Specifically in healthcare, research into organizational culture exploded after it was identified as a factor in alleviating patient risk (McCarthy & Blumenthal, 2006).

<table>
<thead>
<tr>
<th>Author(s)/Publication year</th>
<th>Organizational factors contributing to safety culture</th>
<th>Context</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arboleda, Morrow, Crum, and Shelley (2003)</td>
<td>Safety training; driver scheduling autonomy; opportunity for safety Input; and management commitment Work environment; management attitudes; management actions; safety management systems</td>
<td>Trucking</td>
</tr>
<tr>
<td>Clarke (2010)</td>
<td></td>
<td>Manufacturing/production</td>
</tr>
<tr>
<td>Griffith, Livesey, and Clayton (2010b)</td>
<td>Management systems, styles and processes; leadership; communication; commitment; environment; and risk awareness, perception, and risk taking behavior</td>
<td>Foodservice</td>
</tr>
<tr>
<td>Harvey et al. (2002)</td>
<td>management style and communication; responsibility and commitment; risk-taking; job satisfaction; complacency; and risk awareness</td>
<td>Aviation &amp; Nuclear power</td>
</tr>
<tr>
<td>Killimett (2006)</td>
<td>Communication; management credibility; and importance of safety values</td>
<td>Behavioral Science</td>
</tr>
</tbody>
</table>
In previous literature, the term “safety climate” has been used almost interchangeably with “safety culture” (Harvey et al., 2002). However, Flin (2007) argues that safety climate provides a surface assessment of employees’ attitudes toward safety at a single point in time, like a snapshot of the safety culture. Killimett (2006) further clarifies stating, “the safety climate constitutes the readily measurable, more accessible, and more rapidly-changed aspects of the organizational safety culture,” (p. 95). The safety climate was unstable and can be altered and changed; safety culture was viewed as a continuous phenomenon which was not easily altered (Griffith et al., 2010a). Culture was difficult to measure whereas safety climate can be tracked (Griffin & Neal, 2000).

Ogbonna and Harris (2002) described three main assumptions of safety culture. First, company policies must align with employee values to increase business performance. Next, organizational culture can be influenced to meet business objectives. Lastly, organizational culture can be measured against performance. Thus, measuring performance (i.e. food handling practices) can identify current organizational culture (i.e. food safety culture).
Food Safety Culture

One proposed definition of food safety culture was the aggregation of prevailing, relatively constant, learned, and shared attitudes, values, and beliefs which contribute to hygiene behaviors used within a particular food handling environment (Griffith, 2008). Griffith et al., (2010a) described it simply as beliefs shared by members in an organization. Food safety culture is evident in every foodservice organization and can be assessed on a continuum between positive and negative. The culture may be subtle and only consist of unspoken rules and beliefs or it may be as evident as written food safety polices, training, and organization conducts.

Jespersen, Griffiths, Maclaurin, Chapman, & Wallace (2016) proposed food safety culture as having three connected theoretical perspectives including organizational culture, food science, and social cognitive science. De Boeck, Jacxsens, Bollaerts, and Vlerick (2015) defined food safety climate as “An employees' (shared) perception of leadership, communication, commitment, resources and risk awareness concerning food safety and hygiene within their current work organization” (p.244). Nyarugwe, Linnemann, Jan Hofstede, Fogliano, and Luning (2016) added the importance of incorporating demographic variables when assessing food safety culture, “as they are part of the organisation's context that shapes an organisation's FS[food safety]-culture” (p.85).

Griffith, et al., (2010b) postulated that organizational food safety culture must possess positive organizational goals and values to inspire employees. These goals and values can be communicated by leadership through training, educational materials, or through overt and subliminal communication from the manager. For example, a foodservice manager who washes his/her hands before showing a foodservice employee how to make a ready-to-eat salad was communicating subliminally. This behavior of washing hands was modeled by the manager and
reinforces prior training on hand hygiene. “You can tell a lot about the food safety culture within an organization by their communication or lack of it,” (Yiannas, 2009, p. 49).

Additionally, Griffith (2010) identified four major variables for a foodborne illness outbreak to occur; 1) foods, customers, source of raw materials; 2) management systems & culture; 3) hazards; and 4) food handling behaviors. Griffith (2010) further stated that these four variables are interconnected and must be evaluated as such.

**Relevant Theories**

Food safety culture has been shown to have several grounding theories (Table 2.3). Taylor (2011) used broad concepts from the field of business and management to define culture, discussing theories that are grounded in the development of food safety culture. Social norms, developed by Fishbein and Ajzen (1975) as part of the Theory of Reasoned Actions (TRA), are considered normal behavior within a certain group. Taylor (2011) identified social norms as being a major factor within two parts of food safety culture – within the business setting and within the society in which the foodservice worker was raised.

Bandura (1977) introduced the concept of self-efficacy, shown to influence food safety culture, as foodservice employees do not want to attempt a food handling practice if they think it was too difficult. Taylor (2011) postulated that the Theory of Planned Behavior (TpB) developed by Ajzen (1985), influences a food handler to undertake a specific behavior based on possessing a positive attitude, perception of positive social norms, and having high self-efficacy.

The Theories of Pavlovian Reinforcement (Pavlov, 1927) and Operant Conditioning (Thorndike, 1911; Skinner, 1933) are also grounded in food safety culture through the use of interventions and educational tools to reinforce positive food safety practices. The Health Belief Model, developed in the 1950s by the U.S. Public Health Services, was widely used in health-
behavior research (Rosenstock, 1974). The model was used to explain why individuals make decisions pertaining to health-risk behaviors; perceived knowledge of personal susceptibility; perceived severity of a particular illness; perceived benefits of treatment; and perceived barriers of treatment (Rosenstock, 1974). In food safety, this model was relevant in investigating food handlers’ behaviors and consequences of these behaviors when foodservice employees have been educated about proper food handling practices.

Similarly, The Social Exchange Theory (Blau, 1964), states if an employee perceives that their organization (child care facility) treats them well and perceives a positive organizational (food safety) culture, the employee was more likely to demonstrate positive (food safety) behavior.

Another relevant theory is the Social Action theory, developed by the American sociologist, Talcott Parsons. Parsons laid the theoretical basis for his theory of in his first book, *The Structure of Social Action* (1937), while his second book, *The Social System* (1951), aimed to elaborate on the theory. Part of the Social Action theory discussed the concept of social system. “A social system consists in a plurality of individual actors interacting with each other in a situation which has at least a physical or environmental aspect, actors who are motivated in terms of a tendency to the "optimization of gratification" and whose relation to their situations, including each other, is defined and mediated in terms of a system of culturally structured and shared symbols (Parsons, 1951, p. 5-6).” The social system is a theoretical scheme which articulates our own field with others which are equally part of the same broader fundamental system (Ritzer, 1992). It is a dynamic interrelationships of institutions (i.e. child care facility) and culture (i.e. food safety). In other words, how child care employees’ interact with institutional aspects such as equipment availability, time pressures, number of staff per shift.
The social system is a bounded set of interrelated activities that together constitute a single entity. It is composed of persons or groups of persons who interact and mutually influence each other’s behavior. Furthermore, the system consists of elements that are capable of being understood. Parsons constructed the AGIL (adaptation, goal attainment, integration, and latency) paradigm which he used to identify the four basic conditions that societies needed in order to survive. These four functional imperatives provided a complex and systemic account of social phenomena (Parsons, 1971).

### Table 2.3: Theories relevant to food safety culture

<table>
<thead>
<tr>
<th>Author</th>
<th>Theory</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ajzen (1985)</td>
<td>Theory of Planned Behavior</td>
<td>Influences a food handler to undertake a specific behavior based on positive attitude, perception of positive social norms, and high self-efficacy.</td>
</tr>
<tr>
<td>Bandura (1977)</td>
<td>Self-Efficacy Theory</td>
<td>Foodservice employees do not want to attempt a food handling practice if they think it is too difficult.</td>
</tr>
<tr>
<td>Blau (1964)</td>
<td>Social Exchange Theory</td>
<td>Employees’ perceptions of organizational (food safety) culture influences attitudes and behaviors</td>
</tr>
<tr>
<td>Fishbein and Ajzen (1975)</td>
<td>Theory of Reasoned Actions</td>
<td>Social norms to be a major factor within two parts of food safety culture: within the work business setting and within the society in which the foodservice worker was raised.</td>
</tr>
<tr>
<td>Pavlov (1927)</td>
<td>The Theories of Pavlovian Reinforcement</td>
<td>Used in food safety handling practice interventions.</td>
</tr>
<tr>
<td>Parsons (1951)</td>
<td>Social Action Theory</td>
<td>Social system-relates to quantity and quality of supplies, time pressures, and amount of staff.</td>
</tr>
<tr>
<td>Thorndike (1911) and Skinner (1933)</td>
<td>Operant Conditioning Theory</td>
<td>Used to develop tools to reinforce positive food safety practices.</td>
</tr>
<tr>
<td>U.S. Public Health Services (1950s)*</td>
<td>Health Belief Model</td>
<td>Used by health professional for explaining and predicting health-related behaviors.</td>
</tr>
</tbody>
</table>

Note. *Source (Rosenstock, 1974)*
Factors Influencing Food Safety Culture

As demonstrated, safety culture was well-documented in literature. Additional research has been devoted to food safety culture in several foodservice settings. The following section will include discussion of three recurring factors of safety culture; management and coworker support, communication, and employees’ attitudes and behaviors.

Powell, Jacob, and Chapman (2011) explained that, to support a culture of food safety, businesses need to assess food handling-practices through observation and accept personal responsibility for food safety. The authors suggested marketing food safety practices to the public to enhance overall food safety culture. “Conveying a positive food safety culture through open, transparent communication strategies can help buyers make informed decisions,” (Powell et al., 2011, p. 821). Additionally, studies have shown that behaviors of employees are partly influenced by prevailing cultural norms in their work environments (Yiannas, 2009).

Yiannas (2009) defined food safety culture as a specific form of organizational culture in which there are shared perceptions of food safety policies and procedures among members of an organization. Griffith (2006) furthers this definition by reinforcing the need for active engagement on many fronts, including communication between management and employees about food safety practices as well as food management systems. Employees have an important role to play by following proper food safety practices as it was not enough to simply “know the right practice;” employees must “do the right practice,” (Griffith, 2006).

Ungku Fatimah et al. (2014) used purposive sampling of hospital and school foodservice employees to conduct four focus groups in the identification of relevant factors of food safety culture to develop a survey instrument. Six distinct factors were identified including management and co-worker support, communication, self-commitment, environmental support,
work pressure, and risk judgment. Griffith et al. (2010a) further this point explaining that there will most likely be a range of factors contributing to culture. Businesses with a strong culture can achieve this in a range of ways.

Ungku Fatimah et al. (2014) assessed these factors with healthcare and school foodservice non-supervisory employees’ perceptions of food safety culture, finding the highest agreement scores with self-commitment (M=6.54, SD=0.75) and environment support (M=6.31, SD=0.91). Those factors with the lowest scores, perceived as areas for potential improvement, included risk management (M=5.51, SD=1.43) and co-workers in supporting food safety practices (M=5.62, SD=1.17). Demographic differences were shown to be significant factors on employees’ perceptions of food safety culture. Perceived risk judgment was shown to be higher with female respondents than their male counterparts. Additionally, older-generation employees held a higher level of agreement toward their organization not being involved in risk-taking behaviors than younger generations (Ungku Fatimah et al., 2014).

School foodservice showed significantly higher agreement to management and coworker support, work pressure, and risk judgment factors, compared to respondents in health care (Ungku Fatimah et al., 2014). Furthermore, self-operated foodservice operations showed a significantly higher agreement for environmental support than working in contract-managed operations. Previous research has shown several common factors contribute to organizational culture/climate: management & coworkers support; communication; risk judgment; and self-commitment.

**Management and Coworkers Support**

Hofmann and Morgeson (1999) defined perceived organizational support as a measure of the level of support that employees perceive the organization has provided to them. Griffith
(2010) described that management of the types of foods prepared and management of how they are prepared are likely to contribute to the risk of an organization’s food safety culture. One food safety management definition was “the attainment of food safety goals in an effective and efficient manner through planning, organizing, staffing, directing, and controlling an organization’s resources,” (Griffith, 2010, p.421). Ravichandran et al. (2015) emphasized the importance of managerial support for recruiting and retaining foodservice employees. However, Lee et al. (2011) identified that managers play a more important role in food safety than audits or inspections because managers spend much more time involved in daily operations.

Management effectiveness was a significant overall factor contributing to the prevention of FBI outbreaks (Griffith, 2010). Yiannas (2009) states only management can truly influence, strengthen, or change safety culture; “they’re the leaders.” Furthermore, the strength of a food safety culture was correlated with how important management perceives food safety to be. “The manager plays a key role in the food safety culture by establishing policies and standards, expecting accountability, serving as a role model, controlling rewards and punishment, providing training, and providing needed resources to follow food safety practices,” (Arendt et al., 2013, p. 126).

Seaman and Eves (2010) conducted interviews with food handlers (n=40), their managers (n=20), and accredited training providers (n=10) to explore attitudes toward food hygiene training. Although new employee training was crucial for instilling a company’s food safety culture (Yiannas, 2015), eighty percent of untrained food handlers reported their manager did not discuss food safety training during early stages of employment. Yet, 90% of managers interviewed indicated discussing food safety training needs to new employees. All food handlers, both untrained and trained, in food safety practices understood the importance of training and
showed a positive attitude toward training. Additionally, food handlers who attended food safety trainings found it educational and enjoyable.

However, interviews from both food handlers and managers showed a lack of managerial support prior to food safety training. Several managers indicated a culture of rewarding food handlers for completion of food safety training through financial incentives and receiving a certificate. Yet, this practice of rewarding employees for simply completing the food safety training was a misdirected approach; a more effective approach would be rewarding safe food handling behaviors after training (Yiannas, 2009; 2015).

Research has also shown the effectiveness of coworker support. Larson (2013) provided an example of evidence-based hand hygiene strategy created by the Memorial Sloan Kettering Cancer Center in New York City. Evidence-based hand hygiene strategies are long-term interventions used to improve compliance rates. In 2008, the program established small teams including a representative from quality assurance, an infection preventionist, and nurses to identify barriers to hand hygiene success and to establish hand hygiene performance goals. Once goals were established, hand hygiene training sessions were implemented to review proper hand hygiene practices as well as training to observe each other’s hand hygiene compliance. This additional step to ensure co-worker compliance was crucial to the intervention’s success. Results showed hand hygiene compliance increased from 60% or 70% to 97% and continued to be sustained at that level (Larson, 2013).

**Communication**

Communication was a necessity in any discussion of culture. In the high-risk industry of nuclear power, Ostrom, Wilhelmse, and Kaplan (1993) identified that the process of demonstrating behavioral norms establishes routine activities where it was impractical to
produce documented policies for every imaginable safety hazard. “Conveying a positive food safety culture through open, transparent communication strategies can help buyers make informed decisions,” (Powell et al., 2011, p. 821). The authors further described unspoken rules concerning expected behaviors that, if not followed, may result in consequences. However, Yiannas (2009) argues that the way in which food handling practice messages are presented was crucial. Instead of overloading employees with statistics on the number of FBI’s, it would be more effective to choose one case which will resonate with foodservice employees.

Griffith (2010) reported the need for food handlers to “know what they need to know.” It was crucial for communication to occur to ensure food handlers have knowledge of food safety practices and how to use that knowledge. Previously reported, knowledge alone of food safety/hygiene does not always translate into implementation of food safety practice, thus constant communication for new and tenured employees was needed (Griffith, 2010). Important to note was the significance of communicating to new employees learning the food safety culture (Griffith et al., 2010a). To successfully achieve this team spirit requires strong, fundamental communication skills (Kyriakidou & Gore, 2005). Food safety policies must be documented and clearly defined for new and current employees to fully understand (Yiannas, 2009), however, management “actions speak louder than words.”

**Employees’ Attitudes and Behaviors**

Griffith et al. (2010a) state that food safety culture requires contributions from people at all levels. Two variables found to be significant in foodservice employee’s safe food handling practices were their attitude toward food safety and their level of perceived control (Clayton & Griffith, 2008). Cooper (2000) identified that different subcultures will emerge and form around different employee levels in an organization. It has been shown that these subcultures may
compete for priority within the organization. Through case analysis, Griffith et al. (2010a) identified that the biggest rival to food safety culture was a culture of saving money. Thus, analysis of safety culture should focus on the relationships between safety policies, procedures, and practices, while taking into account these outside influences from other cultures (Zohar, 2010).

**Social System**

The aspects of the social system important to food safety culture include work pressures and environmental support. “The actual behavior of individuals, their symbolically oriented actions, may be to a widely varying degree congruent with the meanings of the cultural system” (Parsons, 1972, p. 255). The organizational environment has an influence on motivation and self-commitment to follow proper food safety practices (Yiannas, 2009). Findings show a single safety culture within the organization was recommended (Cooper, 2000). “Tangible factors, complacency, standards, degree of excellence, consistency, and organizational support are elements in employees’ perceived environment support,” (Ungku Fatimah, 2013, p. 39). Kyriakidou and Gore (2005) showed that if an organization can create a climate of learning through employee empowerment, training, and employee self-commitment, culture can gain a significant competitive advantage.

Negative factors can also influence culture. Work pressure and stress has an impact on work performance, behavior, practices or behavioral norms (Griffith et al., 2010a). If a foodservice operation has a culture of compliance with food safety policies, the risk to consumers can be dramatically minimized (Griffith et al., 2010a). Griffith and Redmond (2009) postulated two potential problems food handlers have when determining risk judgment; optimistic bias and the illusion of control. With optimistic bias, food handlers perceive that there
was an overall risk but their business would not be affected by it (Griffith & Redmond, 2009). Optimistic bias raises high concern in child care facilities. Gordon (2003) suggested that FBI prevention messages should incorporate self-efficacy and stimulate risk perception to increase adoption of food safety behaviors. Risk perception was a significant motivator of behavior (Gordon, 2003).

Yiannas (2009) detailed that, historically, regulatory inspections and training have been used to assess and reduce FBI outbreaks. However, if food safety programs are going to be successful, there needs to be a focus on organizational culture of the establishment as a whole, without overlooking the individuals within the organization; the “human element” (Neal, Binkley, & Henroid, 2012). Yiannas (2009; 2015) goes on to argue that traditional food safety management systems need to be reevaluated to not simply focus on process, but must include people as well to improve safe food handling behaviors.

Taylor (2011) presented a theoretical framework for factors that impact food safety culture containing four basic categories; knowledge, attitude/psychological, external, and behavioral. The author further explains that interventions approaching individual factors will not change behaviors as factors impacting food safety practices are interconnected and reinforce other factors. Therefore, future interventions should incorporate the broader framework of organizational food safety culture to improve food safety practices.

