

BELIEFS AND PERCEPTIONS ABOUT HACCP IN CHILDCARE CENTERS:  
AN EXPLORATORY STUDY

by

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B.S., Peru State College, 1996  
M.B.A., Webster University, 2002

AN ABSTRACT OF A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF PHILOSOPHY

Department of Hotel, Restaurant, Institution Management and Dietetics  
College of Human Ecology

KANSAS STATE UNIVERSITY  
Manhattan, Kansas

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## **Abstract**

This research developed a model to assess beliefs and perceptions of employees about following a Hazard Analysis and Critical Control Points (HACCP) -based food safety program in Childcare Centers. The four Health Belief Model constructs included perceived susceptibility, severity, benefits, and barriers. Because of their proven worth in behavioral research, the constructs behavioral intention and self-efficacy were added to the model. An instrument designed to test the model was mailed to directors and foodservice employees at accredited Childcare Centers in six Midwestern states (n = 528). The final response rate was 17.5 percent.

Self-efficacy was tested as a moderator between the independent variables and behavioral intentions. Exploratory factor analysis identified factors. Most items loaded as expected, but the construct perceived severity loaded on two factors requiring an additional factor in the model. The final factor names included perceived susceptibility, center consequences, child consequences, perceived benefits, perceived barriers, self-efficacy, and behavioral intentions. The model accounted for 70.07% of the variance for a six-factor model.

Perceived benefits and self-efficacy significantly affected behavioral intentions to follow a HACCP-based food safety program. In addition, self-efficacy had a moderating effect on the relationship between perceived benefits and behavioral intentions. Results indicated that directors and foodservice employees understood that children are susceptible to foodborne illnesses. However, they did not believe that a foodborne illness

could occur at their Center, and if it did, there would be no consequences to themselves or the Center.

Improved construct items need to be developed and tested utilizing a population that has more knowledge about HACCP-based food safety programs. This model should be tested with other populations that are familiar with HACCP-based food safety programs to determine if perceived susceptibility, severity, or barriers have an impact on behavioral intentions to follow a HACCP-based food safety program. Once beliefs and perceptions about food safety practices and behaviors are identified, interventions can be tailored to address specific misconceptions resulting in improved food safety practices and behaviors.

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## **Dedication**

This work is dedicated to my family, and especially to my husband for his endless patience, support, and encouragement while I have been extending my education - without him; I could not have reached so high. I love you all.



# CHAPTER 1

## INTRODUCTION

The safety of food in Childcare Centers should be a primary concern of administrators, directors, teachers, and foodservice staff of Childcare Centers as well as parents and the community. Young children are at a higher risk for foodborne diseases because of their less developed immune systems, lower weight, and limited control over food risks (Buzby, 2001; United States (U. S.) General Accounting Office, 2003). In addition, children in Childcare Centers are exposed to pathogens by secondary sources, such as ill classmates and contaminated food (Buzby, 2001).

According to the Food and Agriculture Organization (FAO), every segment in the food chain has the potential of being a source of microbiological hazards due to mishandling of food (FAO, 1998). If a foodborne disease outbreak were to occur in a child care setting, children could become sick and transmit the disease to their peers, teachers, and families. The financial and emotional consequences to the Childcare Center could be devastating (National Restaurant Association Educational Foundation, 2004).

The Food and Drug Administration (FDA) Retail Food Program Steering Committee (FDA Retail Food Program Steering Committee, 2000) reported that of 17,477 observations of food handling practices, behaviors needing priority attention were: 1) cold holding of potentially hazardous food; 2) cold holding of ready-to-eat potentially hazardous food; 3) commercially processed ready-to-eat potentially hazardous food date marked; 4) clean, sanitized surfaces and utensils; and 5) proper, adequate handwashing. In a subsequent study, the same practices and behaviors continued to be

inadequate (FDA National Retail Food Team, 2004). These are basic food safety practices and behaviors that foodservice operations need to address.

The academic literature acknowledges Hazard Analysis and Critical Control Points (HACCP) as a proactive food safety program that can, when properly implemented, reduce the number of foodborne disease outbreaks and ensure unsafe food-handling practices and behaviors are controlled (National Advisory Committee on Microbiological Criteria for Foods (NACMCF), 1998). HACCP, developed for NASA by Pillsbury in 1959 as an effective food safety program, incorporated seven principles based on scientific evidence (Morrone & Rathbun, 2003). Using a HACCP based food safety system has been mandatory in the seafood industry since 1995, in meat and poultry starting in 1996, and juice industries in 1998. Since HACCP has been required in these industries, there has been a decrease in foodborne disease outbreaks (Center for Disease Control and Prevention (CDC), 2005). CDC reported that the occurrence of *E.Coli O157:H7 (Hemorrhagic Colitis)* decreased 42%, *Salmonella* 8%, *Campylobacter* 31%, and *Listeria* 40% (CDC, 2005). These results offer substantive evidence that taking a proactive stance against foodborne disease is effective.

Amendments to the Richard B. Russell National School Lunch Act (108th Congress, 2004) required HACCP-based food safety programs be implemented in school foodservice. In response to this amendment, the U. S. Department of Agriculture's (USDA) Food and Nutrition Service (FNS) published guidance for school foodservices on the development and requirements of HACCP-based food safety programs (USDA, FNS, 2005).

The American Academy of Pediatrics, the American Public Health Association, and the National Resource Center for Health and Safety in Child Care collaborated to develop and publish health and safety standards for Childcare Centers (National Resource Center for Health and Safety in Child Care, 2002). These standards are measures of quality for accreditation, however, accreditation of Childcare Centers is voluntary, and none of these standards or regulations mandates a HACCP-based food safety program.

### **Problem Statement**

Young children are at a higher risk for foodborne diseases because of their less developed immune systems, lower weight, and limited control over food risks (Buzby, 2001; U. S. General Accounting Office, 2003). In the U.S. between 1990 and 2004, there were 43 confirmed foodborne disease outbreaks that affected 1,276 children in Childcare Centers (CDC, 2006). In Childcare Centers, three routes generally contribute to spreading foodborne diseases: person-to-person, contaminated inanimate objects or substances (e.g. clothing, soap), and contaminated environmental surfaces (Wilde, Van, Pickering, Eiden, & Yolken, 1992). Because young children may not recall where or what food they have eaten, transmission by food may be difficult to assess (Hedberg & Osterholm, 1993).

Directors of Childcare Centers should ensure the safety of food served using the best possible techniques, which would include incorporating a HACCP-based food safety system (NACMCF, 1998). HACCP is not mandated for Childcare Centers, but implementation of prerequisite programs and development of a HACCP-based food safety program would ensure the safety of food being served to the very young.

Therefore, for Childcare Centers to follow HACCP-based food safety programs, it is important to understand how the beliefs and perceptions about benefits and barriers affect behavioral intentions of Childcare Center directors and foodservice employees. Behavior-change theories can be used to assess these beliefs and perceptions because a key concept of these theories is that "...what we know and think affects how we act" (*Theory at a glance: A guide for health promotion practice*, 2003).

Glanz, Lewis, and Rimer (1996) found that the Health Belief Model was the first and most commonly used theory in health-behavior research. The Health Belief Model is based on the presumption that individuals will protect their health if they: 1) consider themselves to be susceptible to an illness; 2) believe certain behaviors reduce susceptibility and/or severity of the illness and that the behavior benefits are greater than the barriers; and 3) are confident they can perform the behavior (Athearn et al., 2004).

In this exploratory study, an instrument was developed using a modified Health Belief Model to identify Childcare Center directors' and foodservice employees' beliefs and perceptions about intentions to follow a HACCP-based food safety program. To the researchers' knowledge, there has been no published research concerning HACCP or food safety perceptions in Childcare Centers. This study was compelled by the scarcity of research in this area.