**Assessing Food Safety Culture**

Griffith et al. (2010b) listed multiple reasons to assess food safety culture: 1) to assess potential compliance with safety management systems to avoid error and food poisoning costs; 2) raise awareness of food safety; 3) benchmark; 4) make inform decisions about training an remedial action; 5) promote commitment; and 6) identify weaknesses and evaluate risk.
Jespersen et al. (2016) developed a maturity model with five capability areas, with each area containing five stages of maturity. Each stage identified desired specific food safety behaviors to assess the current food safety culture. The capability areas being assessed included perceived value, people systems, process thinking, technology enabled, and tools and infrastructure. Maturity models are tools to evaluate a current state of a given culture and to develop improvement plans against a scale of maturity (Jespersen et al., 2016). Assessing food safety culture will help foodservice organizations understand food handler behaviors (Ungku Fatimah et al., 2014; Yiannas, 2009). Table 2.4 illustrates prior safety culture/climate assessment instruments.

<table>
<thead>
<tr>
<th>Authors</th>
<th>Area adapted/Assessment instrument</th>
<th>Factors of food safety culture assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ball, Wilcock, and Colwell (2010)</td>
<td>Food safety culture questionnaire</td>
<td>Management commitment, work unit commitment, food safety training, infrastructure and worker food safety behavior</td>
</tr>
<tr>
<td>Cooper (2000)</td>
<td>Food safety culture questionnaire, observations, audits</td>
<td>Subjective internal psychological, food safety behaviors, situational and environmental</td>
</tr>
<tr>
<td>De Boeck et al. (2015)</td>
<td>Food safety culture questionnaire</td>
<td>Leadership, communication, commitment, resources and risk awareness</td>
</tr>
<tr>
<td>Griffith et al. (2010a)</td>
<td>Food safety management</td>
<td>Management systems, leadership, communication, commitment, environmental &amp; risk awareness, perception and risk taking behavior</td>
</tr>
<tr>
<td>Jespersen et al. (2016)</td>
<td>Food safety culture maturity model</td>
<td>Perceived value, people systems, process thinking, technology enabled, and tools and infrastructure</td>
</tr>
<tr>
<td>Neal et al. (2012)</td>
<td>Food safety culture questionnaire</td>
<td>Management commitment, worker food safety behavior</td>
</tr>
</tbody>
</table>
Table 2.4: (Continued)

<table>
<thead>
<tr>
<th>Authors</th>
<th>Area adapted/Assessment instrument</th>
<th>Factors of food safety culture assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nyarugwe, et al. (2016)</td>
<td>Food safety culture</td>
<td>Organizational and administrative characteristics; technical facilities/resources; employee characteristics; food safety policy/procedure characteristics; and food safety performance</td>
</tr>
<tr>
<td>Taylor (2011)</td>
<td>Psychology</td>
<td>Knowledge, attitude/psychological, external and behavioral</td>
</tr>
<tr>
<td>Thogaru (2015)</td>
<td>Food safety culture questionnaire, audits</td>
<td>commitment, control, communication and competence</td>
</tr>
<tr>
<td>Ungku Fatimah et al. (2014)</td>
<td>Food safety culture questionnaire</td>
<td>management and coworkers support, communication, self-commitment, environment support, work pressure, and risk judgment</td>
</tr>
<tr>
<td>Yiannas (2009)</td>
<td>Food science</td>
<td>Leadership, employee behavior, management support, accountability, and communication</td>
</tr>
<tr>
<td>Yiannas (2015)</td>
<td>Food science</td>
<td>Leadership, commitment, communication, continuous training, and attitude/psychological</td>
</tr>
</tbody>
</table>

Neal et al. (2012) used a modified version of the Food Safety Climate Tool to assess foodservice employees’ beliefs about food safety culture. Two factors were identified which explained 54% of the variance – management commitment and worker food safety behavior. Management influence was further identified by respondents as stressing food safety even when the restaurant was busy; keeping employees focused on food safety; checking on employees to ensure that proper food safety behaviors are being practiced; having adequate food safety tools for employees; ensuring management follows food safety rules; and ensuring management shows
visible support for food safety culture. Participants also reported a strong sense of personal responsibility for handling food properly.

Nyarugwe et al. (2016) identified the need for food safety culture research to be cognizant of the different hierarchical levels in an organization, as these different employee levels deal with different food safety tasks, responsibilities and decisions. Additionally, the “what” and “how” these different hierarchal levels are measured needs to be taken into consideration when assessing an organizations food safety culture (Nyarugwe, 2016).

Thogaru (2015) developed a questionnaire to assess hygiene culture and identified areas that needed to be improved in the existing hygiene culture. Four major components which strongly impact the food safety culture were identified as commitment, control (leadership), communication, and competence. A comparison between restaurant audit scores and food safety questionnaire scores revealed restaurants with the highest score on the questionnaire also had the highest audit scores.

Yiannas (2009; 2015) argued that historically, foodservice organizations use training programs and inspections as food safety culture indicators for prevention of FBI outbreaks. As previously reviewed training and knowledge assessment alone was not enough to change or fully understand food safety behaviors, reinforcement of knowledge was one factor that can help to positively change behavior. Furthermore, audits alone are not sufficient to ensure food safety (Powell et al., 2013). Yiannas (2009) emphasized use of audits and inspections as part of a multifactorial approach to food safety to help understand and identify gaps in food safety behaviors. Powell et al. (2013) reviewed three types of audits; self-audits – internal reviews of food safety practices and policies; second-party audits – used by a downstream company on a supplier to ensure food safety practices are being followed; and third-party audits - performed by an external
organization to verify food safety practices and policies are being followed by the organization. Third-party audits are similar to a regulator foodservice inspection in that they are both observational judgements which can vary in consistency of the auditor or inspector (Powell et al., 2013). However, audits and inspections were shown to be limited in their effectiveness as they are only a snap-shot of information. Thus, audits/inspections are only useful if results are reviewed by the organization and corrections are implemented. Powell et al. (2013) argued to understand an organization’s food safety culture, you must assess indicators such as internal observations of food handling practices, externally-led evaluations (KAP scores), and audit and inspection scores. Once an organization has assessed food safety culture, gaps can be identified and tailored interventions can be implemented. This study will add to the child care food safety body of literature and attempt to fill a gap regarding food safety culture and social system in child care.

References


CHAPTER 3. METHODOLOGY

Introduction

The review of literature illustrated following proper food safety practices was a complex issue. As training and knowledge alone are not enough to change food safety practices, it was crucial to understand factors that influence food safety practices. This point was of utmost importance in child care facilities as children are a high risk population for foodborne illnesses (FBI). To better understand complexities of following food safety practices the identification of organizational culture factors as well as barriers and motivators which influence following proper food safety practices should be assessed. Therefore, the current study examined food safety culture in licensed center-based child care facilities as well as barriers and motivators to following recommended food safety practices.

The specific research objectives for the study were:

1. Assess child care food handlers’ perceptions of food safety culture and social system factors.
2. Identify which food safety culture and social system factors affect child care food handling employee’s self-commitment to perform safe food handling practices.
3. Identify important barriers and motivators to following food safety practices in child care facilities.
4. Compare child care food handling employees’ perceptions on barriers and motivators to following food safety practices in child care facilities based on demographic and operational characteristics.
Use of Human Subjects Statement

As this research involved human subjects, the research protocol for this study was submitted to the Iowa State University Human Subjects Review Board (IRB) prior to the start of the study (see Appendix A). No recruitment or data collection was initiated until IRB approval was received. All researchers involved in the study completed Iowa State University’s Human Subjects Research Assurance Training. To ensure participant protection, participants were informed of the study purpose and notified of confidentiality measures that were utilized; participants’ consents was obtained before data collection.

Research Design

This study utilized a quantitative approach to investigate food safety culture factors in licensed center-based child care facilities, as well as child care food handlers’ perceived barriers and motivators to following recommended food safety practices. Two paper-based questionnaires, one for child care directors and one for child care employees, were utilized. Child care director questionnaires collected facility demographics, while the child care employee questionnaires collected food safety culture factors, barriers and motivators to following food safety practices, and employee demographics. Once both types of questionnaires were collected, data from each facility (i.e., director and employee questionnaires) was combined to accomplish the research objectives.

Sample Selection

The target population for this study was South Carolina licensed center-based child care employees involved in food handling, as all of these employees handle food which the children consume by either preparing or serving the food. The setting for this study was South Carolina licensed center-based child care facilities including commercial, church, and preschools.
Licensed center-based child care facilities provide care and education to 13 or more children in a non-residence setting, operating more than four hours a day and more than two days a week (South Carolina Child Care, 2016). All exempt (i.e. only operated less than 4 hours per day or on school holidays or no licensing or inspections required by law) facilities were eliminated as they are not required to be licensed or inspected by law. Additionally, home-based child care facilities were eliminated as this type of facility often has one or two employees, thus assessing food safety culture would be difficult. The South Carolina Department of Social Services (SCDSS) database of licensed center-based child care facilities was utilized for this study (SCDSS, 2016). Addresses were obtained from the SCDSS database for all licensed center-based child care facilities.

As one of the study objectives was to compare food safety culture based on operational characteristics (size of child care facility), a stratified random sampling technique was used for selecting the sample of licensed center-based child care facilities for this study. The total target population size was estimated to be 1,400 South Carolina licensed center-based child care facilities, with each facility employing approximately 10 child care employees. Maximum child capacity was the characteristic used to divide the 1,400 South Carolina licensed center-based child care facilities into three separate strata: 1) small facilities (0-100 children); 2) medium facilities (101-200 children); and 3) large facilities (201+ children). Facilities were separated into these three strata to ensure the sample was representative of the South Carolina licensed center-based child care facility population. From each of the three strata, 33 South Carolina licensed center-based child care facilities, a total of 99 facilities, were randomly selected to participate in the current study. Random selection was conducted by alphabetically listing all South Carolina licensed center-based child care facilities for each strata. Then starting at the fourth licensed
center-based child care facilities listed, each fifth facility was selected until 33 facilitates per strata were obtained.

Each of the 99 facilities were sent a packet containing one director questionnaire and 10 employee questionnaires; therefore a total of 99 director questionnaires and 990 employee questionnaires were distributed to licensed center-based child care facilities for completion. Using the paper-based tailored design method and an estimated 40% response rate based on literature (Dillman, Smyth, & Christian, 2014), a sample size of 40 directors and 396 child care employees was targeted.

Prior to survey distribution, a gatekeeper, the South Carolina child care program coordinator, was contacted and informed of the study purpose. A gatekeeper sent an announcement email to all licensed center-based child care facility directors detailing the study purpose, to “be on the look-out”, and request participation. A paper-based invitation letter (Appendix B) was sent two weeks prior to survey distribution to each licensed center-based child care director selected for study participation to request participation in the study. The paper-based invitation letter also contained two recruitment fliers (Appendix C) for the director to post in high traffic areas for employees to view. The flier detailed purpose and benefits of participating in the study, as well as detailing process for completion and identifying a token of appreciation.

**Questionnaires**

**Director**

Prior to completing the paper-based questionnaire, child care facility directors received a director cover letter (Appendix D) discussing the study purpose, instructions on employee
selection criteria, and packet distribution, as well as a director questionnaire informed consent form (Appendix E). Based on the review of literature of child care studies and food safety studies, the child care director questionnaire (Appendix F) was developed. The director questionnaire consisted of 21 questions to evaluate child care facility demographics, and child care facility food safety practices. The child care facility demographics section contained 13 questions including: legal status (i.e. for profit, nonprofit); type of child care facility (i.e. independently owned or operated, chain/franchise); number of full-time and part-time foodservice employees; number of food handling employees; number of meals served (i.e. breakfast, lunch, dinner); type of meal service; organizational affiliations (i.e. Head Start, CACFP, NAEYC); child maximum capacity; and current enrollment. The child care facility food safety practices section contained 8 questions pertaining to food safety policies (3 questions); food safety training (4 questions); and food purchasing.

**Employee**

Prior to completing the questionnaire, participants received an employee invitation letter (Appendix G) explaining the study purpose and instruction on how to complete the paper-based questionnaire, as well as an employee questionnaire informed consent form (Appendix H). Sections of previously developed survey instruments (Strohbehn et al., 2014; Ungku Fatimah, Arendt, & Strohbehn, 2014) were utilized with permission for the employee questionnaire. Both instruments were previously shown to have acceptable reliability and validity. After a review of literature, additional demographic questions were added to better assess employees in the child care setting (Appendix I).

The child care employee paper-based questionnaire consisted of three sections. The first section consisted of six previously developed and validated (Ungku Fatimah, et al., 2014) food
safety culture factors. This section assessed child care food handlers' agreement with factors pertaining to the organizational culture of food safety practices in their current child care facility. Child care food handlers were asked to rate their level of agreement with each of the 31 statements using a seven-point Likert-type scale (1 = Strongly Disagree to 7 = Strongly Agree). The seven food safety culture factors included were management and coworker support; speak freely; communication; self-commitment; environment support; work pressure; and risk judgment. The following is a description of each factor and an example statement (Ungku Fatimah, et al., 2014):

1.) Management and coworkers support (10 statements)

Description: This factor was related to managers and management roles in encouraging safe food handling practices and teamwork among coworkers.

Example statement: My coworkers are supportive of each other regarding food safety.

2.) Speak freely (2 statements)

Description: This factor was related to management creating an environment in which employee’s feel comfortable discussing food safety.

Example statement: I can freely speak up if I see something that may affect food safety.

3.) Communication (4 statements)

Description: This factor was related to communication between management and employees as well as communication among coworkers.

Example statement: All of the necessary information for handling food safely is readily available to me.
4.) Self-commitment (5 statements)

Description: All items in this factor reflected employees’ internal motivation to perform safe food handling.

Example statement: I follow food safety rules because I think they are important.

5.) Environment support (4 statements)

Description: This factor represented measures on adequacy and quality of infrastructures that support safe food handling practices.

Example statement: Adequate supplies are readily available to perform safe food handling practices.

6.) Work pressure (3 statements)

Description: This factor described pressures in the workplace associated with time, work load and staff adequacy that affect safe food handling practices.

Example statement: My work load does not interfere with my ability to follow safe food handling practices.

7.) Risk judgment (3 statements)

Description: This factor was associated with organization risk taking decisions when implementing and complying with food safety rules and regulations.

Example statement: I believe that written food safety policies and procedures are nothing more than a cover-up in case there is a lawsuit.

The second section consisted of two root questions previously developed and validated (Strohbehn et al., 2014) to assess food handlers' perceived level of importance of “barriers” and “motivators” to following recommended food safety practices in their current child care facility. Child care food handlers were asked to indicate their perceived importance with each of the 15
“barrier” statements and 26 “motivator” statements using a five-point Likert-type scale (1= Not Important; 5=Very Important).

The following are the root questions for assessing barriers and motivators as well as example statements for each:

Root question for assessing barriers: (15 statements) - “At work, how important do you believe the following statements are in preventing you from preparing/serving food safely?”

“Afraid of co-workers’ reaction”
“Lack of time”
“Too much work to do”

Root question for assessing motivators: (26 statements) – “At work, how important are the following in encouraging you to preparing/serving food safely?”

“Being taught about food safety”
“Keeping children satisfied”
“Not harming the children”

The third section consisted of 12 demographic questions to evaluate child care employee demographics. Demographic questions were developed after a review of literature and input from experts in the field. Child care demographic questions included were sex; age; years of experience (4 questions); work status; hours worked per week; job position; food safety training; food safety training certification; and hours of annual food safety training.

Pilot Study

Prior to pilot testing, the questionnaire was reviewed in terms of content validity, clarity of wording, and format by experts in the area of food safety (n=3), child development (n=1), and
survey design (n=1). Minor modifications were made upon experts’ feedback to better assess the child care setting. For example, in the child care setting the term “Director” was more appropriate than the term “Manager.” The Iowa State University Child Development Laboratory School was utilized for the pilot test.

A large packet containing one director packet and ten employee packets was sent to the facility director. The director packet contained five items: 1) director cover letter; 2) director questionnaire informed consent form; 3) director paper-based questionnaire; 4) questionnaire pilot test evaluation form (Appendix J); and 5) prepaid addressed return envelope. The child care director then distributed the packets to child care employees fitting the following two selection criteria: 1) participants must be a minimum of 18 years of age; and 2) participants must be involved in food handling (this could be food preparation or food service). The employee packets contained 5 items: 1) employee invitation letter; 2) employee informed consent form; 3) employee paper-based questionnaire; 4) questionnaire pilot test evaluation form; and 5) prepaid addressed return envelope.

Nine completed surveys were returned, a director survey (n=1) and employee surveys (n=8). Two employee surveys were not returned, because at the time of pilot testing two child care employee positions were not filled at the pilot facility. Pilot test respondents were not included in the final sample. The small sample size was acceptable as analysis of questionnaire responses and questionnaire pilot test evaluation form responses was for content clarity, additionally the measurement instruments validity was previously tested in school and hospital foodservice and shown to be acceptable.

The questionnaire pilot test evaluation form asked respondents to identify how long the questionnaire took to complete as well as question clarity and formatting. Respondents were also
asked to indicate questions that could be made clearer. Respondents’ feedback regarding clarity along with suggestions for improvement to the questionnaire were reviewed. The director evaluation reported 5 minutes were needed to complete the questionnaire and no other modifications were needed as the questionnaire was understandable. The employee questionnaire feedback reported on average 15 minutes was needed to complete the questionnaire. Minor modifications were made after reviewing pilot test responses. For example, the root questioning wording was changed from “At work, how important are the following in keeping you from handling food safely?” to “At work, how important do you believe the following statements are in preventing you from preparing/serving food safely?”, for clarification purposes. Additionally, the statement under the barriers assessment “Risk losing my utensil and equipment if sent through dish machine” was removed as it was deemed not applicable in this setting.

Data Collection

To reduce sampling error and increase participation rates a survey implementation plan was utilized (Dillman et al., 2014). In the first mailing a large packet, containing one director packet and ten employee packets was sent to each licensed child care facility director. The director packet contained 4 items: 1) director cover letter; 2) director questionnaire informed consent form; 3) director paper-based questionnaire; and 4) prepaid addressed return envelope. Child care directors then distributed the packets to child care employees fitting the following selection criteria: 1) participants must be a minimum of 18 years of age; and 2) participants must be involved in food handling (this could be food preparation and/or food service). The employee packets contained 4 items: 1) employee invitation letter; 2) employee informed consent form; 3) employee paper-based questionnaire; and 4) prepaid addressed return envelope.
Follow-up contacts, spaced approximately one week apart for three weeks, were used to recruit participants (Dillman et al., 2014). Replacement questionnaires were offered. A final telephone contact to child care directors was made to those child care facilities who had not responded. A structured director follow-up phone contact script was used (Appendix K). A five dollar electronic Target gift card was given to child care food handling employees after returning a completed questionnaire. Additionally, general study results were offered to child care directors who returned a completed questionnaire.