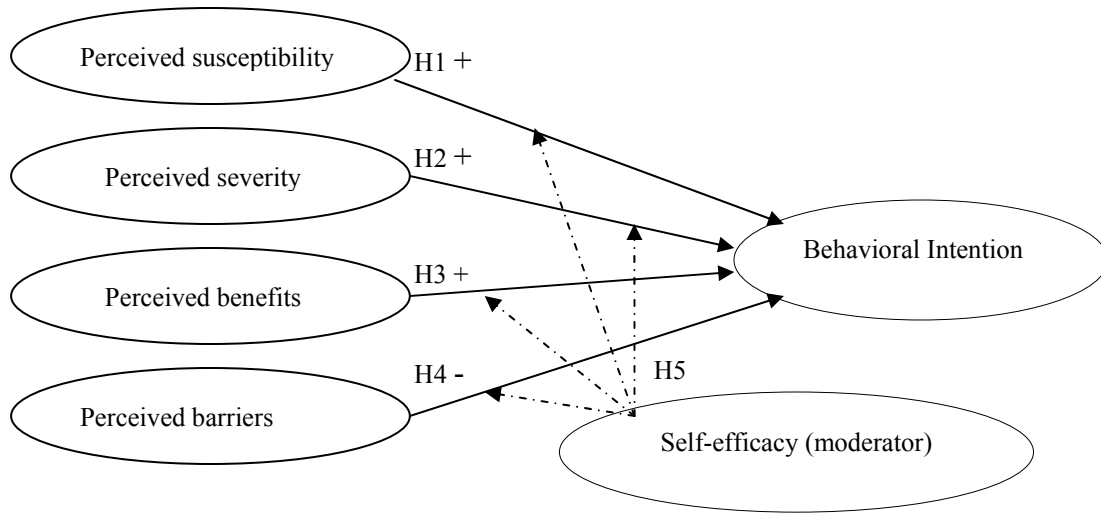
### **Purpose**

The purposes of this exploratory research were: 1) to examine Childcare Center directors' and foodservice employees' beliefs and perceptions about the benefits, barriers, and intentions to follow a HACCP-based food safety program and 2) to determine implementation status of HACCP prerequisite programs in Childcare Centers. As none

exists, an experiential instrument was developed to test a modified version of the Health Belief Model. The experimental instrument was developed to assess beliefs and perceptions related to HACCP-based food safety programs.

### **Objectives**

1. To develop an instrument to assess food safety beliefs and perceptions of Childcare Center directors and foodservice employees;
2. Using the instrument, test a modified Health Belief Model that would evaluate behavioral intentions to follow a HACCP based food safety program;
3. Assess relationships between constructs in the exploratory model;
4. Determine validity and reliability for the experiential instrument;
5. Determine beliefs and perceptions of directors and foodservice employees about benefits, barriers, and intentions to follow HACCP-based food safety programs;
6. Examine differences in beliefs and perceptions between directors and foodservice employees;
7. Examine differences in beliefs and perceptions between those with associate degrees and less and those with a bachelors degree or higher;
8. Examine differences in beliefs and perceptions between those with and without food safety certification; and
9. Determine the status of HACCP prerequisite programs implemented in Childcare Centers.



**Figure 1 Proposed Exploratory Research Model**

### Hypotheses

The following five hypotheses were tested:

- H<sub>1</sub>: Perceived susceptibility of foodborne illness will have a positive effect on behavioral intentions related to willingness to follow a HACCP-based food safety program.
- H<sub>2</sub>: Perceived severity of foodborne illness consequences will have a positive effect on behavioral intention related to willingness to follow a HACCP-based food safety program.
- H<sub>3</sub>: Perceived benefits of following HACCP-based food safety programs will have a positive effect on behavioral intention.
- H<sub>4</sub>: Perceived barriers to following a HACCP-based food safety programs will have a negative effect on behavioral intentions.

H<sub>5</sub>: Self-efficacy to follow HACCP-based food safety programs will have a moderating effect on the relationship between independent variables (perceived susceptibility, perceived severity, perceived benefits, and perceived barriers) and behavioral intention related to willingness to follow a HACCP-based food safety program.

### **Definition of Terms**

**Child Care Centers:** Institutions or facilities that are licensed to provide nonresidential child care services to enrolled children, primarily of pre-school age.

**Barriers:** Anything that prevents a recommended behavior from being performed.

**Behavioral Intention:** A substitute for behavior, it is the plan to perform the behavior.

**Benefits:** Rewards or positive outcomes occurring from performing a recommended behavior.

**Hazard Analysis Critical Control Point (HACCP):** A proactive food safety program that can, when properly followed, reduce the number of foodborne illness outbreaks associated with food (NACMCF, 1998).

**Prerequisite programs:** Programs that provide the basis for a HACCP-based food safety program. Examples include policies on personal hygiene, maintenance, and sanitation programs.

**Self-efficacy:** Degree of belief that the person can perform a recommended behavior successfully.

**Severity:** The amount of harm expected or seriousness of a foodborne illness.

**Susceptibility:** The likelihood that a foodborne illness will occur to a given person.

### **Delimitation and Limitation of Study**

Limitations of this study included the use of an experimental instrument and distribution of the instrument was confined to six Midwestern states: Colorado, Iowa, Kansas, Missouri, Nebraska, and Oklahoma. The sample population also limited the study because the list of Childcare facilities was obtained from the membership database of the National Association for the Education of Young Children (NAEYC) that contained only their accredited centers. Childcare Center directors and foodservice employees were included in the sample based on their willingness to participate in the study.

### **Significance of Study**

The exploratory study developed an instrument and model based on the Health Belief Model to assess beliefs and perceptions of food safety and HACCP-based food safety programs in Childcare Centers. No instrument or model has ever been developed or tested for food safety research with this population. Future researchers who wish to understand beliefs and perceptions about food safety behaviors could modify this model to fulfill their research objectives. The modifications needed would include wording and situational cues specific to the population under study.



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## CHAPTER 2

### REVIEW OF LITERATURE

This chapter is intended to summarize literature related to the objectives of the study. Topic areas include foodborne diseases (FBDs), the history of food safety regulations, types of childcare operations, Hazard Analysis and Critical Control Points (HACCP) in foodservice operations, and behavior change theories.

#### **Foodborne Disease**

Foodborne diseases, caused by bacterial, viral, and parasitic contamination, continue to be a matter of significant concern in the United States (U.S.). Mead, et al. (1999) reported staggering numbers of illnesses, hospitalizations, and deaths due to foodborne disease and associated chronic sequelae: hemolytic uremic syndrome (HUS) from *E. coli* 0157:H7; Guillain-Barré syndrome (GBS) from *Campylobacter*; and mental retardation from congenital *Listeria* (Buzby, 2001).

#### **Incidence of Foodborne Disease**

Bresee, Widdowson, Monroe, and Glass (2002) reported that Norwalk-like viruses (NLVs) accounted for two-thirds of all food-related illnesses, making them the most common, yet underreported, cause of foodborne diseases in the U.S. In 2004, there were 16,015 laboratory confirmed foodborne disease infections in the ten FoodNet surveillance sites (Centers for Disease Control and Prevention (CDC), 2006). These included: *Campylobacter*, 5,684 cases; STEC 01577 (*Hemorrhagic Colitis*), 402;

*Listeria*, 119; *Salmonella*, 6,498; and *Shigella*, 2,248; *Vibro*, 123; and *Yersinia*, 176 (CDC, 2006).

A 2004 CDC report stated that there had been 519 outbreaks and 16,382 individual cases of foodborne disease. The largest category for outbreak and cases were those with unknown etiology: 800 outbreaks and 11,867 cases. Other etiologies included bacterial with 208 outbreaks and 5,269 cases; chemical, 47 outbreaks and 153 cases; parasitic, 8 outbreaks and 230 cases; viral, 251 outbreaks and 9,994 cases; and multiple etiologies with 5 outbreaks and 726 cases (CDC, 2004a).

In the U. S., population surveys and laboratory surveillance are conducted to monitor food related illnesses. In 2004, 15% (43.3 million) of the U.S. population was monitored for foodborne disease with results estimating the rate of *acute gastroenteritis* to be .72 episodes per person annually. This figure represents an estimated 195 million episodes nationally (Flint, et al, 2005).

### **Practices in Foodservice that Cause Foodborne Disease**

In 2000, the Food and Drug Administration (FDA) Retail Food Program Steering Committee reported a 40% out of compliance rate of 17,477 food-handling observations analyzed (FDA & Retail Food Program Steering Committee, 2000). The food safety practices and behaviors that caused foodborne diseases and needed priority attention were: 1) cold holding of potentially hazardous food; 2) cold holding of ready-to-eat, potentially hazardous food; 3) commercially processed ready-to-eat, potentially hazardous food date marked; 4) clean, sanitized surfaces and utensils; and 5) proper, adequate handwashing (FDA Retail Food Program Steering Committee, 2000).

According to the FDA National Retail Food Team (2004), the three major causes of

foodborne disease in foodservice operations were poor personal hygiene, cross-contamination, and time-temperature abuse.