Data Analysis

Data were analyzed using SPSS (Version 23.0). Descriptive statistics including mean, standard deviation, frequency, and percentage were used to summarize the data. Negatively phrased items were reverse coded. Internal consistency, Cronbach’s coefficient alphas, were calculated to evaluate reliability of the food safety culture factors. Alpha coefficients for each factor ranged from 0.713 to 0.892, all were above the 0.70 threshold for standard of reliability as suggested by Nunnally (1978). A bivariate correlation analysis was conducted to assess the relationship between each food safety culture factor (independent variables) and employee self-commitment (dependent variable) to following food safety practices. Regression analysis was used to examine which food safety culture factors impact self-commitment to following food safety practices. Self-commitment was the dependent variable. Independent variables were the food safety culture factors. Independent $t$-tests and one-way ANOVA were conducted to compare mean scores to identify significant differences in perceptions of barriers and motivators to following recommended food safety practices, respondent demographic characteristics and operation characteristics. A parametric $F$-test was conducted when there was homogeneity between groups, while for unequal variances between groups the Welch test was run. Post-hoc
tests including: Scheffe, Tukey, and Games-Howell were conducted to determine within group differences. The 0.05 level of significance was used for analysis.

References


CHAPTER 4. INVESTIGATING FOOD SAFETY FACTORS THAT INFLUENCE CHILD CARE EMPLOYEES’ SELF-COMMITMENT TO PERFORM SAFE FOOD HANDLING PRACTICES

A paper to be submitted to The Journal of Foodservice Management & Education

Joel Reynolds and Lakshman Rajagopal

Both authors were involved in all the research stages including: study design, data collection & analysis, and manuscript development.

Abstract

Young children are considered a high risk population for foodborne illness. This study aimed to identify which food safety culture and social system factors affected child care food handler’s self-commitment to perform safe food handling practices in South Carolina licensed center-based child care facilities. Results identified three factors, manager/coworker support, the ability to speak freely, and communication from managers to staff, had the highest correlations with self-commitment. However, speak freely and communication were the only factors with statistically significant effects on self-commitment. Conclusions and implications of the study are given.

Word Count: 4,747

Keywords: Child care; Food safety; Organizational culture, Social system
Introduction

In 2013, over 15.6 million children under the age of five were in licensed center-based child care facilities (i.e., commercial, church, and preschools) or home-based child care facilities in the United States (U.S. Census Bureau, 2013). A licensed center-based child care facility is defined as providing care and education to 13 or more children in a non-residence setting, operating more than four hours a day and more than two days a week (South Carolina Child Care, 2016). On average, children attending child care spend 33 hours per week in some type of child care setting (U.S. Census Bureau, 2013). Breakfast, lunch, and snacks are prepared and served at most child care facilities. Child care employees are often involved in food preparation, serving, and cleanup which makes the need for safe food handling practices throughout the flow of food is paramount (Todd, Greig, Bartleson, & Michaels, 2007).

Young children are considered a high risk population for foodborne illnesses (FBI) (Food and Drug Administration [FDA], 2009) because their immune systems are not fully developed, they have low body mass and reduced stomach acid production (Pew Health Group, 2014); as well as a lack of control over food handling practices (Center for Disease Control and Prevention, 2013). In 2010, the Center for Disease Control and Prevention (CDC), using population-based surveillance for laboratory-confirmed cases of infection, found that children ages four years and younger have 4.5 times the number of infection incidents transmitted through food than adults aged 20-49 years. Furthermore, children in licensed center-based child care facilities are 3.5 times more likely to contract FBIs in comparison to children cared for in their own home (Lu et al., 2004). Yet, this could be drastically higher as many small FBI outbreaks go unreported (Painter et al., 2013). The size of the facility also impacts the frequency of infectious disease occurring (Brady, 2005).
In the final phase of a ten-year study, the FDA observed within foodservice establishments a low level of compliance with food safety policies; the three highest non-compliance factors were time and temperature abuse, poor personal hygiene, and cross contamination (FDA, 2009). Yet, each of these non-compliance factors could be mitigated by improving employee safe food handling practices. However, research findings indicate that knowledge and training alone are not enough to improve safe food handling practices (Roberts et al., 2008; York et al., 2009). Food safety practices are influenced by more than just proper knowledge and attitudes; food safety practices are partly influenced by the prevailing cultural norms found within foodservice environments (Yiannas, 2015).

**Food Safety Culture**

Schein (1992) detailed organizational culture as “the pattern of basic assumptions that a given group has invented, discovered, or developed in learning to cope with its problems of external adaptation and internal integration which have 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 other problems” (p. 12). Within the last two decades there has been a shift in emphasis in safety literature, moving away from individual-level accident antecedent factors (e.g. error or non-compliance with safety procedures), and moving towards broader organizational factors (e.g. safety culture) (Zohar, 2010). “In safety culture the concept of organizational culture is taken and applied to one specific area of a business’ activities, i.e. the safety of people working within a business or people who could be adversely affected by its existence, products or services” (Griffith, Livesey, & Clayton, 2010a, p.429).

Food safety research has only recently started to examine food safety practices through the organizational lens. Yiannas (2009) identified food safety culture as a specific form of
organizational culture in which there are shared perceptions of food safety policies and procedures among members of an organization. Previously assessed food safety culture factors are identified in Table 4.1. In previous studies there are three major recurring factors of safety culture; management and coworker support, communication, and employees’ attitudes and behaviors.

Management and Coworker Support. Hofmann and Morgeson (1999) defined perceived organizational support as a measure of the level of support that employees perceive the organization has provided to them. Medeiros, Cavalli, and Proenca (2012) identified specific managerial and organizational behaviors including providing supervisory and peer support, adequate resources, training, and a positive management culture. Management effectiveness was a significant overall factor contributing to the prevention of FBI outbreaks (Griffith, 2010). Furthermore, the strength of a food safety culture was correlated with how important management perceives food safety to be (Griffith, 2010).

Communication. Communication was a necessity in any discussion of culture. Yiannas (2009) argues that the way in which food handling practice messages are presented was crucial. Griffith (2010) reported the need for food handlers to “know what they need to know.” It was essential for communication to occur to ensure food handlers have knowledge of food safety practices and how to use that knowledge. Knowledge of food safety/hygiene alone does not always translate into implementation of food safety practice, thus constant communication for new and tenured employees was needed (Griffith, 2010). Important to note was the significance of communicating to new employees who are learning the food safety culture (Griffith et al., 2010a).
Employees’ Attitudes and Behaviors. Griffith et al. (2010a) stated that food safety culture requires contributions from people at all levels. Two variables found to be significant in foodservice employees’ safe food handling practices were their attitude toward food safety and their level of perceived control (Clayton & Griffith, 2008). Cooper (2000) identified that different subcultures will emerge and form around different position levels in an organization. It has been shown that these subcultures may compete for priority within the organization. Griffith et al. (2010a) identified that a major barrier to food safety culture was a culture of saving money. The organizational environment has an influence on motivation and self-commitment to follow proper food safety practices (Yiannas, 2009).

Social System

The aspects of the social system important to food safety culture include work pressures and environmental support. “The actual behavior of individuals, their symbolically oriented actions, may be to a widely varying degree congruent with the meanings of the cultural system” (Parsons, 1972, p. 255). The organizational environment has an influence on motivation and self-commitment to follow proper food safety practices (Yiannas, 2009). Work pressure and stress has an impact on work performance, behavior, practices or behavioral norms (Griffith et al., 2010a).

Assessing Food Safety Culture and Social System

Griffith, Livesey, and Clayton (2010b) listed multiple reasons to assess food safety culture and social system: 1) to assess potential compliance with safety management systems to avoid error and food poisoning costs; 2) raise awareness of food safety; 3) benchmark for future comparisons; 4) make informed decisions about training; 5) promote commitment; and 6) identify weaknesses and evaluate risk. Assessing food safety culture will help foodservice organizations
understand food handler behaviors (Ungku Fatimah, Strohbehn, and Arendt, 2014b; Yiannas, 2009). Once an organization has identified which food safety factors positively influence employee’s self-commitment to following recommended food safety practices, modifications should be made that will align the current culture with the identified influential factors. No known research has been conducted in regards to food safety culture and social system within child care facilities. Thus, the purpose of this study was to investigate food handling employees’ perceptions of food safety culture and social system in licensed center-based child care facilities using a quantitative research approach. The specific research objectives for the study were:

1. Assess child care food handlers’ perceptions of food safety culture and social system factors.
2. Identify which food safety culture and social system factors affect child care food handling employee’s self-commitment to perform safe food handling practices.

Methods

Research Design

A quantitative approach, utilizing two separate paper-based questionnaires, was used to complete the study’s research objectives. A child care director questionnaire was used to collect child care facility organizational characteristics as well as food safety policies and training practices. A child care food handling employee questionnaire was used to collect perceptions of food safety culture factors and employee demographics. Once both types of surveys were collected, director survey data (for each facility) was entered into the corresponding facility employee survey data. Approval from the Human Subjects Review Board was obtained prior to data collection.
Sample

The target population for this study was South Carolina licensed center-based child care employees involved in food handling, as these employees handle food which the children consume. The setting for this study was South Carolina licensed center-based child care facilities including commercial, church, and preschools. Licensed center-based child care facilities provide care and education to 13 or more children in a non-residence setting, operating more than four hours a day and more than two days a week. All exempt (i.e. only operated less than 4 hours per day or on school holidays or no licensing or inspections required by law) facilities were eliminated as they are not required to be licensed or inspected by law. Additionally, home-based child care facilities were eliminated as this type of facility often only has one or two employees, thus assessing food safety culture would be difficult.

As one of the study objectives was to compare food safety culture based on operational characteristics (size of child care facility), a stratified random sampling technique was used for selecting the sample from a population estimated at 1,400 South Carolina licensed center-based child care facilities. Maximum child capacity was the characteristic used to divide the 1,400 South Carolina licensed center-based child care facilities into three separate strata: 1) small facilities (0-100 children); 2) medium facilities (101-200 children); and 3) large facilities (201+ children). From each of the three strata, 33 South Carolina licensed center-based child care facilities were randomly selected to participate in the current study (total facilities=99). Random selection was conducted by alphabetically listing all South Carolina licensed center-based child care facilities for each strata. Then starting at the fourth licensed center-based child care facilities listed, each fifth facility was selected until 33 facilitates per strata were obtained.
Each of the 99 facilities were sent a packet containing one director questionnaire and 10 employee questionnaires, therefore a total of 99 director questionnaires and 990 employee questionnaires were sent to licensed center-based child care facilities for completion.

**Research Instruments**

**Director.** Based on the review of literature of child care studies and food safety studies (Enke, Briley, Curtis, Greninger, & Staskel, 2007; Wohlgenant et al., 2014), the child care director questionnaire was developed. The director questionnaire consisted of 21 questions to evaluate child care facility demographics, and child care facility food safety policies and training practices. The child care facility demographics section contained 13 questions including: legal status (i.e. for profit, nonprofit); type of child care facility (i.e. independently owned or operated, chain/franchise); number of full-time and part-time foodservice employees; number of food handling employees; number of meals served (i.e. breakfast, lunch, dinner); type of meal service; program affiliation (i.e. Head Start, Child and Adult Care Food Program [CACFP], National Association for the Education of Young Children [NAEYC]); child maximum capacity; and current enrollment. The child care facility food safety practices section contained 8 questions pertaining to food safety policies (3 questions); food safety training (4 questions); and food purchasing (1 question).

**Employee.** The child care employee questionnaire consisted of two sections. The first section assessed child care food handlers’ perceptions of factors pertaining to the organizational culture of food safety in describing their current child care facilities. Respondents were asked to rate their level of agreement to each of the 31 statements which described their current work environment, using a seven-point Likert-type scale (1 = Strongly Disagree; 7 = Strongly Agree). The instrument was previously developed and validated in school and hospital foodservice
settings (Ungku Fatimah, Arendt, and Strohbehn, 2014a). The 31 statements consisted of 7 food safety culture factors including management and coworker support; speak freely; communication; self-commitment; environment support; work pressure; and risk judgment. The factors speak freely and communication were previously one factor, called communication. They factors were separated to better assess the nuances of communication that occurs in the child care setting. The following are descriptions of factors (Ungku Fatimah, et al., 2014a):

1) Management and coworkers support (10 statements) – This factor was related to managers and management roles in encouraging safe food handling practices and teamwork among coworkers.

2) Speak freely (2 statements) – This factor was related to management creating an environment in which employee’s feel comfortable discussing food safety.

3) Communication (4 statements) – This factor was related to communication between management and employees as well as communication among coworkers.

4) Self-commitment (5 statements) – All items in this factor reflected employees’ internal motivation to perform safe food handling.

5) Environment support (4 statements) – This factor represented measures on adequacy and quality of infrastructures that support safe food handling practices.

6) Work pressure (3 statements) – This factor described pressures in the workplace associated with time, work load and staff adequacy that affect safe food handling practices.

7) Risk judgment (3 statements) – This factor was associated with organization risk taking decisions when implementing and complying with food safety rules and regulations.
The second section consisted of 12 demographic questions to evaluate child care employee demographics. The employee demographics section contained 12 questions including: sex, age, years’ experience (4 questions), work status (2 questions), job title, and food safety training (3 questions).

**Data Collection**

Prior to data collection, experts in the area of food safety (n=3), child development (n=1), and survey design (n=1) reviewed the instruments. Minor modifications were made upon experts’ feedback to better assess the food safety culture in the child care setting. A pilot test was conducted with child care employees (n=9) at one child care facility to assess clarity of wording for both survey instruments.

Prior to survey distribution a gatekeeper sent an announcement email to all licensed center-based child care facility directors detailing the study purpose, to “be on the look-out”, and request participation. Additionally, a paper-based invitation letter was sent two weeks prior to survey distribution to each licensed center-based child care director selected for study participation to request participation in the study. A recruitment flier was also included, which detailed purpose and benefits of participating in the study as well as detailing process for completion and identifying a token of appreciation.

To reduce sampling error and increase participation rates a survey implementation plan was utilized (Dillman, Smyth, & Christian, 2014). In the first mailing a large packet, containing one director packet and ten employee packets, was sent to each licensed child care facility director. Child care directors then distributed the employee packets to child care employees fitting the following selection criteria: 1) participants must be a minimum of 18 years of age; and
2) participants must be involved in food handling (this could be food preparation and/or food service).

Follow-up contacts, spaced approximately one week apart for three weeks, were used to recruit participants (Dillman et al., 2014). A final telephone contact to child care directors was made to those child care facilities who had not yet responded. A five dollar electronic Target gift card was given to child care food handling employees after returning a completed questionnaire, as well as general study results were offered to child care directors who returned a completed questionnaire.

Statistical Analysis

Data were analyzed using SPSS (Version 23.0). Descriptive statistics including frequency, mean, and standard deviation were used to summarize the data. Negatively worded items were reverse coded. Reliability of the instrument was determined by measuring the internal consistency of each factor using the Cronbach’s alpha. Alpha coefficients for each factor ranged from 0.713 to 0.892, all were above the 0.70 threshold for standard of reliability as suggested by Nunnally (1978). A bivariate correlation analysis was conducted to assess the relationship between each food safety culture factor (independent variables) and employee self-commitment (dependent variable) to following food safety practices. Furthermore, regression analysis was used to examine which food safety culture factors impact self-commitment to following food safety practices. Self-commitment was the dependent variable. Independent variables were the food safety culture factors. The 0.05 level of significance was used for analysis.
Results

Of the 990 employee questionnaires sent, 287 were returned, with 271 being usable, resulting in a response rate of 27.4%. Of the 99 child care directors contacted, 71 completed the director questionnaire, for a director response rate of 71.1%. All child care facilities where the director completed the questionnaire at least one employee also completed a questionnaire. Employee questionnaires returned and usable ranged between one and 10 per facility.

Employee and operational characteristics

Child care food handling employee respondents (n=271) characteristics are shown in Table 4.2. The majority of respondents were female (97.8%) and between the ages of 18 and 29 (76.8%). Over half had between 1-4 years’ food handling experience in child care facilities. Respondents (77.1%) reported working in their current facility for less than 5, years and the majority (65.3%) stated having less than one year of foodservice experience. Only 5.5% reported working part-time. Respondents identified their job title as cook (6.6%), teacher (63.5%), assistant teacher (28.8%), and aide (1.1%). The majority (83.8%) reported receiving food safety training, yet only 8.1% reported a food safety certificate. Hours of training per year were identified as: none (16.6%), only periodic on-the-job (58.7%), less than 1 hour (17%), 1-2 hours (6.6%), and 3-5 hours (1.1%).

Of the 71 participating facilities (table 4.3), 97% of directors reported having food safety policies, yet only 74.5% reported having written food safety policies. Majority of directors (83.8%) reported receiving food safety training, with 70.8% also receiving food safety certification. Directors reported conducting food safety training on cross contamination (46.9%), cleaning and sanitizing (85.2%), temperature danger zone (53.5%), handwashing (77.1%), glove use (62%), allergens (35.1%), and proper food storage practices (9.2%). Over two-thirds of
facilities were considered for profit (79.7%), and reported being independently owned/operated (64.9%). The majority of facilities had less than 2 full-time foodservice employees (77.9%), and less than 2 part-time foodservice employees (95.6%). However, 28.2% of facilities did not have a designated foodservice employee. Although, 68% had over 11 food handling employees. Nearly all facilities reported serving morning snack, lunch, and afternoon snack. Facilities predominantly used family-style (82.2%) or pre-plated in kitchen (17%) meal service.

Respondents worked in CACFP (50.5%), Head Start (12.9%), and NAEYC (4.4%) affiliated facilities, with some employees working in facilities that had several affiliations.

**Food Safety culture factors**

All statements per food safety culture factor were computed to identify each food safety culture factors overall mean scores. Each factor had an overall mean score above 5.0 (1= Strongly Disagree; 7=Strongly Agree) and Cronbach’s alpha scores above 0.80 (see Table 4.4).

**Correlation results**

The results of the bivariate correlation analysis showed that management/coworkers support, the ability to speak freely, and communication from managers to staff have moderate positive correlations with self-commitment (see, Table 4.5). As the aim of this study was to assess the relationship between food safety factors and self-commitment, further analyses of other correlating factors were not conducted, analyses of these factors will be reported in a forthcoming manuscript.

**Regression estimation**

The regression estimation failed due to (multi)collinearity. This problem was revealed by the variable environmental support having a negative estimate on self-commitment. To eliminate this problem, the factors environmental support and work pressures were combined
into a single factor, entitles social system. This newly combined factor reflects the nature of the social system (i.e., quantity and quality of supplies and equipment, time to get work completed, and number of staff). The Cronbach’s alpha score for this new factor was 0.843.

**Food safety culture and social system factors effect on self-commitment**

Upon further analysis the overall regression was significant. The analysis of variance was able to predict values of the outcome variable, $F=27.541, p=0.000$, and adjusted $R^2 = 0.330$. As the analysis of variance demonstrated significance, coefficients for the regression model were computed and presented in Table 4.6. The finding illustrates that two factors, speak freely ($t=2.783, p=0.006$) and communication ($t=4.796, p=0.000$) had significant effect on self-commitment to perform proper food safety practices.

**Discussion**

The purpose of this study was to assess food safety culture factors effect on child care food handlers’ self-commitment to perform safe food handling practices. Results showed that management/coworkers support, the ability to speak freely, and communication from managers to staff had the highest correlations with employees’ self-commitment to following proper food safety practices. Researchers have previously shown “The manager plays a key role in the food safety culture by establishing policies and standards, expecting accountability, serving as a role model, controlling rewards and punishment, providing training, and providing needed resources to follow food safety practices,” (Arendt, Paez, & Strohbehn, 2013, p. 126).

Regression analysis showed that the two variables related to communication (speak freely and communication) are the only two variables with statistically significant effects on self-commitment. The factor speak freely pertained to food handling employees ability to openly
about food safety and give suggestions to improve food safety practices. For example, the need to establish an environment in which child care food handlers feel comfortable discussing food safety issues with coworkers and the director. Griffith (2006) detailed the need for active engagement on many fronts, including two-way communication between management and employees about food safety practices.

The factor *communication* pertained to the way management (i.e. director) communicates to employees about food safety information. For example, ensuring that all necessary food safety information is given to employees as well as in a timely manner. This factor also relates to directors giving appropriate instruction and well as constancy of food safety information given. Therefore, the need for proper communication from child care directors not just on the “how” but also the “why” child care food handlers should follow proper food safety practices is important. Previous research identified that effective management communication was a significant overall factor contributing to the prevention of foodborne illness outbreaks (Griffith, 2010).

The influence of the director on food safety practices is important through their support in encouraging safe food handling practices and consistent communication about proper food safety practices. A cost effective approach to ensuring consistent food safety communication is through written food safety policies. Researchers have examined hygiene and sanitation practices in child care facilities (n=51), with results showing less than half of facilities examined had written food safety policies (Wohlgenant et al., 2014). With written food safety policies consistent information is possible. Additionally, Rajagopal, Arendt, Shaw, Strohbehn, and Sauer (2016) developed and observed the use of minimal-text educational food safety posters in foodservice operations, findings identified the use of the posters had a positive impacts on both microbial levels and food safety behaviors. This would suggest that the use of posters may be a good tool
for increasing communication about food safety. Previous microbial analysis of child care facilities with and without written food safety policies showed the lack of written procedures for food preparation and service areas to be a potential reason for high-microbial contamination.

Findings showed the need for written policies as well as ongoing training to ensure these policies are being followed (Li et al., 2014). Food safety policies must be documented and clearly defined for new and current employees to fully understand what proper food safety practices are and why they must be followed (Yiannas, 2009). Yet, sometimes management (director) “actions speak louder than words.” Directors must also remember that “leading by example” is a non-verbal form of communication. Directors can communicate proper food safety practices by performing these practices properly themselves.

Respondents were predominantly woman between the ages of 18 and 29 with less than five years child care experience. Taylor, Adams, and Ellis (2008) identified that inexperienced child care employees need further communication and assistance from more vested employees to assist in decision-making for controlling enteric illness in the child care settings. Therefore, directors should be mindful that these less experience employees may need additional attention and communication than more tenured employees.

The majority of child care food handlers reported being teachers or assistant teachers. It is important to note that child care food handling employees have many responsibilities in addition to handling food safely, primarily caring for the children and ensuring their safety. Thus, food safety practices are likely not the principal responsibility. During meal service food handling employees often have many responsibilities including serving children, educating on proper feeding cues, and encouraging appropriate eating habits (Ramsay, et al., 2010). The American Academy of Pediatrics recommends director communicate to employees the
importance of prevention of foodborne illness contamination during food preparation and family-style meal service (Aronson & Shope, 2013).

Additionally, directors reported 28.2% of participating facilities did not have a designated foodservice employee (i.e., cook). Thus, many facilities require child care food handlers (teachers and assistant teachers) to have several jobs, such as preparing food and caring for children in the same day. This situation is distinctly different than commercial foodservice establishments (i.e., restaurants), in which the foodservice employees are primarily responsible for preparing the food and not serving and cleaning. Understanding this directors should make efforts to continuously encourage food handling employees to follow safe food handling practices and communicate consistently regarding food safety practices as well as create an atmosphere where staff feel comfortable in speaking freely.

**Conclusions and Applications**

This study assessed food safety culture factors in licensed center-based child care facilities affecting food handling employees’ self-commitment. Findings showed factors related to employees ability to speak freely about food safety practices and communication from directors to employees had an effect on employees’ self-commitment to follow food safety practices. Therefore, directors should reevaluate their level of engagement about food safety practices with their food handling employees and remain consistent on food safety information communicated. Directors need to ensure employee perceive an open line of communication between employees and management. Increased communication about food safety practices has to start at the management level. Yiannas (2009) stated only management can truly influence, strengthen, or change safety culture; “they’re the leaders.”
Child care directors should review these finds to help develop interventions aimed at increasing communication from all employees in child care facilities. For example, food safety signage that communicates important food safety topics can be placed in strategic positions. Hedin, Petersson, Cars, Beckman, and Hakansson (2006) showed through the use of food safety related posters in child care facilities communication between parents and teachers increased and food safety prevention knowledge increased. Using signage could be an inexpensive and effective way to create discussions about food safety and help to facilitate speech about food safety issues that food handling employees may have.

Another intervention approach to increase food safety communication could be having a brief meeting each day during nap hours with each room to discuss food safety topics. This time could also be used to encourage employees to speak freely about food safety concerns or areas for improvement. In turn this will potentially increase their self-commitment to perform food safety practices.

Additionally, directors should develop written food safety policies, this will help directors ensure consistent food safety information is being distributed to all employees. It is important to note, that developing food safety policies is one form of communication that may increase employees’ self-commitment and does not incur any cost to the facility. With directors communicating proper food safety practices along with coworker support and a culture of encouragement pertaining to openly speaking about food safety issues and potential improvements, employee self-commitment to following safe food handling practices can potentially be improved.

This study has some limitations. First, the sample population was contained to South Carolina and generalization of results to other states should be done with caution as regulations
are different from state-to-state. Additionally, only center-based facilities were included in this study, therefore generalizations to other types of child care setting (i.e. home based) cannot be inferred. Combining the factors environmental support and work pressure due to (multi)collinearity during regression analysis hindered the ability to interpret the nuances of these factors independently. Finally, the use of a quantitative survey based design only gathered the food safety culture and social system for one moment in time and results are not able to identify the prevailing food safety culture and social system over time. Therefore, future studies could use a qualitative approach and collect observations and interviews to further explain results of this study. Other research in the child care setting could assess barriers and key motivators to following food safety practices, as identification of these could help directors to improve overall food safety.

References


Table 4.1: Previously assessed food safety culture factors

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<th>Authors</th>
<th>Factors of food safety culture</th>
<th>Area adapted/Assessment instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ball, Wilcock, and Colwell (2010)</td>
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<td>Food safety culture questionnaire</td>
</tr>
<tr>
<td>Cooper (2000)</td>
<td>Subjective internal psychological; and food safety behaviors, situational and environmental</td>
<td>Food safety culture questionnaire, observations, audits</td>
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<td>De Boeck, Jacxsens, Bollaerts, and Vlerick, (2015)</td>
<td>Leadership, communication, commitment, resources and risk awareness</td>
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<tr>
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<td>Jespersen, Griffiths, Maclaurin, Chapman, and Wallace (2016)</td>
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<td>Neal, Binkley, &amp; Henroid (2012)</td>
<td>Management commitment; and worker food safety behavior</td>
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<td>Nyarugwe, Linnemann, Jan Hofstede, Fogliano, and Luning (2016)</td>
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<td>Food safety culture</td>
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<td>Thogaru (2015)</td>
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<td>Food safety culture questionnaire, audits</td>
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Table 4.3: Child care facilities’ organizational characteristics (n=271)

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*aMultiple responses provided*
Table 4.3: (Continued)

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</tr>
<tr>
<td>Fewer than 25</td>
<td>4</td>
<td>1.5</td>
</tr>
<tr>
<td>26-50</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>51-100</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>101-150</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>151-200</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>More than 200</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Don’t serve dinner</td>
<td>271</td>
<td>98.5</td>
</tr>
<tr>
<td><strong>Type of meal service</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family-style</td>
<td>223</td>
<td>82.2</td>
</tr>
<tr>
<td>Pre-plated in kitchen</td>
<td>46</td>
<td>17.0</td>
</tr>
<tr>
<td>Lunch box</td>
<td>2</td>
<td>0.7</td>
</tr>
<tr>
<td><strong>Program affiliations</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Head Start</td>
<td>35</td>
<td>12.9</td>
</tr>
<tr>
<td>CACFP</td>
<td>115</td>
<td>42.4</td>
</tr>
<tr>
<td>NAEYC</td>
<td>12</td>
<td>4.4</td>
</tr>
<tr>
<td>None</td>
<td>109</td>
<td>40.2</td>
</tr>
</tbody>
</table>
Table 4.3: (Continued)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Child maximum capacity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-100</td>
<td>61</td>
<td>22.5</td>
</tr>
<tr>
<td>101-200</td>
<td>130</td>
<td>48.0</td>
</tr>
<tr>
<td>More than 200</td>
<td>80</td>
<td>29.5</td>
</tr>
<tr>
<td><strong>Current child enrollment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-100</td>
<td>98</td>
<td>36.2</td>
</tr>
<tr>
<td>101-200</td>
<td>134</td>
<td>49.4</td>
</tr>
<tr>
<td>More than 200</td>
<td>39</td>
<td>14.4</td>
</tr>
</tbody>
</table>
Table 4.4: Employee’s mean agreement scores for food safety culture factors \((n=271)\)

<table>
<thead>
<tr>
<th>Factor and item</th>
<th>Mean(^{a}) ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factor 1: Management and coworker support ((\alpha = 0.891))</strong></td>
<td></td>
</tr>
<tr>
<td>There is good cooperation among employees to ensure that children receive safely prepared food.</td>
<td>5.89 ± 1.33</td>
</tr>
<tr>
<td>When lots of food preparation and service work needs to be done quickly, employees work together as a team to get the tasks completed safely.</td>
<td>5.82 ± 1.47</td>
</tr>
<tr>
<td>My coworkers are supportive of each other regarding food safety.</td>
<td>5.75 ± 1.50</td>
</tr>
<tr>
<td>Employees remind each other about following food safety practices.</td>
<td>5.68 ± 1.65</td>
</tr>
<tr>
<td>New employees and experienced employees work together to ensure food safety practices are in place.</td>
<td>5.66 ± 1.61</td>
</tr>
<tr>
<td>Employees are disciplined or reprimanded when they fail to follow food safety practices.</td>
<td>5.59 ± 1.70</td>
</tr>
<tr>
<td>My supervisor watches to see if employees are practicing safe food handling.</td>
<td>5.51 ± 1.72</td>
</tr>
<tr>
<td>Supervisor(s) enforce food safety rules consistently with all employees.</td>
<td>5.43 ± 1.91</td>
</tr>
<tr>
<td>My supervisor inspires me to follow safe food handling practices.</td>
<td>5.34 ± 1.98</td>
</tr>
<tr>
<td>My supervisor is actively involved in making sure safe food handling is practiced.</td>
<td>5.28 ± 1.90</td>
</tr>
<tr>
<td><strong>Factor 2: Speak freely ((\alpha = 0.713))</strong></td>
<td>5.72 ± 1.60(^{b})</td>
</tr>
<tr>
<td>I can freely speak up if I see something that may affect food safety.</td>
<td>5.72 ± 1.62</td>
</tr>
<tr>
<td>I am encouraged to provide suggestions for improving food safety practices.</td>
<td>5.71 ± 1.57</td>
</tr>
<tr>
<td><strong>Factor 3: Communication ((\alpha = 0.845))</strong></td>
<td>5.31 ± 1.89(^{b})</td>
</tr>
<tr>
<td>All of the necessary information for handling food safely is readily available to me.</td>
<td>5.48 ± 1.80</td>
</tr>
<tr>
<td>My supervisor generally gives appropriate instructions on safe food handling.</td>
<td>5.46 ± 1.79</td>
</tr>
<tr>
<td>My supervisor provides adequate and timely information about current food safety rules and regulations.</td>
<td>5.28 ± 1.92</td>
</tr>
<tr>
<td>All supervisors give consistent information about food safety.</td>
<td>5.02 ± 2.05</td>
</tr>
<tr>
<td><strong>Factor 4: Self-commitment ((\alpha = 0.838))</strong></td>
<td>6.02 ± 1.03(^{b})</td>
</tr>
<tr>
<td>I am committed to following all food safety rules.</td>
<td>6.10 ± 1.20</td>
</tr>
<tr>
<td>I keep my work area clean because I do not like clutter.</td>
<td>6.08 ± 1.28</td>
</tr>
<tr>
<td>I follow food safety rules because it is my responsibility to do so.</td>
<td>6.08 ± 1.25</td>
</tr>
<tr>
<td>I follow food safety rules because I think they are important.</td>
<td>5.96 ± 1.38</td>
</tr>
<tr>
<td>Food safety is a high priority to me.</td>
<td>5.88 ± 1.50</td>
</tr>
</tbody>
</table>

\(^{a}\)7-point Likert scale used (1 = Strongly Disagree; 7 = Strongly Agree)

\(^{b}\)Overall factor mean

\(^{c}\)Items were reverse coded
Table 4.4: (Continued)

<table>
<thead>
<tr>
<th>Factor and item</th>
<th>Mean&lt;sup&gt;a&lt;/sup&gt; ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factor 5: Environment support (α = 0.869)</strong></td>
<td>5.55 ± 1.39&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>I am provided with quality supplies (e.g. gloves, serving utensils) that make it easy for me to follow safe food handling practices.</td>
<td>5.61 ± 1.76</td>
</tr>
<tr>
<td>Facilities are of adequate quality to follow safe food handling practices.</td>
<td>5.60 ± 1.59</td>
</tr>
<tr>
<td>Equipment items needed to prepare/serve food safely (e.g. handwashing sinks) are readily available and accessible.</td>
<td>5.53 ± 1.62</td>
</tr>
<tr>
<td>Adequate supplies are readily available to perform safe food handling practices.</td>
<td>5.47 ± 1.60</td>
</tr>
<tr>
<td><strong>Factor 6: Work pressure (α = 0.845)</strong></td>
<td>5.56 ± 1.48&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>My work load does not interfere with my ability to follow safe food handling practices.</td>
<td>5.57 ± 1.71</td>
</tr>
<tr>
<td>The number of staff scheduled at each shift is adequate for me to get my work done and handle food safely.</td>
<td>5.57 ± 1.67</td>
</tr>
<tr>
<td>I always have enough time to follow safe food handling procedures, even during rush hours.</td>
<td>5.56 ± 1.71</td>
</tr>
<tr>
<td><strong>Factor 7: Risk judgement (α = 0.892)</strong></td>
<td>5.15 ± 1.87&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>I am sometimes asked to cut corners with food safety so we can save costs when preparing food.</td>
<td>5.30 ± 2.07</td>
</tr>
<tr>
<td>When there is pressure to finish food production/service, supervisors sometimes tell us to work faster by taking shortcuts with food safety.</td>
<td>5.20 ± 1.98</td>
</tr>
<tr>
<td>I believe that written food safety policies and procedures are nothing more than a cover-up in case there is a lawsuit.</td>
<td>4.96 ± 2.13</td>
</tr>
</tbody>
</table>
Table 4.5: Food safety culture and social system factors correlation (n=271)

<table>
<thead>
<tr>
<th>Food safety culture factor</th>
<th>Self-commitment</th>
<th>Management/colleague support</th>
<th>Speak freely</th>
<th>Communication</th>
<th>Environmental Support</th>
<th>Work pressures</th>
<th>Risk judgement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-commitment</td>
<td>1</td>
<td>0.447**</td>
<td>0.493**</td>
<td>0.493**</td>
<td>0.155**</td>
<td>0.353**</td>
<td>0.220**</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Management/colleague support</td>
<td>0.447**</td>
<td>1</td>
<td>0.598**</td>
<td>0.631**</td>
<td>0.260**</td>
<td>0.498**</td>
<td>0.347**</td>
</tr>
<tr>
<td>Correlation</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>0.493**</td>
<td>0.598**</td>
<td>1</td>
<td>0.647**</td>
<td>0.258**</td>
<td>0.456**</td>
<td>0.251**</td>
</tr>
<tr>
<td>Speak Freely</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Correlation</td>
<td>0.550**</td>
<td>0.631**</td>
<td>0.647**</td>
<td>1</td>
<td>0.218**</td>
<td>0.449**</td>
<td>0.345**</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Environmental support</td>
<td>0.155*</td>
<td>0.260**</td>
<td>0.258**</td>
<td>0.218**</td>
<td>1</td>
<td>0.389**</td>
<td>0.082</td>
</tr>
<tr>
<td>Correlation</td>
<td>0.011</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.177</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>0.353**</td>
<td>0.498**</td>
<td>0.456**</td>
<td>0.449**</td>
<td>0.389**</td>
<td>1</td>
<td>0.268**</td>
</tr>
<tr>
<td>Work pressure</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Correlation</td>
<td>0.220**</td>
<td>0.347**</td>
<td>0.251**</td>
<td>0.345</td>
<td>0.082</td>
<td>0.268**</td>
<td>1</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.177</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

** Correlation is significant at 0.01 level (2-tailed)
* Correlation is significant at 0.05 level (2-tailed)
Table 4.6: Food safety culture and social system regression analysis (n=271)

<table>
<thead>
<tr>
<th>Factor</th>
<th>(\beta)</th>
<th>(t)</th>
<th>(p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management/coworkers support</td>
<td>0.089</td>
<td>1.266</td>
<td>0.207</td>
</tr>
<tr>
<td>Speak freely</td>
<td>0.195</td>
<td>2.783</td>
<td>0.006*</td>
</tr>
<tr>
<td>Communication</td>
<td>0.348</td>
<td>4.796</td>
<td>0.000*</td>
</tr>
<tr>
<td>Social system</td>
<td>0.040</td>
<td>0.688</td>
<td>0.492</td>
</tr>
<tr>
<td>Risk judgement</td>
<td>0.012</td>
<td>0.216</td>
<td>0.829</td>
</tr>
</tbody>
</table>

*Dependent Variable: Self-Commitment
*p<0.05
CHAPTER 5. CHILD CARE FOOD HANDLING EMPLOYEES’ PERCEIVED BARRIERS AND MOTIVATORS TO FOLLOW FOOD SAFETY PRACTICES

A manuscript to be submitted to The Journal of Child Nutrition & Management

Joel Reynolds and Lakshman Rajagopal

Both authors were involved in all the research stages including: study design, data collection & analysis, and manuscript development.