In 1995 and 1996, the Behavioral Risk Factor Surveillance Systems (BRFSS), a nationally administered telephone survey, which asked 12 food safety questions was conducted in seven states (Yang, et al., 1998). Respondents answering the 12 questions were those who had or were working in foodservice, had worked in food preparation, or had worked with ready-to-eat foods. Results showed that 18.6% of respondents did not wash their hands after handling raw chicken or meat, 19.5% did not wash the cutting board after cutting raw chicken or meat, 19.7% ate pink hamburgers, and 50.2% ate undercooked eggs (Yang, et al).

Green, et al (Green, et al, 2005) conducted a random telephone survey in the ten FoodNet surveillance sites to determine food-handling practices of foodservice employees. Participants were asked questions related to food safety and 40% indicated they always wore gloves when working with ready-to-eat foods. Foodservice workers who wore gloves indicated that over an eight-hour work shift, they changed gloves and washed their hands an average of 15 times (Green, et al).

Of respondents who worked with ready-to-eat foods and raw meat and poultry, the majority reported washing their hands (77%) and changing gloves between products (66%)(Green et al, 2005) . Foodservice workers indicated that visual cues, touch, and timers were used to determine the doneness of cooked foods. Approximately 47% of respondents indicated they used a thermometer. Of 484 respondents, only 4.7% indicated they had worked while sick with diarrhea or vomiting (Green, et al).

Findings indicated that foodservice employees frequently reported using food-handling practices that are considered dangerous (Green, et al, 2005). More than half (52.7%) of respondents indicated that they did not use a thermometer to check the doneness of cooked foods. While less than 5% of the foodservice employees admitted working while ill, other studies (Center for Science in the Public Interest, 2005) indicated that a large number of outbreaks are attributed to foodservice workers either because of cross-contamination or because foodservice employees work while ill.

### **Costs of Foodborne Disease**

The Economic Research Service (ERS) of the U. S. Department of Agriculture (USDA) (n.d.) estimated the foodborne disease costs for five pathogens: *Campylobacter spp.*, *Salmonella*, *E. coli* 0157, *E. coli*, non-0157 STEC, and *Listeria monocytogenes* was \$6.9 billion in 2000 (USDA, ERS). Costs were calculated to include all medical expenses, lost productivity, and premature death.

In 2002, estimated costs of illness due to *Campylobacter* and associated Guillain-Barré syndrome were \$1.2 billion annually (USDA, ERS, n.d.). Other estimates included *Listeria monocytogenes* at \$2.3 billion, *E. coli* 0517 at \$659.1 million, and non-0157 STEC at \$329.7 million annually. In 2003, annual illness costs attributed to *Salmonella* were estimated at \$2.8 billion (USDA, ERS).

Costs associated with foodborne disease include medical and laboratory fees, hospitalization, medication, and ambulance service. However, these costs are not exhaustive (Roberts, Buzby, & Ollinger, 1996). Table 1 presents some societal costs associated with foodborne disease. These costs are, in part, responsible for current food safety regulations.

**Table 2.1 Societal Costs of Foodborne Disease**

<b>Costs to individuals/households:</b>	<b>Industry Costs</b>
Medical/physician costs	Costs of animal production
Laboratory costs	Control costs for pathogens
Hospitalization or nursing home	Costs of new processes
Drugs and other medication	Outbreak costs
Ambulance or other travel costs	
Income/productivity losses	<b>Outbreak Costs</b>
Averting behavior costs	Costs of investigating outbreak
Psychological costs	Testing to contain an outbreak
	Costs of cleanup
	Legal suits to enforce regulations that may have been violated
<b>Research costs</b>	<b>Regulatory/public health costs</b>
Identify new pathogens	Disease surveillance
Develop cheaper/faster pathogen testing	Monitor incidence/severity of foodborne pathogens to humans
Identify which customers are high-risk for which pathogens	Monitor pathogen incidence in all links in food chain
Establish high-risk products and production and consumption practices	Develop integrated database for foodborne pathogens
Risk assessment modeling for all links in food chain	
Adapted from Buzby, et al (1996)	

### **History of Food Safety Regulations**

As the incidence and costs of foodborne disease increase, so do food safety regulations. The United States Public Health Service first proposed basic food safety practices in 1934. *An Ordinance Regulating Food and Drink Establishments* was mimeographed in December 1935 with updates in 1938, 1940, and 1943 (FDA, 2005).

In 1957, a new regulatory manual was published: *The Vending of Foods and Beverages – A Sanitation Ordinance and Code*. The manual was revised in 1965 and 1978. However, another manual, *Food Service Sanitation Manual Including A Model Food Service Sanitation Ordinance and Code* was published in 1962 and updated in 1976. In 1982, FDA published the *Retail Food Store Sanitation Code* (FDA, 2005).



A new name was used for the document in 1993 with the publication of the *Food Code*. This manual was revised every two years until 2001. At that time, the FDA and the Conference for Food Protection agreed that publication of a complete revision could be expanded to every four years with supplements available, if necessary, in the interim (FDA, 2005).

The FDA *Food Code* recommends basic food safety procedures. It is intended as a model for local, state, tribal, and federal regulators. Additionally, it provides guidance based on scientific evidence and is the legal basis for regulating retail and foodservice operations. The *Food Code* (FDA) is, essentially, a “best practices” manual and contains references on how to prevent foodborne diseases by controlling known risk factors (FDA, 2005).

### **Hazard Analysis and Critical Control Points (HACCP)**

In 1959, before the food safety regulations were fully developed, the National Aeronautics and Space Administration contracted with Pillsbury to develop a more scientific approach to food safety for the space program. Scientists named this program Hazard Analysis and Critical Control Points (HACCP) (Stevenson & Bernard, 1999).

In 1971, HACCP was presented at the National Conference on Food Protection. In 1985 the National Academy of Sciences recommended that regulators and the food industry use HACCP. Based on this recommendation, the National Advisory Committee on Microbiological Criteria for Foods (NACMCF) developed guidelines and published the principles of HACCP in 1989 with revisions in 1992 and 1997 (Hulebak & Schlosser, 2002; Stevenson & Bernard, 1999). In May 1995, the FDA announced that seven food companies were going to pilot test a new program of preventive controls to enhance food

safety using HACCP. The purpose of the pilot was for FDA to determine the practicality of HACCP (FDA, 1995).

HACCP was mandated for the seafood industry in December 1995, with the third edition of the guidance document available in June 2001 (FDA, n.d.). The USDA and FDA required meat and poultry plants to implement HACCP between December 1996 and December 1998, and juice processing plants by January 2004 (FDA). There also are programs such as the egg safety action program, a voluntary dairy HACCP, and a low acid canned foods process. HACCP is voluntary for retail foodservice operations (FDA).

HACCP is comprised of seven principles that guide the system. Because there are many differences in production methods, food formulations, and packaging materials, no two HACCP programs will be identical (National Assessment Institute (NAI), 1994). The seven principles as applied to production and manufacturing are: 1) Conduct hazard analysis; 2) Determine critical control points; 3) Establish critical limits; 4) Establish monitoring procedures; 5) Identify corrective actions; 6) Verify that the system works; and 7) Establish procedures for record keeping and documentation (NAI).

Academic literature has acknowledged HACCP as a proactive, scientific based food safety program that can decrease the number of foodborne disease outbreaks associated with food if used properly (NACMCF, 1998). According to the NAI (1994), using traditional approaches, foodservice facilities could earn high scores on traditional inspections for clean walls, floors, and equipment and still have defects in food safety. Time/temperature abuse and food contaminated by workers, chemicals, and equipment were consistently found to be the cause of many illnesses (NAI, 1994). HACCP focuses on identifying, monitoring, and correcting these critical food safety behaviors.

Additionally, as no two HACCP programs are alike, it is important to have a clear understanding of the operation type.

### **Types of Child Care**

There are several recognized types of childcare operations. Group day care homes provide care for up to 12 children less than 16 years of age (Federal Register, 2006). Preschools provide learning experiences for pre-kindergarteners who must be at least 30 months of age. The term "preschool" includes Montessori schools, nursery schools, church-sponsored preschools, and cooperatives. A preschool can care for a maximum of 13 children for no more than a three-hour period per day (Federal Register, 2006).