Abstract

Purpose/Objectives: The purpose of this study was to identify child care food handling employees’ perceived barriers and motivators to following recommended food safety practices.

The specific research objectives for the study were to:

1. Identify important barriers and motivators to following food safety practices in child care facilities.

2. Compare child care food handling employees’ perceptions on barriers and motivators to following food safety practices in child care facilities based on demographic and operational characteristics.

Methods: A paper-based questionnaire was sent to ninety-nine licensed center-based child care facilities in the state of South Carolina. Descriptive statistics were used to profile the sample. t-tests and ANOVA were conducted to assess relationships between dependent variables (barriers and motivators) and predictor variables (employee and operational characteristics).

Results: A total of 71 director questionnaires were completed and returned or were completed over the phone. Of the 287 returned employee questionnaires, 278 were usable resulting in a response rate of 28.1%. Six important barriers and 14 key motivators to following recommended food safety practices. Important barriers pertained to too much work to do; the work pace; too
busy; lack of time; being afraid of coworkers reaction; and don’t think I need to follow food safety practices. Key motivators were focused on children’s safety, available supplies, communication, and food safety training/information. Employee and facility characteristics were shown to influence perceived importance of barriers and motivators to following food safety practices.

Applications to Child Nutrition Professionals: Child care directors should review scheduling, teacher-child ratios, job duties, and work loads of employees as the majority of identified barriers focused on “work pace” and “time restraints.” Future training should incorporate identified important motivators, while attempting to mitigate barriers.

Word Count: 4,396

Keywords: Child care; Food safety; Barriers; Motivators
Introduction

The Center for Disease Control and Prevention (CDC) estimates that each year, 48 million Americans become ill due to foodborne illnesses (FBIs). Of those 48 million people, 128,000 Americans are hospitalized and 3,000 die from FBIs (Scallan, Griffin, Angulo, Tauxe, & Hoekstra, 2011a; Scallan et al., 2011b). Research on reported FBI outbreaks has shown that children under the age of five are disproportionately affected by FBI than other groups (Scallan et al., 2011b) partly because children’s immune systems are not fully developed and children also have low body mass and reduced stomach acid production (Pew Health Group, 2014). Additionally, children have a lack of control over food handling practices (CDC, 2013).

Children enrolled in child care facilities are 3.5 times more likely to contract FBIs in comparison to children cared for in their own home (Lu et al., 2004). The American Academy of Pediatrics (AAP) notes the close proximity of children in child care facilities and their natural curiosity to touch a wide range of objects and surfaces heightens their risk of acquiring infections (Aronson & Shope, 2013). It has been estimated that acute gastrointestinal illnesses associated with child care facilities cost over $2.3 billion in healthcare costs, annually (Snowdon, Buzby, Roberts, Cliver, & Riemann, 2002).

According to the 2013 U.S. Census, over 15.6 million children under the age of five are enrolled in licensed center-based child care facilities (i.e., commercial, church, and preschools) or home-based child care facilities in the United States (U.S. Census Bureau, 2013). On average, children spend 33 hours per week in some type of child care facility (U.S. Census Bureau, 2013). Many child care facilities provide breakfast, lunch, and snacks. Some facilities have designated foodservice employees, while others utilize teachers or parents to supply or prepare food. Unlike restaurant foodservice workers, child care employees face other challenges such as diaper-
changing, toilet training, and the handling of food brought from home (Aronson & Shope, 2013). Each of these challenges can lead to unsafe food handling practices resulting from poor personal hygiene, time-temperature abuse, improper cleaning and/or sanitizing, cross-contamination, and other possible factors.

Wohlgenant et al. (2014) examined hygiene and sanitation practices of child care employees during food preparation and service. Results showed the highest out-of-compliance practices were: food handlers wearing effective hair restraints, food handlers wearing gloves, sanitizer test kit available for facilities that wash dishes by hand, and availability of a food thermometer. Staskel, Briley, and Curtis (2007) also observed child care cooks (n=35) to be out of compliance with food safety practices including the lack of thermometer use and lack of proper handwashing. Microbial analysis showed child care facilities without a written food preparation policy had significantly higher aerobic plate counts on all surfaces (e.g., faucet and refrigerator handles, toys, diaper changing areas, and eating tables) (Li et al., 2014).

Additionally, Kotch et al. (2007) identified that proper equipment in diapering, handwashing, and food preparation areas designed to reduce the spread of infection had a significant effect on reducing diarrheal illness among the children.

Research has shown that employees would be more likely to perform safe food handling practices if fewer barriers existed (Howells et al., 2008). Previous research has identified barriers to following safe food handling practices in foodservice establishments as lack of motivation (Arendt, Paez, & Strohbehn, 2013; Arendt et al., 2014; York et al., 2009), time limitations (Brannon, York, Roberts, Shanklin, & Howells, 2009), lack of knowledge (Meysenburg, Albrecht, Litchfield, & Ritter-Gooder, 2014), and lack of resources (Howells et al., 2008; Webb & Morancie, 2015). Additionally, Sneed and Strohbehn (2008) identified the ever-changing
demographic profile of foodservice employees as a major challenge to safe food handling practices. However, little research has identified barriers and motivators to following recommended food handling practices in the child care setting. Enke, Briley, Curtis, Greninger, and Staskel (2007) identified child care barriers to increased food safety practices were shown as a lack of resources and a lack of knowledge.

Training and increased knowledge alone cannot address all previously identified barriers. Therefore, child care directors must understand what their employees perceive as barriers and motivators to following recommended food safety practices. Once identified, directors can reduce barriers and develop strategies focused on identified motivators. The specific research objectives for the study were to:

1. Identify important barriers and motivators to following food safety practices in child care facilities.
2. Compare child care food handling employees’ perceptions on barriers and motivators to following food safety practices in child care facilities based on their demographic and operational characteristics.

**Methodology**

Two paper-based questionnaires, one for child care directors and one for child care food handling employees, were utilized. The child care director questionnaire collected facility demographics, while the child care food handling employee questionnaire identified important barriers and motivators to following recommended food safety practices as well as employee demographics. Once both types of questionnaires were collected, the director questionnaire data for each facility was entered into the corresponding facility employee questionnaire data. Prior to the start of the study, IRB approval was obtained.
**Instrument(s)**

**Director.** The director questionnaire consisted of 21 questions to evaluate “child care facility demographics,” and “child care facility food safety practices.” The child care facility demographics section contained 13 questions.

**Employee.** The first section consisted of two root questions previously developed and validated (Strohbehn et al., 2014) to assess child care food handlers' perceived level of importance of “barriers” and “motivators” to following recommended food safety practices in their current child care facility. Child care food handlers were asked to rate the level of importance with each of 15 barrier statements and 26 motivator statements using a five-point Likert-type scale (1 = Not Important; 5 = Very Important). The second section consisted of 12 demographic questions.

**Sample**

The population targeted for this study was licensed center-based (i.e. commercial, church, and preschools) child care employees in South Carolina involved in food handling. All of these employees handle food which children consume through either preparing or serving the food. As one of the study objectives was to compare barriers and motivators to following recommended food safety practices based on operational characteristics (size of child care facility), a stratified random sampling technique was used for selecting the sample. Maximum child capacity was the characteristic used to stratify the 1,400 South Carolina licensed center-based child care facilities into three separate strata: 1) small facilities (1-100 children); 2) medium facilities (101-200 children); and 3) large facilities (201+ children). From each of the three strata, 33 facilities were randomly selected to participate in the current study, totaling 99 facilities. This approach was utilized to ensure the sample represented the South Carolina child care facility population.
Data Collection

Pilot Test. Prior to pilot testing, the questionnaire was reviewed by experts in the area of food safety (n=3), child development (n=1), and survey design (n=1). Minor changes were made to more accurately assess barriers and motivators to following food safety practices in the child care setting. The pilot test was conducted at one child care facility. A total of nine completed questionnaires were returned; a director questionnaire (n=1) and employee questionnaires (n=8). Minor clarification changes were made after reviewing pilot test feedback.

For the main study, a paper-based invitation letter was sent prior to questionnaire distribution to each selected child care facility director. To reduce sampling error and increase participation rates, a tailored design method recommended by Dillman, Smyth, and Christian (2014) was utilized. Each of the 99 facilities received a packet containing one director questionnaire and ten employee questionnaires. Child care directors then distributed the packets to child care employees fitting the following selection criteria: 1) participants must be a minimum of 18 years of age; and 2) participants must be involved in food handling (food preparation and/or food service). Each questionnaire contained a prepaid addressed return envelope.

Follow-up contacts, spaced approximately one week apart for three weeks, were used to recruit participants (Dillman, et al., 2014). A final telephone contact to child care directors was made to those child care facilities who had not yet responded. A five dollar electronic Target gift card was given to child care food handling employees after returning a completed questionnaire, as well as general study results were offered to child care directors who returned a completed questionnaire.
Data Analyses

Data was analyzed using SPSS (Version 23.0). Descriptive statistics including mean, standard deviation, frequency, and percentage were used to summarize the data. Negatively worded items were reverse coded. Independent \( t \)-tests and analysis of variance (ANOVA) were conducted to assess the relationships between the dependent variables (barriers and motivators) and predictor variables (employee and operational characteristics). A parametric \( F \)-test was conducted when homogeneity existed between groups; for unequal variances between groups, the Welch test was run. Post-hoc tests including: Scheffe, Tukey, and Games-Howell were conducted to determine within group differences.

Results

A total of 71 director questionnaires were completed either by returning the questionnaire or by completing the questionnaire over the phone. Of the 287 returned employee questionnaires, 278 were usable. A response rate of 28.1% was achieved. All child care facilities of which the director completed the questionnaire (n=71) also submitted at least one employee questionnaire. Returned and useable employee questionnaires ranged between one and ten per facility.

Descriptive statistics of the 278 employee respondents are shown in Table 5.1. An overwhelming majority of respondents were female (97.5%) between the ages of 18-29 years old (76.3%). Over half of respondents reported having between one and four years of experience in the child care setting (51.8%). Nearly two-thirds of employees reported less than one year of experience in foodservice (64.7%). Child care food handling employees stated they currently work full-time (94.6%), which is between 31-40 hours per week. Respondents held positions as cooks, teachers, assistant teachers, and aides, 6.8%, 63.3%, 28.8%, and 1.1%, respectively. Nearly all child care food handling employees reported receiving food safety training (83.8%),
with the majority (58.6%) reporting only period on-the-job training. However, 91.4% of respondents reported not receiving a food safety certification.

Organizational characteristics (see Table 5.2) showed the majority of facilities were considered for profit (79.9%) and independently owned/operated (64.7%). Facilities served breakfast (40.4%), morning snack (91.0%), lunch (99.3%), afternoon snack (98.2%), and dinner (1.4%), with family-style meal service being utilized most often (82.4%). Directors indicated most facilities had zero (39.6%) or only one (37.8%) full-time foodservice employee as well as zero (62.2%) or one (33.1%) part-time foodservice employee. Directors reported having program affiliations with Head Start (12.9%), Child and Adult Care Food Program (CACFP) (49.6%), and National Association for the Education of Young Children (NAEYC) (4.3%). Child enrollment per facility was predominantly medium-sized (101-200) (49.6%), followed by small (1-100) (36%), and large (>200) (14.4%). Directors (97.1%) reported their facilities as having food safety policies, though only 75.2% had written food safety policies. Almost all directors (90.3%) reported offering food safety training to their employees including: cleaning and sanitizing (86%), temperature danger zone (55%), handwashing (76.6%), glove use (63.3%), allergens (35.3%), and proper food storage practices (9.4%).

**Perceived barriers to following food safety practices**

Of the 15 barriers assessed, 6 were perceived as important (with mean score of 4.0 or higher on the 5.0 scale) in preventing child care food handlers from preparing and/or serving food safety (see Table 5.3). Important barriers include: “too much work to do” (4.31 ± 1.11), “the work pace” (4.21 ± 1.29), “Too busy” (4.21 ± 1.25), “lack of time” (4.10 ± 1.16), “afraid of co-workers’ reaction” (4.05 ± 1.30), and “don’t think I need to follow safe handling practices”
Child care food handlers’ perceived “lack of good habits” (1.87 ± 1.42) as the least important barrier.

**Perceived motivators to following food safety practices**

A total of 14 of the 26 motivators investigated were perceived by child care food handlers as important (with mean score of 4.0 or higher on the 5.0 scale), as illustrated in Table 5.4. These key motivators were: “keeping children safe from food-related diseases” (4.91 ± 0.54), “not harming the children” (4.84 ± 0.66), “being taught about food safety” (4.61 ± 0.99), “training on safe food handling” (4.58 ± 0.99), “a workplace that does not tolerate unsafe handling behaviors” (4.44 ± 1.12), “information about food safety” (4.22 ± 1.29), “having gloves available” (4.17 ± 1.27), “equipment that works” (4.15 ± 1.23), “a workplace that has policies and procedures on food safety” (4.14 ± 1.29), “the skills to handle food safely” (4.13 ± 1.37), “enough towels and hand soap for washing hands” (4.13 ± 1.32), “a supervisor to explain what is expected of me” (4.12 ± 1.36), “feeling like I did a good job” (4.04 ± 1.38), and “a workplace that rewards those who follow the rules” (4.01 ± 1.35). The three least important motivators perceived by child care food handlers were “no rules about handling food safely” (1.84 ± 1.37), “a health inspector who doesn’t make me handle food safely” (1.78 ± 1.34), and “an unsupportive work group” (1.75 ± 1.24).

**Barriers and motivators assessed by demographics**

Further analysis on barriers and motivators identified as important (with mean score of 4.0 or higher on the 5.0 scale) was conducted assessing employee and operational characteristics. Statistically significant results were found between perceived important barriers and demographics characteristics including: written food safety policies, number of food handling employees, program affiliation, and size of facility (current child enrollment). Respondents
working in facilities with written food safety policies (4.42 ± 1.01) identified the barrier too much work to do significantly more important (t=2.370, p=0.020) than employees working in facilities without written policies (4.00 ± 1.34). Child care food handling employees in facilities with fewer (5-10) employees perceived significantly (p=0.039) higher importance (4.41 ± 1.04) on being afraid of co-worker reaction than employees in 21-25 employee facilities (3.39 ± 1.47). Additionally, employees in small (0-100 children) facilities (4.25 ± 1.22) also perceived significantly (p=0.033) higher importance of being afraid of coworker reaction than employees (4.05 ± 1.43) in larger (>200 children) facilities. Furthermore, post-hoc analysis showed CACFP affiliated employees perceived the barriers of “too much work to do” and “too busy” significantly (p<0.037) higher than employees with no program affiliation.

Statistically significant results were found between perceived important motivators and demographics characteristics including: years of child care experience, work status, amount of food safety training, written food safety policies, and type of operation. More tenured employees (5-8 years’ experience) reported the importance of having a supervisor who explains what is expected of me significantly higher (p<0.002) than less tenured employees (less than 4 years’ experience). Results of a t-test analysis showed motivators related to a workplace that has policies and procedures on food safety (t=-3.640, p=0.001), a workplace that does not tolerate unsafe handling behaviors (t=-2.374, p=0.027), and training on safe food handling (t=-4.098, p=0.000), had significantly higher mean agreement scores among part-time respondents than full-time.

Employees who did not receive any training (3.07 ± 1.47) were significantly (p=0.000) less encouraged by the skills to handle food safely than employees who receive any amount of training. Employees who received 3-5 hours (5.00 ± 0.00) reported significantly higher
importance to this same motivator than employees receiving only periodic (4.29 ± 1.30) and less than 1 hour (4.36 ± 1.17) of annual training. These results suggest that employees who receive more training will be more motivated to utilize the skills they learn. Furthermore, one-way ANOVA results showed that the level of agreement scores for a supervisor to explain what was expected of me were statistically different across respondents’ hours of annual food safety training \((F=2.428, p=0.048)\). Games-Howell post-hoc test showed agreement scores for employees receiving 3-5 hours annual training (5.00 ± 0.00) was significantly higher \((p<0.002)\) than respondents who received less training: no training (3.61 ± 1.68); only periodic (4.20 ± 1.26); and less than 1 hour (4.47 ± 0.90).

Analysis showed employees working in facilities with written food safety policies had significantly higher mean scores for the key motivators of a workplace that has policies and procedures on food safety \((t=2.415, p=0.018)\), and a workplace that does not tolerate unsafe handling behaviors \((t=2.704, p=0.008)\), than employees in facilities without written policies. Finally, \(t\)-test analysis showed employees in chain/franchise facilities (4.52 ± 1.07) perceived the skills to handle food safely significantly higher \((t=-3.931, p=0.000)\) as a key motivator than employees in independently owned/operated facilities (3.92 ± 1.47).

**Discussion**

The purpose of this study was to identify child care food handling employees’ perceptions of important barriers and motivators to following recommended food safety practices and then assess the influence of demographic characteristics on the identified barriers/motivators. A total of six important barriers to following food safety practices were perceived by child care food handling employees. Furthermore, the top four perceived important barriers pertained to time and work limitations: “too much work to do”, “the work pace”, “too busy”, and “lack of
time.” These results are similar to barriers identified related to time and organization in the school and university foodservice setting (Strohbehn et al., 2014). However, it was important to note the major differences in job title and responsibilities. In the current study, the majority of respondents reported being either a teacher or assistant teacher (92.1%); not strictly a foodservice employee (e.g. cook). Within the child care setting, teachers and assistant teachers are tasked with not only caring for children (e.g. diaper, toileting, serving food), but often also food preparation, as many facilities do not have designated foodservice employees. In the current study, directors reported that only 60.4% and 37.8% of facilities had full-time or part-time foodservice employees, respectively. However, 28.2% of facilities did not have a designated foodservice employee. These findings suggest a need to reevaluate job descriptions, workloads, teacher-child ratios, and current food safety policies and procedures.