Childcare Centers care for 13 or more children who are two months to 16 years old for at least three hours a day but less than 24 hours a day. Besides general care, centers may provide educational activities. The center must employ a qualified program director full-time and have the appropriate number of qualified staff based on the number of children in care (Federal Register, 2006)

### **National Child Care Standards**

*Caring for Our Children: National Health and Safety Performance Standards: Guidelines for Out-of-Home Child Care* is a collaborative effort by the American Academy of Pediatrics, the American Public Health Association, and the National Resource Center for Health and Safety in Child Care (NRCHSCC) (NRCHSCC, 2002). These standards were designed for use by health professionals, trainers, regulators, childcare providers, academics, and researchers, and can be used for administrative

guidance, reference, revision of licensing requirements, funding decisions, or as information for parents and the public.

The standards affirm that childcare is governed by at least three different legal entities or jurisdictions (NRCHSCC, 2002, p. xxi). The three independent departments are responsible for enforcing building codes, health codes, and childcare licensing. Also stated explicitly is that the standards do not address laws or regulations for each state and that in the event of standards being less stringent than local laws or regulations, the local requirements prevail. Broad areas of performance are covered in each chapter with areas subdivided to explain each standard.

Areas included in the standards (NRCHSCC, 2002) important to this research are guidelines for nutrition and food service, including staffing, meal service, meal patterns and requirements, and food safety, and procedures for the control and management activities related to infectious diseases including enteric diseases (NRCHSCC, 2002). The food safety standards state only to follow state and local laws and regulations.

### **Child and Adult Care Food Program**

The Child and Adult Care Food Program (CACFP) provides meals and snacks to U.S. children in Childcare Centers, Head Start, and other programs (USDA, ERS, 2006). Participating Childcare Centers account for approximately 60% of the 1.8 billion meals served by CACFP.

The Child and Adult Care Food Program require that centers participating in the program follow nutritional and meal pattern guidelines (Federal Register, 2006). In general, breakfast contains one serving each of milk, grain/bread, and fruit/vegetable and lunch contains one serving each of milk, grain or bread, meat or meat alternative and two

servings of fruits or vegetables. Snacks, morning and afternoon, include one serving of two of the following: milk, grain or bread, meat or meat alternative, and fruits or vegetables (Federal Register, 2006). These requirements are mirrored by childcare accrediting agencies (NAEYC, n.d.).

### **Foodservices in Child Care Centers**

Childcare Centers that are reimbursed through the CAFCP (Federal Register, 2006) must follow the nutritional requirement and meal pattern guidelines. The USDA Food and Nutrition Service (FNS) reports indicated that Childcare Centers typically include meals in their fees. Childcare Centers receive payments based on the type of meal served and the child's eligibility (USDA, FNS, April 24, 2006). Childcare Centers receiving reimbursement from the Child and Adult Care Food Program are required to comply with all state and local laws and regulations concerning food safety and sanitation (Federal Register, 2006).

### **Foodborne Diseases in Children & Child Care**

Childcare attendance has been reported as associated with a number of infections and outbreaks. Keswick, Pickering, DuPont, and Woodward (1983) studied survival time of bacteria on surfaces in Childcare Centers. In a limited sample, 16% of apparently clean surfaces were contaminated with rotavirus (Keswick, et al.). Novoty, Hopkins, Shillam, and Janoff (1990) reported that *Giardia lamblia* was often discovered in asymptomatic children and 46% of all *G. lamblia* infections in Colorado residents during 1983 might have been associated with children attending Childcare Centers.

Reeves, et al. (1990) found that fecal colonization of a strain of *E. Coli* was higher among children in child care (30%) than among control children (6%) or medical

students (8%). In 1991, researchers (Hurwitz, Gunn, Pinsky, & Schonberger, 1991) reported that the second most common cause of illness for children attending child day care was diarrheal illnesses. Wilde, Van, Pickering, Eiden, and Yolken (1992) stated that rotaviruses are rampant in day care facilities during diarrheal outbreaks. Hedberg and Osterholm (1993) reported that Norwalk-like viruses (*rotaviruses, caliciviruses, and astroviruses*) had become the most common cause of viral *gastroenteritis* outbreaks in young children.

Matson (1994) identified factors that promote the spread of viral *gastroenteritis* in child care facilities which included the high infectious rate of viruses, recognition that infections occur most often during outbreaks and asymptomatic infections are more common than symptomatic infections. Stroup and Thacker (1995) proposed increased surveillance of child care facilities because the risk of children having a diarrheal incident was 1.6 to 3.5 times higher than for those who stayed at home and there were significant risks of spreading infection from these outbreaks.

Gratz and Claffey (1996) studied health behaviors of directors, teachers, and providers of childcare. Results showed that more than 80% of workers in all three groups reported they had gone to work while ill for a variety of reasons. No substitutes, not ill enough to stay home, and work responsibilities were some of the reasons given for exposing children to illness (Gratz & Claffey).

Parashar, Hummelman, Bresee, Miller and Glass (2003) reported that for children less than five years old, one in 73 was hospitalized for *rotavirus gastroenteritis* between 1993 and 1995. Daniels, et al (2002) reported that nearly 50,000 illnesses,

approximately 1500 hospitalizations, and one death were attributed to foodborne disease in U.S. schools between 1973 and 1997.

Tucker, et al (1998) reported that nearly 1.5 million doctor visits, 200,000 hospitalizations, and 300 deaths per year of children in the U. S. were caused by *acute gastroenteritis*. About one third of all hospitalizations of children less than five years old are for *rotavirus* diarrhea. Foodborne disease costs in direct medical care for these children are estimated to be \$250 million per year, with an additional societal cost estimated at \$1 billion per year (Tucker, et al).

Roberts, et al (2000) discussed the effectiveness of handwashing interventions in Childcare Centers. Intervention facilities reduced diarrheal incidents by 50 percent. In facilities with high children's compliance, the reduction was up to 66 percent. Aronson (2003) stated that childcare staff are educators, not health care workers, and that gloves were regularly misused in child care facilities.

The CDC (CDC, 2006a) confirmed 43 foodborne disease outbreaks in Childcare Centers, which affected 1,276 children between 1990 and 2004. CDC (CDC, 2004b) reported cases of *Shigella sonnei* in six states: Virginia (876), Maryland (250 ill, one death), New Jersey (254), South Carolina (95), Delaware (200), and North Carolina (935). High portions of these were associated with day care attendance (CDC, 2004b).

Reported U.S. cases of notifiable foodborne disease in 2003 for children less than 5 years old were *Botulism*, 76; *Cryptosporidiosis*, 759; *E. Coli* 0157:H7, 617; *Giardiasis*, 3,737; *HUS*, 89; *Hepatitis A*, 231; *Listeriosis*, 68; *Salmonellosis*, 12,012; and *Shigellosis*, 7,083 (CDC, 2005). De Wit, Koopmans, Marion, and Duynhoven (2003) studied risk factors associated with contracting *gastroenteritis*. Results indicated that Norovirus and

*rotavirus* were independently associated with food-handling hygiene and that, for children less than five years old, food-handling hygiene was a risk factor. To reduce and/or prevent foodborne diseases in Childcare Centers, implementation of a HACCP based food safety program would be beneficial.

### **HACCP in Foodservice Operations**

Since no research has been conducted with HACCP and Childcare Centers, a review of the research in retail and non-commercial operations highlight potential benefits and barriers to implementation of HACCP-based food safety programs. The range of policies and programs that provide the foundation for HACCP are prerequisite programs. Examples of prerequisites would be policies and procedures for personal hygiene, cleaning and sanitation, pest control, and food safety training, to name a few. Without these prerequisite programs, the successful implementation of a HACCP-based food safety program is uncertain (NACMCF, 1998).

In Iowa retail operations, Roberts & Sneed (2003) found that of 13 barriers listed 60.6% of respondents indicated employee training and employee motivation were the greatest barriers to implementing prerequisite and HACCP programs. Other barriers identified included manager's time to implement programs, more money to spend on food safety, and employees' time to follow food safety practices. In a follow-up study, Roberts, Barrett, and Sneed (2005) found that sanitarians in Iowa and Kansas felt the greatest barriers were employee knowledge and time.

Sauer (1998) found that college and university foodservice directors were in various stages of HACCP implementation. Slightly more than five percent reported complete implementation. Partially implemented programs were reported by 51.3% of



respondents. In a subsequent study, Riggins, Roberts, and Barrett (2005) found that 28% of college and university foodservice directors had fully implemented HACCP programs.

In school foodservice, Hwang, Almanza, and Nelson (2001) found that of 162 school foodservice managers, 22 (14%) had HACCP programs in their facilities. Of those who did not currently have a HACCP program, only 28% had plans to implement HACCP. The majority (69%) did not know what a HACCP program was or had no plans of implementing HACCP.

Sullivan, Harper, and West (2002) surveyed 1,000 randomly selected school foodservice managers to determine the training needs of foodservice site managers. Of 38 training topics listed, three were related to food safety. Respondents (36%) indicated that training was needed in proper food handling and correct sanitation procedures and 28% of respondents felt training was needed in receiving, storing, rotating, and ordering foods (Sullivan, et al).

Giampaoli, Sneed, Cluskey, and Koenig (2002) examined U.S. school foodservice directors' attitudes and perceived challenges to HACCP implementation. The survey was administered to a national sample of 800. Results indicated that the majority of school foodservices had not implemented a HACCP program, and some respondents were unaware of what HACCP was or how to implement such a program. The greatest obstacles to HACCP implementation were time and money followed by employees' attitudes, lack of adequate facilities, and lack of staff (Giampaoli, et al).

Youn and Sneed (2003) found that school foodservice directors in Iowa had implemented HACCP because of various internal and external reasons. Reported reasons included stringent health department requirements, understanding the high-risk

population they served, fear of the penalty for not having a HACCP program, elevated appreciation of food safety issues, and the severe consequences of a foodborne disease outbreak (Youn & Sneed).

Strohbehn, Gilmore, and Sneed (2004) assessed perceptions of Registered Dietitians (RDs) and dietary managers about food safety practices and HACCP implementation. Almost all dietary managers and more than half of the RDs responding had completed food safety certification. The highest food safety concern indicated by both RDs and dietary managers were inexperienced employees, lack of knowledge about handwashing, and lack of handwashing practices. Barriers to HACCP implementation identified by both RDs and dietary managers were factors related to employees (knowledge, supervision, and turnover), time (to develop/implement HACCP, and conduct training), and commitment (monitoring HACCP and value perception of HACCP) (Strohbehn, et al).

Henriod, Mendonca, and Sneed (2004) conducted a microbiological assessment of food contact surfaces in 40 schools located in Iowa. Results showed that only four of the schools met all the standards for aerobic plate counts for all surfaces tested. Conclusions implied improvement was needed in cleaning and sanitation procedures.

Sneed, Strohbehn, and Gilmore (2004) evaluated food safety practices and readiness to implement HACCP programs in 40 Iowa assisted living facilities. Employees had high scores for both knowledge and attitude, but performance on the knowledge questions varied significantly with position title and certification status. Questions about sanitizer strength and cooling time were the ones answered incorrectly

most often. Food handling assessments indicated that sanitizing procedures, handwashing, and temperature recording needed improvement (Sneed, et al).

Research shows that the most common foodborne disease risk factors in school foodservice were directly related to food handling and sanitation practices of foodservice employees (FDA Retail Food Program Steering Committee, 2000; FDA National Retail Food Team, 2004). These may be a result of the reported barriers to HACCP implementation by school foodservice employees that included time, training, money, and resources (Giampaoli, et al., 2002; Hwang, et al., 2001; Strohbehm, et al., 2004; Youn & Sneed, 2002; 2003).

With most risk factors for foodborne disease being directly related to food handling practices and sanitation procedures performed by employees, it seems evident that traditional training is not working (Jenkins-McLean, Skilton, & Sellers, 2004). It has been shown that knowledge alone does not persuade people to execute food safety activities accurately or dependably (Cates, 2002). Researchers need to ascertain what foodservice employees believe about safe food handling practices and this could be accomplished by studying employee attitudes using behavior-change theories.

### **Behavior Change Theories**

Models of behavior at the individual level fall within the broad category of cognitive-behavioral theories. A key concept applicable to all these theories is that "...behavior is considered to be mediated through cognitions; that is, what we know and think affects how we act" (U.S. Department of Health and Human Services, National Institutes of Health, 2003). Glanz, Lewis, and Rimer (1997) described the most commonly used theories in health behavior and education in a two-year period: 1992 to

1994. The Health Belief Model (Health Belief Model) was shown as being used by most researchers with Theory of Reasoned Action (TRA) a close second. “The Health Belief Model was one of the first models that adapted theory from the behavioral sciences to health problems” (U.S. Department of Health and Human Services, National Institutes of Health, 2003).

### **The Health Belief Model**

The Health Belief Model has had a major influence in health behavior research and practice (Glantz et al, 1997, p.38). Rosenstock (1974) reported that the Health Belief Model was initially developed for preventative health behaviors, or behaviors that decrease the likelihood of a health problem occurring. The theory is based on the assertion that individuals protect their health if they:

- 1) consider themselves as susceptible to a health condition with inauspicious consequences (threat); 2) believe that certain behaviors will reduce the susceptibility and/or severity of the health condition and that the benefits of the behavior are greater than the barriers (outcome expectations); and 3) are confident in their ability to perform the behavior (efficacy expectations) (Athearn, et al, 2004).

Meta analyses of the Health Belief Model concluded that the most distinct predictor among the Health Belief Model dimensions across all studies and behaviors was perceived barriers (Kirscht, 1974; Rosenstock, 1974). Perceived severity was shown to be the least powerful predictor (Glantz, et al., 1997).

Janz and Becker (1984) summarized 46 studies and noted that in the eleven studies utilizing a prospective research design, “perceived barriers” obtained positive, significant results, and that the “perceived severity” dimension generated the poorest results. However, few studies prior to 1974 attempted to measure “perceived barriers” (Janz & Becker).

Maiman, Becker, Kirscht, Haefner, & Drachman (1977) developed scales for each of the model components and evaluated the Health Belief Model for dimension relationships and consistency. Components of the Health Belief Model were measured with multiple questions rated on a six-point Likert-type scale. Consistency coefficients above .90 were found for the constructs severity, susceptibility, and combined “overall health concern” and “general health threat”. Additionally, indices above .80 were found for “special health practices” and “seriousness of overweight”. Multiple regression techniques demonstrated the usefulness of employing the constructs together (Maiman, et al). Results indicated that indices based on Health Belief Model dimensions were useful in explaining and predicting behavior.

Bond, Nolan, Pattison, and Carlin (1998) studied mothers’ perceptions of vaccine preventable diseases using Health Belief Model constructs. A purposeful sample of 150 individuals yielded a 47.3% response rate for completed interviews (n = 45). The participants were asked the same questions and all questions were open-ended. Interviews were audio taped, transcribed, and coded. Questions relating to perceived susceptibility and severity showed that mothers did not feel that very young children were at risk for diseases or that they would get a serious disease (which were defined by the parents as “life-threatening, chronic, or long lasting”) (Bond, et al). Benefits of prevention and benefits of diseases, which were not considered serious, were seen as equally beneficial. No difference in benefits between contracting the disease and being vaccinated were found. Barriers to vaccination included anti-vaccination information, physician dismissal of concerns and side effects, and confusion about which vaccinations the children had already received or what ones were needed (Bond, et al).

Vaccination was perceived as beneficial because it prevented disease but it was also perceived as detrimental to the child's immune system. The perceived effect on the immune system was a barrier to mothers feeling comfortable about immunizing their children. Conversely, the risks of diseases to their young children were not so immediately present to these mothers (Bond, et al, 1998, p. 445).

Scandell and Wlazelek (2002) validated the Aids Health Belief Scale (AHBS) by randomly assigning participants to one of two experimental conditions to complete a questionnaire: face-to-face interview or self-administration. The sample (n = 189) included 86 men and 103 women. The AHBS contained 16 items to measure the four components (four items each) of the Health Belief Model on six point Likert scales. Reliability was measured using Cronbach's alpha. The total model had an alpha of .82 and construct reliabilities ranged from .83 to .92. The model accounted for 64% of the variance for a four-factor solution (Scandell & Wlazelek). A significant negative correlation was found between benefits and barriers but significant positive correlations between benefits and susceptibility and severity and barriers were found. The AHBS did not predict high-risk sexual behavior; however, it did appear to be measuring the constructs related to sexual attitudes and beliefs (Scandell & Wlazelek, 2002).