Interestingly, respondents working in facilities with written food safety polices perceived having “too much work” than employees in facilities without written food safety polices. One possible explanation could be that employees working in facilities with written food safety policies are more aware of the requirements necessary to comply with proper food handling practices than their counterparts in facilities without written policies. This point was reinforced by CACFP affiliated employees perceiving being “too busy” and “too much work to do” more than non-affiliate employees. CACFP programs require additional training hours pertaining specifically to food nutrition and food safety. Therefore, interventions attempting to mitigate barriers pertaining to time limitations should not focus on increasing knowledge of food safety practices, but rather reassess employee work loads and staffing practices or simplify work processes when possible.
In the current study, respondents were afraid if they followed proper food safety practices their peers would react poorly. Specifically, smaller facilities with few food handling employees found this barrier to be more significant than employees working in larger facilities with more employees. Previously, Seaman and Eves (2008) identified that food handlers were most influenced to perform proper food safety practices in the child care setting due to what others thought they should do. Results from the current study could partly be explained because, in smaller facilities, food handling employees are often responsible for more foodservice and non-foodservice responsibilities than in larger facilities; additionally, the close proximity of employees in smaller facilities causes more interaction between co-workers that may not be as prevalent in larger facilities. Chapman et al. (2010) suggested a need for educating food handlers and making them aware that their food handling practices influence work environment and their coworkers’ food safety behaviors. Current food safety training focuses solely on an individual foodservice employee’s actions – not how employees influence each other.

An unexpected finding was the respondents’ perceptions they do not need to follow safe food handling practices. This finding reinforces the need for proper communication and education from child care directors not just on the “how” but also the “why” child care food handlers should follow proper food safety practices. Research has shown there was a disconnect between knowledge and practices and a lack of risk judgement regarding food safety. Reynolds & Rajagopal (unpublished) found child care food handling employees perceived their child care facility to have risk taking food safety practices. In another study, findings showed respondents believed children were a high risk population, but a foodborne illness would not happen at their facility, nor would there be consequences if an outbreak did occur (Riggins, & Barrett, 2008). It
was important to not just educate on food safety knowledge and practices; employees need to know why these practices are important and how they will prevent FBIs.

Employees did identify 14 key motivators to following recommended food safety practices; with the highest two focused on “keeping children safe from food-related diseases” and “not harming the children.” Other perceived important motivators focused on available supplies, communication, and food safety training. Child care directors need to reassess current management practices as all of these key motivators are influenced by the director. In the current study, the importance of having equipment that works and proper supplies available were key motivators to following recommended food safety practices. Kotch, et al. (2007) identified that proper equipment in diapering, handwashing, and food preparation areas designed to reduce spread of infection had a significant effect on reducing diarrheal illness among the children. Ensuring the availability of proper equipment and supplies such as hand towels and soap was critical as handwashing by child care employees has been identified as the single most important preventative measure to avoid infecting themselves and children with harmful pathogens (Brady, 2005; Pickering, Baker, Kimberlin, & Long, 2012).

Within the current study, respondents with more child care tenure and more annual training identified the importance of having a supervisor to explain what the food safety expectations are. Other research identified the need for managers to continuously monitor food safety practices of employees to encourage a positive food safety culture in an organization (Arendt et al., 2014). Child care directors need to reassess how food safety practices are being communicated by the child care director as well as policies implemented. A recent study identified child care food handlers perceived a lack of consistency and timeliness of food safety information received from child care directors (Reynolds & Rajagopal, in review). Respondents
working in facilities with written food safety policies identified the key motivators of written policies and procedures as well as a workplace that does not tolerate unsafe handling behaviors more importantly then respondents in facilities without. Li, et al. (2014) assessed microbial contamination in child care facilities, identifying the lack of written procedures for food preparation as a potential reason for high-microbial contamination. Findings show the need for written policies as well as ongoing training to ensure these policies are being followed. These findings align with the AAP’s (2011) recommendation for written food handling policies, as these policies can decrease the spread of FBIs due to increased compliance with proper food handling policies. Thus, child care director consistency in communication and policy enforcement was essential.

Four of the perceived key motivators to following food safety practices were focused on training or skills to handle food properly. The majority of respondents (83.8%) reported receiving food safety training, yet only 8.3% reported receiving a food safety certification. It was unrealistic to assume all child care food handlers obtain food safety certification, however it was important that these employees receive some food safety training. In the current study, 75.1% of respondents reported receiving only periodic on-the-job training or no training at all, with the predominant training topics covering cleaning and sanitizing (86%), handwashing (76.6%), and glove use (63.3%). The least covered topics included proper food storage practices (9.4%) and food allergens (35.3%). It has been identified that the three most prevalent food safety violation categories in child care were lack of labeled food & beverages, lack of temperature controls, and improper cleaning & sanitizing (Reynolds, & Rajagopal, in press). There was a need for child care directors to reassess training topics as well as the amount of training per year for their
employees as training for safely handling food has been shown to be an important motivator in following recommended food safety practices.

Conclusions and Applications

Six important barriers and 14 key motivators to following food safety practices were identified. Child care directors could review findings to assist in mitigating perceived barriers. Specifically, child care directors should review scheduling, teacher-student ratios, job duties, and work loads of employees as the majority of identified barriers focused on “work pace” and “time restraints.” It should be noted that the majority of respondents described themselves as teachers or assistant teachers (97%) and not strictly foodservice employees (i.e. cooks) and most (91.4%) did not receive a food safety certification.

Lack of food safety knowledge was not identified as a barrier, but “being taught about food safety” was shown to be an important motivator for following recommended food safety practices. Therefore, future training should incorporate identified important motivators, while attempting to mitigate perceived barriers. For example, incorporate the use of practical and situational examples in food safety training to reinforce the importance of food safety practices and instill a positive food safety culture to eliminate barriers such as “being afraid of co-workers’ reactions”, and “don’t think I need to follow safe handling practices.”

Demographic characteristics showed significant differences in both perceived barriers and motivators, thus tailoring training to specific demographics should be considered; the general one-size-fits all method has been shown to be ineffective. Child care directors should also review identified key motivators as several were inexpensive or free to implement, such as
ensuring supplies are available (i.e. gloves and hand soap), having effective communication about the importance of food safety, and having written food safety policies in place.

Several limitations should be noted as the sample for this study was taken from licensed center-based child care facilities in South Carolina. Generalization to other states and types of facilities should be done with caution as regulations differ by state. A self-reported survey was implemented in which respondents could have reported socially desirable responses creating a biased result. Future research could investigate the director’s influence on food safety practices through training topics and methods compared to food safety violation report scores. Additionally, investigation surrounding barriers and motivators could be conducted through the use of observations and interviews to further explore the results of the current study. With the mitigation of identified barriers and inclusion of key motivators to following recommended food safety practices, a positive food safety culture can be created and future FBIs can be mitigated.

References


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### Table 5.2: Child care facilities’ organizational characteristics (n=278)

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<td>276</td>
<td>99.3</td>
</tr>
<tr>
<td>Afternoon snack</td>
<td>273</td>
<td>98.2</td>
</tr>
<tr>
<td>Dinner</td>
<td>4</td>
<td>1.4</td>
</tr>
</tbody>
</table>

*Multiple responses provided
Table 5.2: (Continued)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of meal service</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family-style</td>
<td>229</td>
<td>82.4</td>
</tr>
<tr>
<td>Pre-plated in kitchen</td>
<td>47</td>
<td>16.9</td>
</tr>
<tr>
<td>Lunch box</td>
<td>2</td>
<td>0.7</td>
</tr>
<tr>
<td><strong>Program affiliations</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Head Start</td>
<td>36</td>
<td>13.0</td>
</tr>
<tr>
<td>CACFP</td>
<td>116</td>
<td>41.7</td>
</tr>
<tr>
<td>NAEYC</td>
<td>12</td>
<td>4.3</td>
</tr>
<tr>
<td>None</td>
<td>114</td>
<td>41.0</td>
</tr>
<tr>
<td><strong>Current child enrollment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-100</td>
<td>100</td>
<td>36.0</td>
</tr>
<tr>
<td>101-200</td>
<td>138</td>
<td>49.6</td>
</tr>
<tr>
<td>More than 200</td>
<td>40</td>
<td>14.4</td>
</tr>
</tbody>
</table>
### Table 5.3: Child care employees’ mean rating of barriers to following recommended food handling practices (n=278)

<table>
<thead>
<tr>
<th>Barriers</th>
<th>Mean± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too much work to do</td>
<td>4.31 ± 1.11</td>
</tr>
<tr>
<td>The work pace</td>
<td>4.21 ± 1.29</td>
</tr>
<tr>
<td>Too busy</td>
<td>4.21 ± 1.25</td>
</tr>
<tr>
<td>Lack of time</td>
<td>4.10 ± 1.16</td>
</tr>
<tr>
<td>Afraid of co-workers’ reaction</td>
<td>4.05 ± 1.30</td>
</tr>
<tr>
<td>Don’t think I need to follow safe handling practices</td>
<td>4.02 ± 1.39</td>
</tr>
<tr>
<td>Can’t find supplies at work</td>
<td>3.11 ± 1.69</td>
</tr>
<tr>
<td>Don’t have enough supplies such as gloves and alcohol wipes</td>
<td>2.43 ± 1.54</td>
</tr>
<tr>
<td>Don’t know what to do</td>
<td>2.40 ± 1.41</td>
</tr>
<tr>
<td>No rules at work</td>
<td>2.23 ± 1.53</td>
</tr>
<tr>
<td>No one gives me the supplies I need</td>
<td>2.23 ± 1.55</td>
</tr>
<tr>
<td>Don’t want to waste supplies</td>
<td>2.16 ± 1.49</td>
</tr>
<tr>
<td>Handwashing hurts my hands</td>
<td>2.05 ± 1.31</td>
</tr>
<tr>
<td>Forgetfulness to follow safe handling practices</td>
<td>2.01 ± 1.44</td>
</tr>
<tr>
<td>Lack of good habits</td>
<td>1.87 ± 1.42</td>
</tr>
</tbody>
</table>

*Rating scale: 1=Not important; 5=Very important*
Table 5.4: Child care employees’ mean rating of motivators to following recommended food handling practices ($n=278$)

<table>
<thead>
<tr>
<th>Motivators</th>
<th>Mean$^a$ ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keeping children safe from food-related diseases</td>
<td>4.91 ± 0.54</td>
</tr>
<tr>
<td>Not harming the children</td>
<td>4.84 ± 0.66</td>
</tr>
<tr>
<td>Being taught about food safety</td>
<td>4.61 ± 0.99</td>
</tr>
<tr>
<td>Training on safe food handling</td>
<td>4.58 ± 0.99</td>
</tr>
<tr>
<td>A workplace that does not tolerate unsafe handling behaviors</td>
<td>4.44 ± 1.12</td>
</tr>
<tr>
<td>Information about food safety</td>
<td>4.22 ± 1.29</td>
</tr>
<tr>
<td>Having gloves available</td>
<td>4.17 ± 1.27</td>
</tr>
<tr>
<td>Equipment that works</td>
<td>4.15 ± 1.23</td>
</tr>
<tr>
<td>A workplace that has policies and procedures on food safety</td>
<td>4.14 ± 1.29</td>
</tr>
<tr>
<td>The skills to handle food safely</td>
<td>4.13 ± 1.36</td>
</tr>
<tr>
<td>Enough towels and hand soap for washing hands</td>
<td>4.13 ± 1.32</td>
</tr>
<tr>
<td>A supervisor to explain what is expected of me</td>
<td>4.12 ± 1.34</td>
</tr>
<tr>
<td>Feeling like I did a good job</td>
<td>4.04 ± 1.38</td>
</tr>
<tr>
<td>A workplace that rewards those who follow the rules</td>
<td>4.01 ± 1.35</td>
</tr>
<tr>
<td>Knowing I’ll eat the food too</td>
<td>3.94 ± 1.38</td>
</tr>
<tr>
<td>A workplace that reward teamwork</td>
<td>3.32 ± 1.67</td>
</tr>
<tr>
<td>Keeping children satisfied</td>
<td>3.17 ± 1.68</td>
</tr>
<tr>
<td>Serving food that smells, tastes and looks good</td>
<td>2.75 ± 1.76</td>
</tr>
<tr>
<td>A thermometer to take temperature of foods</td>
<td>2.47 ± 1.60</td>
</tr>
<tr>
<td>Putting myself in the children’s’ shoes</td>
<td>2.29 ± 1.56</td>
</tr>
<tr>
<td>Time savers$^b$</td>
<td>2.18 ± 1.65</td>
</tr>
<tr>
<td>A workplace that doesn’t reward safe food handling behaviors$^b$</td>
<td>1.93 ± 1.42</td>
</tr>
<tr>
<td>Contributing to a nice looking menu item</td>
<td>1.91 ± 1.40</td>
</tr>
<tr>
<td>No rules about handling food safely$^b$</td>
<td>1.84 ± 1.37</td>
</tr>
<tr>
<td>A health inspector who doesn’t make me handle food safely$^b$</td>
<td>1.78 ± 1.34</td>
</tr>
<tr>
<td>An unsupportive work group$^b$</td>
<td>1.75 ± 1.24</td>
</tr>
</tbody>
</table>

$^a$Rating scale: 1=Not important; 5=Very important

$^b$Statement reverse coded
CHAPTER 6. GENERAL CONCLUSIONS

The aim of this study was two-fold: 1) to assess food safety culture and social system factors effect on child care food handler’s self-commitment to perform safe food handling practices in licensed center-based facilities, and 2) to identify perceived important barriers and motivators to following recommended food safety practices. A quantitative, paper-based questionnaire was utilized to gain child care food handling employees’ perceptions of their facilities food safety culture and social system, and important barriers and motivators to following recommended food handling practices. This chapter summarizes the key results of the study, discusses implications of findings, reviews limitations of the study, and concludes with recommendations for future research.

Summary of Results

A questionnaire packet was sent to 99 licensed center-based child care facilities, containing 1 director and 10 food handling employee questionnaires. A total of 99 director and 990 food handling employee questionnaires were sent. A total of 71 directors completed the questionnaire. While, 287 food handling employee questionnaires were returned. Of the 287 returned questionnaires, 271 were usable when analyzing research objectives pertaining to food safety culture factors, resulting in a response rate of 27.4%. However, when analyzing research objectives pertaining to barriers and motivators to following recommended food safety practices 278 were usable, for a response rate of 28.1%. All child care facilities which the director completed the questionnaire (n=71), at least one employee completed a questionnaire. Employee questionnaires returned and usable ranged between one and 10 per facility. The following results are reported according to which research objectives were being analyzed.
Profile of demographic and operational characteristics

Of the child care food handling employee respondents (n=271), the majority were female (97.8%) and under the age of 29 (76.8%). Over half had between 1-4 years’ food handling experience in child care facilities. Respondents (77.1%) reported working in their current facility for less than 5 years, and the majority (65.3%) stated having less than one year of foodservice experience. Respondents identified their job title as cook (6.6%), teacher (63.5%), assistant teacher (28.8%), and aide (1.1%). The majority (83.8%) reported receiving food safety training, yet only 8.1% received a food safety certificate.

Of the 71 participating facilities, 74.5% reported having written food safety policies. Directors (70.8%) reported receiving a food safety certification. Directors reported conducting food safety training on cross contamination (46.9%), cleaning and sanitizing (85.2%), temperature danger zone (53.5%), handwashing (77.1%), glove use (62%), allergens (35.1%), and proper food storage practices (9.2%). Facilities were considered for profit (79.7%), and reported being independently owned/operated (64.9%). The majority of facilities had less than two full-time foodservice employees (77.9%), and less than two part-time foodservice employees (95.6%). However, 68% had over 11 food handling employees. Nearly all facilities reported serving morning snack, lunch, and afternoon snack. Facilities mainly used family-style (82.2%) or pre-plated in kitchen (17%) meal service. Respondents worked in CACFP (50.5%), Head Start (12.9%), and NAEYC (4.4%) affiliated facilities.

Food safety culture and social system factors

All statements per food safety culture factor were computed to identify each food safety culture factors overall mean scores. Each factor had an overall mean score above 5.0 (1=Strongly Disagree; 7=Strongly Agree) and Cronbach’s alpha scores above 0.80.
Correlation results

The results of the bivariate correlation analysis showed that *management/coworkers support*, the ability to *speak freely*, and *communication* from managers to staff have moderate positive correlations with *self-commitment* (see, Table 4.5). As the aim of this study was to assess the relationship between food safety factors and self-commitment, further analyses of other correlating factors were not conducted, analyses of these factors will be reported in a forthcoming manuscript.

Regression estimation

The regression estimation failed due to (multi)collinearity. This problem was revealed by the variable *environmental support* having a negative estimate on self-commitment. To eliminate this problem, the factors *environmental support* and *work pressures* were combined into a single factor, entitles *social system*. This newly combined factor reflects the nature of the social system (i.e., quantity and quality of supplies and equipment, time to get work completed, and number of staff). The Cronbach’s alpha score for this new factor was 0.843.

Food safety culture and social system factors effect on self-commitment

Upon further analysis the overall regression was significant. The analysis of variance was able to predict values of the outcome variable, $F=27.541$, $p=0.000$, and adjusted $R^2 = 0.330$. As the analysis of variance demonstrated significance, coefficients for the regression model were computed and presented in Table 4.6. The finding illustrates that two factors, *speak freely* ($t=2.783$, $p=0.006$) and *communication* ($t=4.796$, $p=0.000$) had significant effect on self-commitment to perform proper food safety practices.
Important barriers and motivators to following food safety practices

Of the 15 barriers assessed, 6 were perceived as important (with mean score of 4.0 or higher on the 5.0 scale) in preventing child care food handlers from preparing and/or serving food safety. Important barriers include: “too much work to do” (4.31 ± 1.11), “the work pace” (4.21 ± 1.29), “Too busy” (4.21 ± 1.25), “lack of time” (4.10 ± 1.16), “afraid of co-workers’ reaction” (4.05 ± 1.30), and “don’t think I need to follow safe handling practices” (4.02 ± 1.39). Child care food handlers perceived “lack of good habits” (1.87 ± 1.42) as the least important barrier.