Jenkins-McLean, Skilton, and Sellers (2004) examined the effect of using behavior-change theories in foodservice operations. The study involved 250 employees of 40 individual foodservice operations at a large sports arena. Behavior change was measured by the change in inspection scores and violations noted. An instrument was administered to identify "mutable causes" of violations found by the health inspectors. Mutable causes were defined as "behavioral barriers that influence people's actions and thoughts" (p. 15) such as lack of knowledge and management decisions (Jenkins-McLean, et al). Results showed that greater success is achievable in changing behaviors when proven behavior-change theories are used to design and implement a program (Jenkins-McLean et al). Enforcement actions (fines, etc.) serve as only a temporary solution to a problem. The authors concluded that achievement of sustainable

improvements depends on identifying mutable causes, solutions, and preferred training methods of employees. The results could be used in developing training programs (Jenkins-McLean et al).

### **Self-Efficacy**

Strecher, De Vellis, Becker, and Rosenstock (1986) reviewed research on health behavior-change that included the construct of self-efficacy. Of surveys reviewed, results showed that when other psychosocial constructs also are examined, self-efficacy is a distinct and powerful predictor of behavior.

Wood and Bandura (1989) argued that in behavior-change, a strong sense of efficacy will support accomplishments. The concept of efficacy states that if a person believes they can successfully perform a behavior; there is a greater likelihood of that person actually performing the behavior (Grembowski, et al, 1993; Wood & Bandura).

Harrison, Rainer, Hochwarter, and Thompson (1997) examined relationships between self-efficacy and performance. Questionnaires were mailed to salaried personnel in a large university located in the U.S. (n=3488). The response rate was 22.3% (n = 766). Statistically significant relationships were found between self-efficacy and the performance variables. Analysis showed 28% of variability was explained by self-efficacy. The researchers concluded that the self-efficacy construct was central in behavioral research in the organization (Harrison, et al).

Basen-Engquist, et al. (1999) used baseline data from an existing project to identify determinants of HIV/STD-related risk behavior. Initial sample data included information for students (n = 7,614) in grades 9 to 12. The only Health Belief Model constructs were perceived barriers (six items, later reduced to three as suggested by factor

analysis) and self-efficacy (three items). A moderate significant correlation was found between self-efficacy in buying/using condoms and barriers to condom use ( $r = -.68$ ). Individual item reliabilities for self-efficacy in using condoms were .41, .52, and .38 with an overall alpha of .61. Reliabilities for barriers to condom use were .49, .74, and .50 with an overall alpha of .73. The models indicated good construct validity for measuring self-efficacy and barriers related to condom use. Models tested using confirmatory factor analysis fit the data well (Basen-Engquist).

Von Ah, Ebert, Ngamvitroj, Park, and Kang (2004) identified predictors of health behaviors in college students using a cross-sectional research design. Of the initial 400 students, 161 (40%) participated in the study. Perceived self-efficacy and the health behavior questionnaire each had 46 items and five subscales. Structural equation modeling determined if the Health Belief Model constructs mediated or moderated dependent variables (Von Ah, et al). Self-efficacy significantly predicted alcohol and smoking behavior, physical activity and nutrition protection behavior, general safety protective behavior, and sun protective behavior. Under high-perceived threat (susceptibility multiplied by severity), self-efficacy was mediated by perceived barriers for binge drinking and moderated by perceived barriers for physical activity and nutrition protection behavior (Von Ah, et al). Under high threat, self-efficacy was moderated by perceived threat for alcohol use at 30 days and 6 months. Under low threat, perceived barriers for smoking behaviors and general safety protection behaviors mediated self-efficacy. “The most noted finding was that self-efficacy was a significant predictor of all health-behaviors examined and that it has a positive influence on each except for smoking” (Von Ah, et al, p. 471).



Rhodes and Arceo (2004) used Health Belief Model constructs to predict Hepatitis A (HAV) vaccination in homosexual men. Five point Likert scales were used to measure perceptions of barriers (26 items), benefits (9 items), susceptibility (12 items), severity (7 items), and self-efficacy (11 items). Of the initial 415 bar patrons approached, 398 completed the questionnaire for a response rate of 96%. Multivariate logistic regression analysis showed that perceived barriers, perceived benefits, and perceived severity were positively associated with HAV vaccination (Rhodes & Arceo). “Confirmatory factor analysis shows four of five scales had acceptable absolute model fits and that all five scales had excellent comparative model fits” (Rhodes & Arceo, p. 279).

### **Health Belief Model Modification**

The Health Belief Model has been modified in different ways to meet the needs of the various researchers (Kirscht, 1974). The Theory of Reasoned Action (TRA) model asserts that intention is an antecedent of behavior (Gilbert, Fiske, & Lindzey, 1998). Poss (2001) developed a model based on the Health Belief Model and the TRA to account for differences based on culture. Poss stated that both models are based on value-expectancy theory and proposed that beliefs should predict behavior. Poss thought that combining elements of both models should explain differences in cross-cultural research.

The concepts of perceived barriers and perceived benefits of Health Belief Model were believed to be nearly identical to the beliefs and evaluation concepts of the TRA (Poss, 2001). The concept of intention was included because previous research had shown the construct to be a good predictor of behavior.

Wdowik, Kendall, Harris, and Auld (2001) administered an instrument to diabetic college students based on a proposal to extend the Health Belief Model. The proposed model contained the constructs perceived threat, benefits, barriers, and cues to action from the original Health Belief Model. Extensions to the model included self-efficacy, outcome expectations, intention, subjective norms, measures of health importance, locus of control, emotional response, value of action, and situational factors (Wdowik, et al).

The researchers found that intention and emotional response were important predictors of positive behavior and health importance. Situational factors and emotional response were substantial barriers to optimal health behaviors (Wdowik, et al., 2001).

Juniper, Oman, Hamm, and Kerby (2004) conducted a cross-sectional analysis of African-American college women to test the relationships between constructs in the Health Belief Model and the Transtheoretical Model (TTM). A focus group (n = 6) identified salient perceptions of physical activity that could represent the Health Belief Model constructs. Focus group results were used to modify an existing instrument. All constructs were measured on four-point Likert scales, except self-efficacy, which was ranked 0 to 100. Cronbachs' alpha ranged from .76 to .92. ANOVA was used to determine differences among Health Belief Model constructs for each stage of behavior. Most Health Belief Model constructs differed significantly ( $p < .05$ ) among groups for one or more behavior stages. Perceived barriers, perceived severity, and self-efficacy were found to be important factors related to physical activity (Juniper, et al., 2004)

Sullivan, Pasch, Cornelius, and Cirigliano (2004) proposed that the constructs of the Health Belief Model, social norms, knowledge about divorce, and demographics influence intentions, which in turn would predict participation in premarital counseling.

The Health Belief Model scale was developed from content analysis from a focus group containing 16 newly married couples and modeled after existing Health Belief Model scales (Sullivan, et al). The final Health Belief Model scale contained 23 items: susceptibility (6 items), severity (5 items), barriers (8 items), and benefits (4 items) on five-point Likert scales. Cronbachs' alpha for two sets (men and women) of the four subscales ranged from .76 to .87. After controlling for demographics, Health Belief Model factors significantly predicted intentions: 34% in men, 33% in women ( $p < .001$ ). Participation in premarital counseling was predicted by perceived barriers (.20 in men, -.14 in women ( $p < .001$ )). Perceived susceptibility, perceived severity, and perceived barriers predicted intentions in women, where only perceived barriers predicted intentions in men. Perceived barriers predicted actual participation in counseling for both men and women (Sullivan, et al).

Norman and Brian (2005) extended the Health Belief Model to include the Breast Cancer Worry Scale (BCW) to predict breast self-examination (BSE). Women (1,000) were recruited over an 18 month period. Initial questionnaires (Time 1) were returned by 833 (83.3%), of whom 567 (68.1%) completed the second questionnaire (Time 2). Principal component analysis resulted in five factors: perceived emotion barriers (5 items,  $\alpha = .82$ ), perceived self-efficacy barriers (5 items,  $\alpha = .77$ ), perceived severity (4 items,  $\alpha = .71$ ), perceived benefits (3 items,  $\alpha = .69$ ), and perceived susceptibility (2 items,  $\alpha = .74$ ). At Time 1, past behavior ( $\alpha = .88$ ), self-efficacy barriers ( $\alpha = .66$ ), emotion barriers ( $\alpha = .34$ ), and benefits ( $\alpha = .34$ ) predicted frequency of BSE at Time 2. At Time 2, self-efficacy ( $\alpha = .63$ ), severity ( $\alpha = .43$ ), and BCW ( $\alpha = .61$ ) predicted frequency of BSE at

Time 2. The analysis confirmed self-efficacy as an important factor in predicting BSE (Norman & Brian, 2005).