A total of 14 of the 26 motivators investigated were perceived by child care food handlers as important (with mean score of 4.0 or higher on the 5.0 scale). These key motivators were: “keeping children safe from food-related diseases” (4.91 ± 0.54), “not harming the children” (4.84 ± 0.66), “being taught about food safety” (4.61 ± 0.99), “training on safe food handling” (4.58 ± 0.99), “a workplace that does not tolerate unsafe handling behaviors” (4.44 ± 1.12), “information about food safety” (4.22 ± 1.29), “having gloves available” (4.17 ± 1.27), “equipment that works” (4.15 ± 1.23), “a workplace that has policies and procedures on food safety” (4.14 ± 1.29), “the skills to handle food safely” (4.13 ± 1.37), “enough towels and hand soap for washing hands” (4.13 ± 1.32), “a supervisor to explain what is expected of me” (4.12 ± 1.36), “feeling like I did a good job” (4.04 ± 1.38), and “a workplace that rewards those who follow the rules” (4.01 ± 1.35). The three least important motivators perceived by child care food handlers were “no rules about handling food safely” (1.84 ± 1.37), “a health inspector who doesn’t make me handle food safely” (1.78 ± 1.34), and “an unsupportive work group” (1.75 ± 1.24).
**Barriers and motivators assessed by demographics**

Further analysis assessing employee and operational characteristics was conducted on barriers and motivators identified as important (with mean score of 4.0 or higher on the 5.0 scale). Statistically significant results were found between perceived important barriers and demographics characteristics including: written food safety policies, number of food handling employees, program affiliation, and size of facility (current child enrollment). Respondents working in facilities with written food safety policies (4.42 ± 1.01) identified the barrier too much work to do significantly more important ($p=0.020$) than employees working in facilities without written policies (4.00 ± 1.34). Child care food handling employees in facilities with fewer (5-10) employees perceived significantly higher ($p=0.039$) importance (4.41 ± 1.04) on being afraid of co-worker reaction than employees in 21-25 employee facilities (3.39 ± 1.47). Additionally, employees in small (0-100 children) facilities (4.25 ± 1.22) perceived significantly ($p=0.033$) higher importance of being afraid of coworker reaction than employees (4.05 ± 1.43) in larger (more than 200 children) facilities. In other words, smaller facilities and facilities with fewer food handling employees perceived being afraid of co-workers reactions as a more important barrier to following food safety practices than those in larger facilities. Furthermore, post-hoc analysis showed CACFP affiliated employees perceived the barriers of “too much work to do” and “too busy” significantly ($p<0.037$) higher than employees with no program affiliation.

Statistically significant results were found between perceived important motivators and demographics characteristics including: years of child care experience, work status, amount of food safety training, written food safety policies, and type of operation. More tenured employees (5-8 years’ experience) reported the importance of having a supervisor who explains what was expected of me significantly higher ($p<0.002$) than less tenured employees (less than 4 years’
experience). Results of a t-test analysis showed motivators related to a workplace that has policies and procedures on food safety ($t=-3.640$, $p=0.001$), a workplace that does not tolerate unsafe handling behaviors ($t=-2.374$, $p=0.027$), and training on safe food handling ($t=-4.098$, $p=0.000$) had significantly higher mean agreement scores among part-time respondents than full-time.

Employees who received no training ($3.07 \pm 1.47$) were significantly ($p=0.000$) less motivated by the skills to handle food safely than employees who receive any amount of training. One-way ANOVA results showed that the level of agreement scores for a supervisor to explain what was expected of me were statistically different across respondents’ hours of annual food safety training ($F=2.428$, $p=0.048$). Games-Howell post-hoc test showed agreement scores for employees receiving 3-5 hours annual training was significantly higher ($p<0.002$) than respondents who received less training.

Analysis showed employees working in facilities with written food safety policies had significantly higher mean scores for the key motivators of a workplace that has policies and procedures on food safety ($t=2.415$, $p=0.018$) and a workplace that does not tolerate unsafe handling behaviors ($t=2.704$, $p=0.008$) than employees in facilities without written policies. Finally, $t$-test analysis showed employees in chain/franchise facilities ($4.52 \pm 1.07$) perceived the skills to handle food safely significantly higher ($p=0.000$) as a key motivator than employees in independently owned/operated facilities ($3.92 \pm 1.47$).
**Implications of Findings**

This study assessed food safety culture and social system factors effect on child care food handlers’ self-commitment to perform safe food handling practices. As well as identified important barriers and motivators to following food safety practices in licensed center-based child care facilities. Several key implications of findings are evident for practitioners and researchers alike. Results showed that the two factors related to communication (*speak freely* and *communication*) are the only two variables with statistically significant effects on *self-commitment*. Six important barriers and 14 key motivators to following food safety practices were also identified.

The need for proper communication from child care directors not just on the “how” but also the “why” child care food handlers should follow proper food safety practices is important. Directors need to ensure employee perceive an open line of communication between employees and management. Increased communication about food safety practices has to start at the management level. Directors must also remember that “leading by example” is a non-verbal form of communication. Directors can communicate proper food safety practices by performing these practices properly themselves. Understanding this directors should make efforts to continuously encourage food handling employees to follow safe food handling practices and communicate consistently regarding food safety practices as well as create an atmosphere where staff feel comfortable in speaking freely.

Child care directors should review these finds to help develop interventions aimed at increasing communication from all employees in child care facilities. There are several inexpensive approaches directors could take to increase communication and encourage an atmosphere where employees feel comfortable speaking freely about food safety issues. For
example, food safety signage that communicates important food safety topics can be placed in strategic positions (Chapman, Eversley, Fillion, MacLaurin, & Powell, 2010; Rajagopal, Arendt, Shaw, Strohbehn, & Sauer, 2016). Using signage could be an inexpensive and effective way to create discussions about food safety and help to facilitate speech about food safety issues that food handling employees may have.

Another cost effective approach to ensuring consistent food safety communication is through written food safety policies. Written food safety policies would help communicate expectations for new and current employees regarding what proper food safety practices are. It is important to note, that developing food safety policies is one form of communication that may increase employees’ self-commitment and does not incur any cost to the facility.

A third approach to increase food safety communication could be having a brief meeting each day during nap hours with each room to discuss food safety topics. This time could also be used to encourage employees to speak freely about food safety concerns or areas for improvement. In turn this will potentially increase their self-commitment to perform food safety practices. With directors communicating proper food safety practices along with coworker support and a culture of encouragement pertaining to openly speaking about food safety issues and potential improvements, employee self-commitment to following safe food handling practices can potentially be improved.

Child care directors could also review findings to assist in mitigating perceived barriers and incorporate key motivators to following food safety practices. Child care directors should review scheduling, teacher ratios, job duties, and work loads of employees as the majority of identified barriers focused on “work pace” and “time restraints.” It should be noted that the majority of respondents described themselves as teachers or assistant teachers (97%) and not
strictly foodservice employees (i.e., cooks) and most (91.4%) did not receive a food safety certification. Additionally, directors reported 28.2% of participating facilities did not have a designated foodservice employee (i.e., cook). Thus, many facilities require child care food handlers (teachers and assistant teachers) to have several jobs, such as preparing food and caring for children in the same day.

Child care directors should also review results to help develop tailored trainings and interventions targeting gaps in the identified differences in demographic characteristics’ perceptions. This is important as previous research has shown the need for tailored training as the “one size fits all” model is not as effective (Roberts et al., 2012). Lack of food safety knowledge was not identified as a barrier, but “being taught about food safety” was shown to be an important motivator for following recommended food safety practices. Therefore, future training should incorporate identified important motivators, while attempting to mitigate perceived barriers. An example of this training would be the use of practical and situational examples in food safety training to reinforce the importance of food safety practices and instill a positive food safety culture to eliminate or reduce barriers such as “being afraid of co-workers’ reactions”, and “don’t think I need to follow safe handling practices.” Directors could also reassess their level of engagement with their food handling employees and remain consistent on food safety information distributed. Yiannas (2009) stated only management can truly influence, strengthen, or change safety culture; “they’re the leaders.”

Child care directors should also review identified key motivators as several were inexpensive or free to implement, such as ensuring supplies are available (i.e. gloves and hand soap), having effective communication about the importance of food safety, and having written food safety policies in place. Jespersen, Griffiths, Maclaurin, Chapman, & Wallace (2016)
suggests once you know what motivates employees “the company can now make informed decisions on where resources should be allocated to make the most important change in the strength of the organization’s food safety culture. Also, the organization can cross-reference to generic organizational culture to ensure improvements are made to food safety as an integrated part of overall organizational culture” (p.181).

Finally, child care facilities can evaluate the current perceived food safety culture and social system to use as a benchmark for future assessment to continuously evaluate and improve employees’ self-commitment to following food safety practices. Measuring food safety culture and social system factors related to employee self-commitment over time will further identify area for improvement, which can then be used to develop tailored training targeting specific demographic characteristics (i.e. years’ experience, job title). Through continuous assessment best practices can be identified.

This study contributes to the growing body of literature on food safety culture. This study was the first to assess food safety culture and social system factors and perceived barriers and motivators to following food safety practices in the child care setting. Findings further validate the measurement instruments used to assess the research objectives. The assessment instruments could also be modified to a tool for use in a classroom setting, to help educate future foodservice managers on organizational culture factors that contribute to food safety. For example, students could complete the questionnaire several times throughout the semester to see how the organizational culture fluctuates as time elapses and interventions are implemented (i.e. food safety practice lectures or Servsafe®). Additionally, the instruments could be used in the child care setting as a self-audit process. This could help to identify potential risk regarding a low food safety culture.
Limitations of the Study

This study has some limitations. First, the sample population was contained to South Carolina and generalization of results to other states should be done with caution as regulations are different from state-to-state. However, part of the research design (e.g. dividing the sample into three strata based on child care size) was to ensure the sample population reflected the general South Carolina licensed center-based child care population. Additionally, only center-based facilities were included, therefore generalizations to other types of child care setting (i.e. home based) cannot be inferred. Furthermore, generalization to other types of food service operations should be done with caution as the child care setting was an onsite foodservice operation, and onsite operations may have distinct and different organizational cultures than commercial foodservice and even other onsite foodservice settings (i.e. school, university, and hospital).

A self-reported survey was used in which respondents could have reported socially desirable responses, creating a biased result. Though effort was made to ensure anonymity respondents may have been wary of stating their true perceptions of the current organizational culture and food safety practices due to organizational repercussions or decreased facility reputation. Combining the factors environmental support and work pressure due to (multi)collinearity during regression analysis hindered the ability to interpret the nuances of these factors independently. Finally, the use of a quantitative survey based design only gathered the food safety culture and social system as well as perceived barriers and motivators to following recommended food safety practices for one moment in time. Thus, results are not able to identify the prevailing food safety culture and social system as well as perceived barriers and motivators to following recommended food safety practices over time.
**Recommendations for Future Research**

Future studies could use a qualitative approach and collect observations and interviews to further explain results of this study. The qualitative approach could help to further assess the food safety culture in child care settings over a prolonged period of time to better understand the overall picture and gather rich narrative results. Furthermore, using observations to identify and assess actual food safety practices will reduce self-report bias and can further explain barriers and motivators to following food safety practices in the child care setting. Supplementary research should be conducted to confirm the findings of this study in the child care setting.

The current study identified the importance of the manager’s role in influencing the food safety culture. Therefore, future research could investigate the director’s influence on food safety practices and organizational culture through training topics and training methods use in their child care facilities. Finally, child care food safety practices and food safety training methods used could be compared to health inspection food safety violation report scores to identify where gaps in food safety practices and food safety training still occur. With the mitigation of identified barriers and inclusion of key motivators to following recommended food safe practices a positive food safety culture can be created and future FBIs can be mitigated.

**References**


APPENDIX A: HUMAN SUBJECTS 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: 6/3/2016
To: Joel Reynolds  
405 N Park Lane  
Elgin, SC 29045

CC: Dr. Lakshman Rajagopal  
10 MacKay Hall

From: Office for Responsible Research

Title: Investigating Food Safety Culture Factors that Influence Child Care Employees’ Safe Food Handling Practices

IRB ID: 16-260

Study Review Date: 6/3/2016

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 be aware that approval from other entities may also be needed. For example, access to data from private records (e.g., student, medical, or employment records, etc.) that are protected by FERPA, HIPAA, or other confidentiality policies requires permission from the holders of those records. Similarly, for research conducted in institutions other than ISU (e.g., schools, other colleges or universities, medical facilities, companies, etc.), investigators must obtain permission from the institution(s) as required by their policies. An IRB determination of exemption in no way implies or guarantees that permission from these other entities will be granted.

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

Dear Director,

I am a graduate student in the Hospitality Management Program at Iowa State University. We are conducting research to assess food safety culture in child care facilities as well as barriers and motivators for following recommended food safety practices. I am writing this letter to seek your permission to recruit your child care employees who prepare or serve food for this study. I am also seeking your permission to participate in the current study by completing the director questionnaire.

Child care employees will be invited to complete a short survey which will be sent to you in a packet containing directions on survey completion and prepaid addressed envelopes for return. The employee questionnaire will take approximately 10 minutes to complete. Child care employees will receive a $5 Target gift card as a token of our appreciation. The director questionnaire will only take 5 minutes to complete. Results of this study will help to potentially prevent future foodborne illnesses.

This project has been approved by the Institutional Review Board at Iowa State University, IRB#_______. Participation is completely voluntary and all information collected will be kept confidential and anonymous. Summary results will be available upon request.

If you are willing to participate in this study, please find two recruitment flyers enclosed with this letter. Please place the study flyers in a high traffic area such as clock-in area for employee visibility.

Please do not hesitate to contact me or my major professor, Dr. Lakshman Rajagopal, should you have questions. Our contact information is listed below. Thank you in advance for your time and consideration.

Regards,

Joel Reynolds
PhD Candidate
Hospitality Management
Iowa State University
(717) 649-8157
jreynol@iastate.edu

Lakshman Rajagopal
Associate Professor
Hospitality Management
Iowa State University
(515)294-9740
lraj@iastate.edu
Participants Needed!

We are looking for child care employees to participate in our brief study: **Assessing Food Safety Culture in Child Care Facilities**

Who can participate?
- Child care employees who handle food (either preparing or serving)

How to participate?
- Complete a short paper-based survey taking approximately 10 minutes

What are the benefits?
- Results of this study will help to potentially prevent future foodborne illnesses in child care facilities
- All participants will receive a **$5 Target gift card** as a token of our appreciation!

For more information, contact Joel Reynolds at jreynol@iastate.edu or (717) 649-8157. All information collected remains confidential.
APPENDIX D: DIRECTOR COVER LETTER

Dear Director,

I am a graduate student in the Hospitality Management Program at Iowa State University. We are conducting research to assess food safety in child care facilities. We need your help!

There are two types of questionnaire contained in this large packet:

- One director questionnaire and ten employee questionnaire packets. We ask that you please complete the informed consent form (Blue page) and director questionnaire (Green pages), this should take approximately five minutes to complete. Once completed please return both, the informed consent form (Blue page) and director questionnaire (Green pages), directly back to the researchers in the prepaid addressed envelope attached to the questionnaire, using the United States Postal Service.

- Second are ten child care employee questionnaires. We encourage you to distribute all ten questionnaire packets to employees matching the study criteria. Once you distribute the questionnaire packets the employee will complete the questionnaire and return them directly to the researchers using the prepaid addressed envelopes, which are also enclosed in each questionnaire packet.

- To be eligible to participate the following criteria must be met by the child care employees: 1) participants must be a minimum of 18 years of age; and 2) participants must be involved in food handling (this could be food preparation or food service).

The questionnaire should only take employees about 15 minutes and they will receive a $5 electronic Target gift card as a thank you for returning it! Results of this study will help to potentially prevent future foodborne illnesses. One week after distribution please encourage employees to complete and return the questionnaire, this will help increase the response rate.

This project has been approved by the Institutional Review Board at Iowa State University, IRB#16-260. Participation is completely voluntary and all information collected will be kept confidential and anonymous. Summary results will be available upon request.

Please do not hesitate to contact me or my major professor, Dr. Lakshman Rajagopal, should you have questions. Or if you would like to request additional paper-based questionnaires. Our contact information is listed below. Thank you in advance for your time and consideration.

Regards,

Joel Reynolds
PhD Candidate
Hospitality Management
Iowa State University
(717) 649-8157
jreynol@iastate.edu

Lakshman Rajagopal
Associate Professor
Hospitality Management
Iowa State University
(515)294-9740
lraj@iastate.edu
APPENDIX E: DIRECTOR QUESTIONNAIRE INFORMED CONSENT FORM

Title of Study: Investigating Food Safety Factors that Influence Child Care Employees’ Safe Food Handling Practices

Investigators: Joel A. Reynolds, PhD Candidate; Lakshman Rajagopal, PhD

IRB# 16-260

Dear Director:

I am a graduate student in the Hospitality Management Program at Iowa State University. We are interested in assessing food safety in child care facilities. We believe that you are the best source of information about the child care facility and how food is handled from preparation to serving the children. If you agree to participate in this study, we request you take approximately 5 minutes to share your expertise and thoughts with us by completing the survey enclosed in this packet.

The survey consists of questions concerning foodservice and facility demographics in your child care facility. As a token of our appreciation we will send you a summary of study results.

There are no foreseeable risks from participating in this study. Please be assured that your responses and identity will remain strictly confidential. You are free to decide not to participate in this study. You can also withdraw at any time without harming your relationship with the researchers or Iowa State University. A replacement paper survey is available upon request by contacting jreynol@iastate.edu or 717-649-8157.

Your assistance in filling out this director survey will strengthen our efforts to understand and further explore food handling practices and behaviors, to prevent foodborne illnesses. Thank you in advance for your willingness to share your expertise and thoughts with us.

For further information about the study, please jreynol@iastate.edu, 717-649-8157, or Lakshman Rajagopal, lraj@iastate.edu, 515-294-9740. If you have any questions about the rights of research subjects, 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.

Do you agree to participate in this survey?

☐ Yes ☐ No
APPENDIX F: DIRECTOR QUESTIONNAIRE

This survey gathers organizational information about your child care facility. We believe that you are the best source of information about your child care facility. **For this study a food handling employee is defined as: an employee who handles food in the child care facility, from purchasing and receiving through storing, preparing, cooking, holding, cooling, reheating, and serving in a way that prevents foodborne illness.** We request that you share your expertise and thoughts with us by completing this survey and returning it in the prepaid addressed envelope attached.

1. Does your child care facility have food safety policies?
   - [ ] Yes
   - [ ] No (If no, please continue to question 3)

2. Does your child care facility have written food safety policies?
   - [ ] Yes
   - [ ] No

3. Does your child care facility offer food safety training to employees?
   - [ ] Yes (If yes, please answer question 4)
   - [ ] No (If no, please continue to question 5)

4. If yes, what topics have been included (check all that apply)?
   - [ ] Cross contamination
   - [ ] Cleaning and sanitizing
   - [ ] Temperature danger zone
   - [ ] Handwashing
   - [ ] Glove use
   - [ ] Allergens
   - [ ] Proper food storage practices
   - [ ] Other __________________ (Please specify)

5. Have you received food safety training?
   - [ ] Yes
   - [ ] No

6. Do you currently have a food safety training certification (i.e. Servsafe, Certified Food Safety Manager)?
   - [ ] Yes (If yes, please write the name of the certification)
   - [ ] No

7. What is the legal status of your child care facility?
   - [ ] For profit
   - [ ] Nonprofit

8. What is your current type of child care facility?
   - [ ] Independently owned or operated
   - [ ] Chain/franchise
   - [ ] Other____________________ (Please specify)

9. What is the number of full-time (work 35 hours or more per week) foodservice employees working per day?
   - [ ] 0
   - [ ] 1
   - [ ] 2
   - [ ] 3
   - [ ] 4
   - [ ] More than 4

10. What is the number of part-time (work fewer than 35 hours per week) foodservice employees working per day?
    - [ ] 0
    - [ ] 1
    - [ ] 2
    - [ ] 3
    - [ ] 4
    - [ ] More than 4

11. What is the number of total food handling employees working per day?
    - Fewer than 5
    - 5-10
    - 11-15
    - 16-20
    - 20-25
    - More than 25

12. When a primary food preparer cannot come to work who takes their place?
    - [ ] Director
    - [ ] Teacher
    - [ ] Hired Substitute
    - [ ] Other____________________ (please specify)
13. Which of the following does your child care facility serve (Check all that apply)?
   ___ Breakfast
   ___ Morning Snack
   ___ Lunch
   ___ Afternoon Snack
   ___ Dinner

14. What is the estimated total breakfasts served per day to children in your child care facility?
   ___ Fewer than 25
   ___ 26-50
   ___ 51-100
   ___ 101-150
   ___ 151-200
   ___ More than 200
   ___ We don’t serve breakfast

15. What is the estimated total lunches served per day to children in your child care facility?
   ___ Fewer than 25
   ___ 26-50
   ___ 51-100
   ___ 101-150
   ___ 151-200
   ___ More than 200
   ___ We don’t serve lunch

16. What is the estimated total dinners served per day to children in your child care facility?
   ___ Fewer than 25
   ___ 26-50
   ___ 51-100
   ___ 101-150
   ___ 151-200
   ___ More than 200
   ___ We don’t serve dinner

17. What type of meal service does your child care facility use?
   ___ Family-Style (Food serve from common bowls and platters in the classroom)
   ___ Pre-plated in the kitchen
   ___ Lunch box (some or all food brought from home)

18. Is your child care facility associated with any of the following programs (Select all that apply)?
   ___ Head Start
   ___ Child and Adult Care Food Program
   ___ National Association for the Education of Young Children
   ___ None
   ___ Other ______________ (Please specify)

19. Where is food purchased? (Select all that apply)?
   ___ Local Grocery Store (e.g. Piggly Wiggly, Food Lion, Publix)
   ___ Wholesale Company (e.g. Sysco, US Foods)
   ___ Grocery Club (e.g. Sams, Costco)
   ___ Convenience Store (e.g. Seven Eleven, Walgreens)
   ___ Farmers Market
   ___ Grown at child care facility (e.g. Garden at facility)
   ___ Other ______________ (Please specify)

20. What is your child care facility’s maximum capacity?
   ___ Fewer than 50
   ___ 51-100
   ___ 101-150
   ___ 151-200
   ___ 201-250
   ___ 251 or more
21. What is the number of children currently enrolled at your child care facility?
   ___ Fewer than 50
   ___ 51-100
   ___ 101-150
   ___ 151-200
   ___ 201-250
   ___ 251 or more

As a token of our appreciation we will send you a summary of study results.

Would you like to receive an email with the results of this study?
   ___ Yes, please provide your email address _________________________________
   ___ No

Thank you for completing the survey! Please place the following two completed items in the prepaid addressed envelope provided, return using the United States Postal Service:
   1. The Survey (Green pages)
   2. Informed Consent Form (Blue page)
Dear child care employee:

I am a graduate student in the Hospitality Management Program at Iowa State University. We are conducting research to assess food safety in child care facilities. We are interested in assessing food safety in child care facilities. We believe that you are the best source of information about the child care facility and how food is handled from preparation to serving the children. The survey will only take 15 minutes to complete.

**How you can help:**
- If interested, sign the Informed Consent Form (Blue Page)
- Complete the short survey and provide email address (Yellow Pages)
- Place both documents (Blue and Yellow Pages) in prepaid envelope attached to this letter, return envelope using United States Postal Service

**Benefits of this study:**
- You will receive a $5 electronic Target Gift Card
- Results will help identify ways to mitigate future foodborne illnesses in child care settings
- Results will help increase overall health and safety in child care settings

If you have any questions, please don’t hesitate to contact me or my major professor at the contact information listed below.

Regards,

Joel Reynolds
PhD Candidate
Hospitality Management
Iowa State University
(717) 649-8157
jreynol@iastate.edu

Lakshman Rajagopal
Associate Professor
Hospitality Management
Iowa State University
(515)294-9740
lraj@iastate.edu

For further information about the study, please contact jreynol@iastate.edu, (717) 649-8157.
APPENDIX H: EMPLOYEE QUESTIONNAIRE INFORMED CONSENT FORM

Title of Study: Investigating Food Safety Factors that Influence Child Care Employees’ Safe Food Handling Practices

Investigators: Joel A. Reynolds, PhD Candidate; Lakshman Rajagopal, PhD

IRB# 16-260

Dear child care employee:

I am a graduate student in the Hospitality Management Program at Iowa State University. We are interested in assessing food safety in child care facilities. We believe that you are the best source of information about the child care facility and how food is handled from preparation to serving the children. If you agree to participate in this study, we request you take approximately 15 minutes to share your expertise and thoughts with us by completing the survey enclosed in this packet.

The survey consists of three sections concerning food safety in your child care facility. Upon completion of this short survey you will have the opportunity to enter your name and email address for the sole purpose of receiving an electronic $5 Target gift card as a token of appreciation for your participation.

Names and contact information provided for the token of appreciation will be stored in a separate file from questionnaire responses to ensure confidentiality is maintained. Once the gift card is awarded, this list will be destroyed. There are no foreseeable risks from participating in this study. Please be assured that your responses and identity will remain strictly confidential. You are free to decide not to participate in this study. You can also withdraw at any time without harming your relationship with the researchers or Iowa State University. A replacement paper survey is available upon request by contacting jreynol@iastate.edu or 717-649-8157.

Your assistance in filling out this food safety survey will greatly strengthen our efforts to understand and further explore food handling practices and behaviors, to prevent foodborne illnesses. Thank you in advance for your willingness to share your expertise and thoughts with us.

For further information about the study, please jreynol@iastate.edu, 717-649-8157, or Lakshman Rajagopal, lraj@iastate.edu, 515-294-9740. If you have any questions about the rights of research subjects, please contact the IRB administrator, 515-294-4566, IRB@iastate.edu or Director 515-294-3115, Office of Responsible Research, Iowa State University, Ames, Iowa 50011.

Do you agree to participate in this survey?

☐ Yes    ☐ No
APPENDIX I: EMPLOYEE QUESTIONNAIRE

This questionnaire assesses food safety practices. For this study food safety practices are defined as: the handling of food in the child care facility, from purchasing and receiving through storing, preparing, cooking, holding, cooling, reheating, and serving in a way that prevents foodborne illness. We believe that you are the best source of information about the child care facility and how food is handled from preparation to serving the children. We request that you share your expertise and thoughts with us by completing this survey and returning it, directly to the researcher in the prepaid addressed envelope attached, using the United States Postal Service. Thank you.

### Section 1

Please read each the following statement regarding food safety practices in your child care facility and indicate whether you: Strongly disagree (1), Moderately disagree (2), Disagree (3), Neutral (4), Agree (5), Moderately agree (6), or Strongly agree (7).

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Moderately Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Moderately Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. My supervisor watches to see if employees are practicing safe food handling.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>2. My supervisor is actively involved in making sure safe food handling is practiced.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>3. My coworkers are supportive of each other regarding food safety.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>4. When lots of food preparation and service work needs to be done quickly, employees work together as a team to get the tasks completed safely.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>5. Employees remind each other about following food safety practices.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>6. New employees and experienced employees work together to ensure food safety practices are in place.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>7. There is good cooperation among employees to ensure that children receive safely prepared food.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>8. Supervisor(s) enforce food safety rules consistently with all employees.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>9. My supervisor inspires me to follow safe food handling practices.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>
Please read each the following statement regarding food safety practices in your child care facility and indicate whether you: Strongly disagree (1), Moderately disagree (2), Disagree (3), Neutral (4), Agree (5), Moderately agree (6), or Strongly agree (7).

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Moderately Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Moderately Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>10. Employees are disciplined or reprimanded when they fail to follow food safety practices.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>11. I can freely speak up if I see something that may affect food safety.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>12. I am encouraged to provide suggestions for improving food safety practices.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>13. All supervisors give consistent information about food safety.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>14. My supervisor provides adequate and timely information about current food safety rules and regulations.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>15. My supervisor generally gives appropriate instructions on safe food handling.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>16. All of the necessary information for handling food safely is readily available to me.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>17. Food safety is a high priority to me.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>18. I follow food safety rules because I think they are important.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>19. I follow food safety rules because it is my responsibility to do so.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>20. I am committed to following all food safety rules.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>21. I keep my work area clean because I do not like clutter.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>22. Adequate supplies are readily available to perform safe food handling practices.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>
Please read each the following statement regarding food safety practices in your child care facility and indicate whether you: Strongly disagree (1), Moderately disagree (2), Disagree (3), Neutral (4), Agree (5), Moderately agree (6), or Strongly agree (7).

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Moderately Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Moderately Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>23. Equipment items needed to prepare/serve food safely (e.g. handwashing sinks) are readily available and accessible.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>24. Facilities are of adequate quality to follow safe food handling practices.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>25. I am provided with quality supplies (e.g. gloves, serving utensils) that make it easy for me to follow safe food handling practices.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>26. I always have enough time to follow safe food handling procedures, even during rush hours.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>27. My work load does not interfere with my ability to follow safe food handling practices.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>28. The number of staff scheduled at each shift is adequate for me to get my work done and handle food safely.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>29. I am sometimes asked to cut corners with food safety so we can save costs when preparing food.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>30. When there is pressure to finish food production/service, supervisors sometimes tell us to work faster by taking shortcuts with food safety.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>31. I believe that written food safety policies and procedures are nothing more than a cover-up in case there is a lawsuit.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>
Section 2
Please read each the following statement regarding food safety practices in your child care facility. For this study food safety practices are defined as: the handling of food in the child care facility, from purchasing and receiving through storing, preparing, cooking, holding, cooling, reheating, and serving in a way that prevents foodborne illness.

At work, how important do you believe the following statements are in preventing you from preparing/serve food safely?

1 = Not Important; 5 = Very Important

<table>
<thead>
<tr>
<th>Statement</th>
<th>Not Important</th>
<th>Neutral</th>
<th>Very Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of time</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Don’t know what to do</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Can’t find supplies at work</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>The work pace</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Forgetfulness to follow safe handling practices</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Lack of good habits</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Don’t have enough supplies such as gloves and alcohol wipes</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>No rules at work</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Don’t think I need to follow safe handling practices</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>No one gives me the supplies I need</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Too much work to do</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Don’t want to waste supplies</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Afraid of co-workers’ reaction</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Handwashing hurts my hands</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Too busy</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

What are other reasons why you do not always prepare/serve food safely at work?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
At work, how important are the following in encouraging you to preparing/serving food safely?

1= Not Important; 5=Very Important

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>16. A workplace that has policies and procedures on food safety</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>17. A workplace that does not tolerate unsafe handling behaviors</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>18. Time savers</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>19. Serving food that smells, tastes and looks good</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>20. Being taught about food safety</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>21. Keeping children safe from food-related diseases</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>22. A thermometer to take temperature of foods</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>23. Feeling like I did a good job</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>24. The skills to handle food safely</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>25. A supervisor to explain what is expected of me</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>26. A health inspector who doesn’t make me handle food safely</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>27. Knowing I’ll eat the food too</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>28. A workplace that doesn’t reward safe food handling behaviors</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>29. Contributing to a nice looking menu item</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>30. Keeping children satisfied</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>31. Enough towels and hand soap for washing hands</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>32. Information about food safety</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>33. A workplace that rewards those who follow the rules</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>34. A unsupportive work group</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>35. Training on safe food handling</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>36. Not harming the children</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
At work, how important are the following in encouraging you to preparing/serving food safely?

1 = Not Important; 5 = Very Important

<table>
<thead>
<tr>
<th></th>
<th>Not Important</th>
<th>Neutral</th>
<th>Very Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>37. Equipment that works</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>38. Putting myself in the children’s’ shoes</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>39. A workplace that reward teamwork</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>40. No rules about handling food safely</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>41. Having gloves available</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

Please list other reasons why you DO prepare/serve food safely at work
_________________________________________________________________________
_________________________________________________________________________

Section 3: Demographic Information

Please read each the following statements and indicate which answer best describes you/your child care facility.

1. What is your gender?
   ___ Male
   ___ Female

2. What is your age?
   ___ 18-29 years old
   ___ 30-49 years old
   ___ 50-60 years old
   ___ More than 60 years old

3. How long have you worked in the child care setting?
   ___ Less than 1 year
   ___ 1-4 years
   ___ 5-8 years
   ___ 8-12 years
   ___ 13-20 years
   ___ More than 20 years

4. How many years has preparing and/or serving food been a part of your job?
   ___ Less than 1 year
   ___ 1-4 years
   ___ 5-8 years
   ___ 8-12 years
   ___ 13-20 years
   ___ More than 20 years

5. How many years have you worked at your current child care facility?
   ___ Less than 1 year
   ___ 1-4 years
   ___ 5-8 years
   ___ 8-12 years
   ___ 13-20 years
   ___ More than 20 years

6. How many years of professional foodservice experience do you have (including your current job if your primary role is food preparation and service)?
   ___ Less than 1 year
   ___ 1-4 years
   ___ 5-8 years
   ___ 8-12 years
   ___ 13-20 years
   ___ More than 20 years

7. What is your current work status?
   ___ Full-time (Work 35 hours or more per week)
   ___ Part-time (Work less than 35 hours per week)
8. What is the average number of hours each week you work at your current child care facility?
   __ Less than 10 hours
   __10-20 hours
   __21-30 hours
   __31-40 hours
   __More than 40 hours

9. What is your current job position at your child care facility?
   __Cook
   __Teacher
   __Assistant Teacher
   __Aide
   __Other ________________(Please specify)

10. Have you received food safety training?
    __Yes
    __No

11. Do you currently have a food safety training certification (i.e. Servsafe, Certified Food Safety Manager)?
    __Yes (If yes, please write the name of the certification) _____________________
    __No

12. Approximately how many hours of food safety training do you receive from your current child care facility each year?
    __None
    __Only periodic training on-the-job
    __Less than one hour formal training
    __1-2 hours
    __3-5 hours
    __6-10 hours
    __More than 10 hours

Please write, clearly, your email address to receive the $5 electronic Target gift card

_____________________________________________________

Thank you for completing the survey! Please place the following two completed items in the prepaid addressed envelope provided:

1. The Survey (Yellow pages)
2. Informed Consent Form (Blue page)

Once both items are in the prepaid envelope, send it through the United States Postal Service. Upon return we will send you the $5 electronic Target gift card as a token of our appreciation!
APPENDIX J: QUESTIONNAIRE PILOT TEST EVALUATION FORM

Thank you for agreeing to participate in the pilot test phase of this research study. Please answer the following questions or make any comments upon the completion of your questionnaire.

1. Which questionnaire did you complete?
   _______Director  _______Employee

2. How long did it take you to fill out the questionnaire?
   _______Minutes

3. Were the questions understandable?
   Yes _______  No _______

   If NO, please indicate the question number and how they could be made clearer below:

<table>
<thead>
<tr>
<th>Question Number</th>
<th>Suggestion for improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Was the formatting of the questionnaire easy to follow?
   Yes _______  No _______

   If NO, please indicate how this may be improved below:

___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

5. Was the length of the questionnaire okay?
   Yes _______  No _______

   If NO, please indicate how this may be improved below:

___________________________________________________________________________
___________________________________________________________________________

Overall, what suggestions do you have for improving the questionnaire?

___________________________________________________________________________
___________________________________________________________________________

Thank you for participating in our pilot study. Please place the completed pilot test informed consent form, pilot test survey, and this evaluation form in the prepaid addressed envelope and return using the United States Postal Service.
APPENDIX K: DIRECTOR FOLLOW-UP PHONE CONTACT

Script to request director to complete director questionnaire via the telephone (via telephone call)

Hello, my name is Joel Reynolds. I am a graduate student in the Hospitality Management Program at Iowa State University. I am conducting research to assess food safety culture in child care facilities as well as barriers and motivators for following recommended food safety practices. I believe that you are the best source of information about your child care facility.

I would like to seek your permission to participate in the current study by completing the director questionnaire over the phone at this time. Participation is strictly voluntary and all data collected will be kept confidential. Findings from this research will be used to provide information for child care facilities to improve employees’ safe food handling practices.

Would you be willing to participate in this study at this time, the questionnaire will only take five minutes to complete over the phone?

(If the potential participant agrees, the following script will be used)

I appreciate your interest and support for this study. (Start reading the director questionnaire)

(If the participant says declines, the following script will be used)

Thank you for your time, may I ask is there a specific reason why you would like to decline participation?
ACKNOWLEDGMENTS

Firstly, I would like to express my sincere appreciation to my major professor Dr. Lakshman Rajagopal for his unremitting support during my doctoral study, dissertation work, and related research. His patience, encouragement, guidance, and immense knowledge was ever present. His guidance helped me in each stage of the research process, and continues to this day. I could not have imagined having a better advisor and mentor for my doctoral study. He truly is a great mentor.

In addition to Dr. Rajagopal, I would like to thank the rest of my program of study committee: Dr. Susan W. Arendt, Dr. Robert H. Bosselman, Dr. Stephen G. Sapp, and Dr. Christine N. Lippard, they too encouraged and elevated my knowledge and thought process. Without each member of my committee and the support they gave this research would not be what it is, and for that I am eternally grateful.

I would also like to thank the members of my doctoral cohort, Mary Jo, Christina, and Bella, for all the stimulating discussions, the countless hours working together before deadlines, and all the laughs along the way.

Last but not least, I would like to thank my family. My beautiful wife, who always encouraged me through the good times and the bad. To my children, who always showed me how much fun life can be. Finally, to my parents who shaped me into the man I am today, I am forever grateful and humbled. Thank you all.