Brown (2005) measured perceived benefits and perceived barriers for physical activity in a cross-sectional study of 398 undergraduate students. Perceived benefits and perceived barriers were measured on a four-point Likert scale with 29 items. Self-efficacy was measured with five items. The Exercise Benefits/Barriers Scale (EBBS) showed good reliability and convergent validity. Internal consistency for barrier items was  $\alpha = .80$  and benefits was  $\alpha = .92$ . Perceived benefits and perceived barriers were moderately correlated with self-efficacy, .35 and .39 respectively. Perceived benefits and perceived barriers were shown to account for only a small amount of variance in physical activity. Perceived benefits accounted for 4% of the variance (Brown, 2005).

### **Health Belief Model & Food Safety Research**

The Health Belief Model has been used in previous food safety research. Schafer, Schafer, Bultena, & Hoiberg (2004) examined food safety attitudes and behaviors using a mailed questionnaire. Respondents reported that they always washed and peeled fresh produce (68.5%), always wash poultry before use (78.6%) and often bought prepared foods (52.8%) (Schafer, et al).

Hanson and Benedict (2002) investigated associations between perceived threat (which is perceived susceptibility plus perceived severity) and safe food-handling behaviors among older adults. The findings suggested that not all health behaviors have the same association with perceived threat, indicating other predictors may exist (Hanson & Benedict).

Boone, et al (2005) identified food-handling behaviors of adults age 65 and older. Participants reported cost, time, prior knowledge, tradition, skepticism, and habit as obstacles to performing safe practices.

The present research reviewed existing health belief and food safety questionnaires that used Health Belief Model, behavioral intention, and self-efficacy constructs (Brown, 2005; Norman & Brian, 2005; Poss, 2001). Researchers (Hanson & Benedict, 2002; Schafer, et al., 2004; Warburton & Terry, 2000) have concluded that the Health Belief Model is useful in identifying beliefs related to food safety. Although the Health Belief Model has been successful in predicting behavior, the literature review shows limited research on food safety behavior utilizing the Health Belief Model (Becker, et al, 1977; Hanson & Benedict, 2002; Kirscht, 1974; Maiman, et al, 1977; Rosenstock, 1974; Schafer, et al, 2004).

It was the purpose of this study to determine beliefs and perceptions of Childcare Center directors and foodservice employees related to their willingness to follow HACCP-based food safety programs. Beliefs and perceptions were identified using the HBM constructs perceived susceptibility, perceived severity, perceived benefits, and perceived barriers. The construct self-efficacy and behavioral intention were added to determine levels of confidence (skills and ability) and intention of following HACCP-based food safety program.

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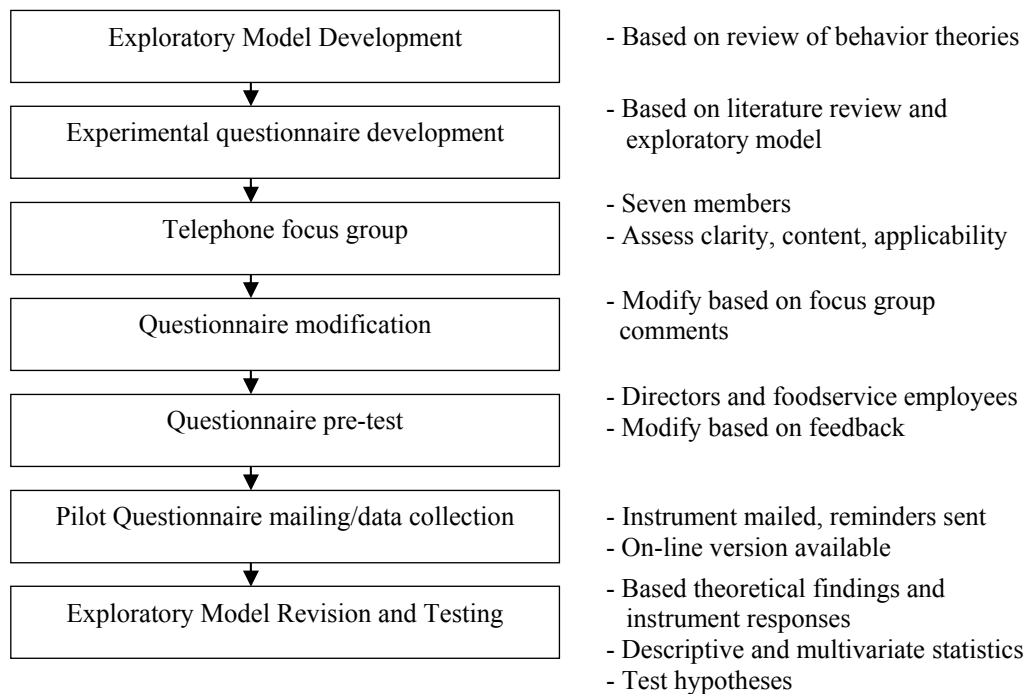
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## CHAPTER 3

### METHODOLOGY

This chapter describes the steps taken to accomplish the study objectives. Included in this chapter are explanations of the population and sample, model development, instrument development, focus group, pre-test, data collection, and data analysis. The purposes of this research were to develop an instrument and test an exploratory model based on the Health Belief Model to assess beliefs and perceptions of Childcare Center directors and foodservice employees about HACCP-based food safety programs and to investigate the status of HACCP prerequisite programs. Beliefs and perceptions were identified using the Health Belief Model constructs: perceived susceptibility, perceived severity, perceived benefits, and perceived barriers. The research procedures are presented in Figure 1.



**Figure 3.1 Overview of Research Progression**

## **Population and Sample**

The population for this study included directors and foodservice employees at 528 accredited Childcare Centers located in the states of Colorado (n = 122), Iowa (n = 99), Kansas (n= 64), Nebraska (n = 58), Missouri (n = 100), and Oklahoma (n = 80). A response rate of 25% was desired to conduct statistical analysis.

## **Model Development**

The theoretical model for this research was based on the Health Belief Model (Health Belief Model). The original Health Belief Model asserts that individuals protect their health if they: 1) consider themselves susceptible to an illness; 2) believe behaviors reduce susceptibility and/or severity of the illness and behavior benefits are greater than barriers; and 3) are confident they can perform the behavior (Rosenstock, 1974).

A second theory used in the model was the Theory of Reasoned Action (TRA), which is based on value-expectancy theory and asserts that “behavioral intention” is the immediate predecessor of behavior (Gilbert, Fiske, & Lindzey, 1998). For behaviors that cannot be directly observed, intention questions measure and interpret intention to perform behaviors. To complete the model, the construct self-efficacy was added because of its impact on behavior (Brown, 2005; Norman & Brian, 2005). Self-efficacy states that if a person believes they can successfully perform a behavior there is a greater likelihood of that person actually performing the behavior (Norman & Brian).

The conceptual definitions of the constructs are based on those used by previous researchers (Champion, 1984; Gilbert et al, 1998; Wood & Bandura, 1989) and are below. These constructs also provided guidance for the development of the experimental questionnaire.

**Perceived susceptibility:** Perceptions and beliefs of the likelihood of children contracting foodborne illnesses at the Childcare Center

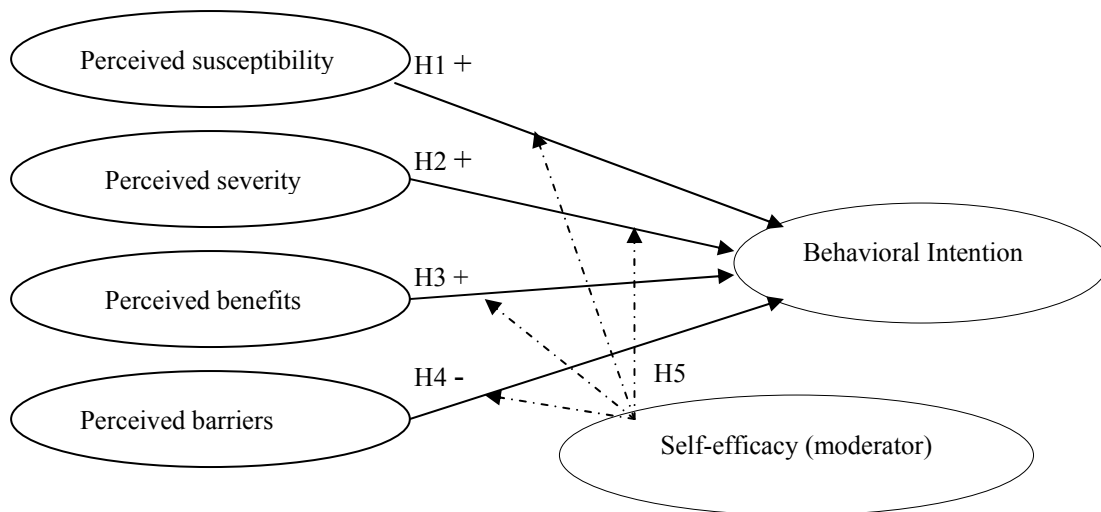
**Perceived severity:** Perceptions and beliefs about the amount of harm expected or seriousness of a foodborne illness to a child

**Perceived benefits:** Perceptions and beliefs that following a HACCP-based food safety program would reduce foodborne illnesses

**Perceived barriers:** Perceptions and beliefs about obstacles that prevent one from following a HACCP-based food safety program

**Self-efficacy:** Degree of beliefs that one can follow a HACCP-based food safety program successfully

**Behavioral intention:** A substitute for actual behavior, it is the intention to follow a HACCP-based food safety program



**Figure 3.2 Proposed Exploratory Research Model**

## **Instrument Development**

By reviewing previous questionnaires using the Health Belief Model (Champion, 1984) and food safety research (Giampaoli, Sneed, Cluskey, & Koenig, 2002; Youn & Sneed, 2002), an instrument was developed using the proposed model to reflect food safety beliefs and perceptions. Items focused on either the Childcare Center, the children at the Childcare Center, or HACCP-based food safety programs. Multiple items measured each concept and the instrument was available in both paper and electronic formats (Appendix A).

The instrument contained 33 items based on the proposed constructs. Six items measured the construct perceived susceptibility and focused on either the Center or the children as it related to foodborne diseases. Perceived severity, which was measured with eight items, addressed the severity of consequences to either the Center or the children in the event of a foodborne disease occurring. Perceptions of benefits and barriers to following a HACCP based food safety system were measured with four and nine items, respectively. The items included benefits and barriers identified in research conducted in other segments of the foodservice industry ((15-17)). Self-efficacy items (n = 3) were worded to assess general agreement about confidence, skills, and knowledge level related to following HACCP-based food safety programs. Three items measured behavioral intention and asked about plans to follow HACCP-based food safety programs in the future. Statements (n = 33) were measured on a five-point Likert scale (one being strongly disagree to five being strongly agree).

Part II asked questions about the facility and the implementation status of nine prerequisite programs, which included personal hygiene, chemical storage, purchasing

procedures, pest control programs, equipment cleaning procedures, kitchen operation policies, equipment maintenance programs, food safety training programs, and food allergy procedures. Part III obtained demographic information. The questionnaire and research protocol were reviewed and approved by the Human Subjects Committee for the Institutional Review Board (Kansas State University, Manhattan) (Appendix B).

### **Telephone Focus Group**

Childcare Center directors in Kansas were asked to participate in a telephone focus group (Silverman, n.d.) and a \$10 grocery card and digital thermometer were given as incentives for participating. Twenty-three facilities were contacted and eight directors agreed to participate in the focus group. The focus group, coordinated through Dole Communications Center at Kansas State University, was conducted by an experienced facilitator who had developed a moderator's guide using the initial instrument (See Appendix C). Participants were given a toll free number to call at a scheduled time and the purpose and importance of the research were explained at that time. The focus group participants (n = 7) reviewed the instrument for clarity, content, and applicability of the subject matter to childcare and identified salient beliefs about HACCP-based food safety programs. Because focus group members were concerned about childcare employees understanding the questions and content, HACCP definitions were added to the instrument.

### **Questionnaire Pre-Test**

Twenty randomly selected Childcare Centers from the sample population were contacted, asked to participate, and were sent the URL because the pilot instrument was only available electronically. These directors were not included in the final sample.

Reminder e-mails were sent two weeks after the initial mailing to encourage instrument completion by non-responders. The questionnaire was completed by eight directors for a 40% response rate. Based on participants' feedback, minor wording changes were made to the instrument (Appendix D).

### **Questionnaire Data Collection**

Two cover letters (Appendix E) introducing the instrument and its research goals, two copies of the instrument, and a postage paid, return envelope were mailed to Childcare Centers in the states of Colorado, Iowa, Kansas, Missouri, Nebraska, and Oklahoma (n = 528). Dillman (2000) suggested a higher response rate might be attained if the instrument was accessible in multiple formats. Therefore, the survey was available in a paper and electronic format and the URL for the instrument was included in the cover letters and paper instruments. Reminder post-cards were sent two and five weeks after the initial mailing to encourage instrument completion by non-responders (Appendix E).

### **Questionnaire Data Analysis**

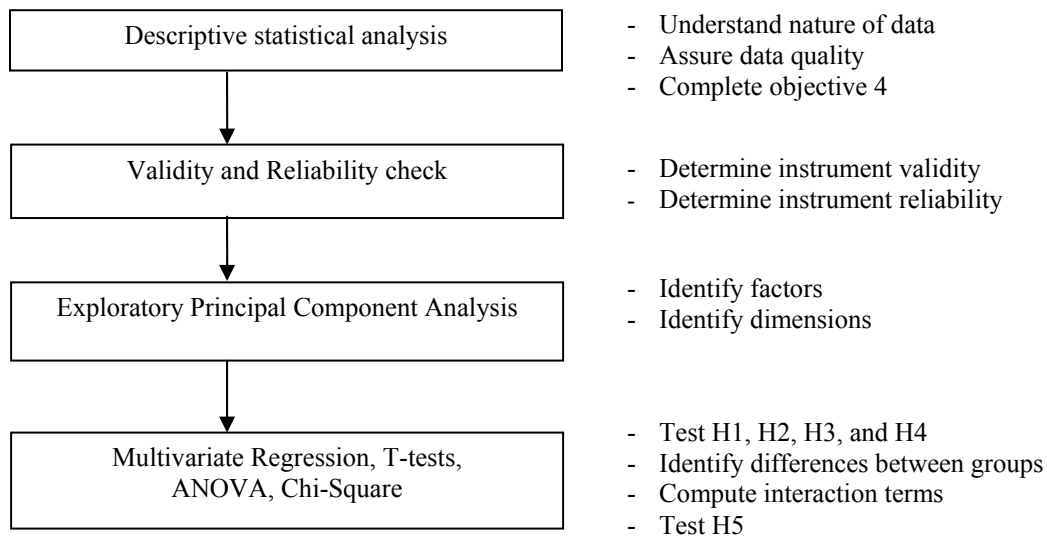
All data analysis used the Statistical Package for Social Sciences (SPSS) (version 12.0, 2003, SPSS, Inc., Chicago: IL). Descriptive and analytical statistics were computed and included frequencies, means, and standard deviations, which were used to familiarize the researcher with respondent and facility characteristics. Cronbach's alpha (1951) determined construct reliability.

Traditionally, a .70 threshold value is used to demonstrate consistency, however for exploratory research a threshold of .60 is acceptable (Droge, 1996) (Appendix F). Principal component factor analysis with varimax rotation determined item loading on



factors (Appendix F). Multiple linear regression analysis examined the relationships between the dependent variable (behavioral intention) and the independent variables (perceived susceptibility, perceived severity, perceived benefits, and perceived barriers) using the step-wise procedure (Appendix F). Additionally self-efficacy was included as an independent variable to facilitate moderation testing.

The flow of data procedures is depicted below.



**Figure 3.3 Flow of Data Analysis Procedures**

Examination of the correlation matrix assessed convergent and discriminant validity between and among variables (Appendix F). Exploratory factor analysis determined coefficients for each questionnaire item. Each was assigned to the factor for which it had the largest discriminant score. The number of factors represented by the instrument was determined based on a minimum eigenvalue of 1.0 and an examination of the scree plot.

Self-efficacy was hypothesized to function as a moderator in the relationship between the independent variables and behavioral intention. Interaction terms were

created by multiplying each independent variable score by the self-efficacy score and treated as independent variables (Appendix F).

T-tests determined differences in factor means and item scores by position, educational level, and certification status of respondents (Appendix F). Analysis of variance examined differences between item means and categorical data (Appendix F). Chi-square determined proportional differences between categorical data items and group categories (Appendix F). The customary level of .05 for Type 1 error was considered significant in analyzing results.

Self-efficacy was reduced to one item in the factor analysis and an alternative reliability measure was used: test-retest reliability coefficient. Methodology research (Landis, 1997; Trochim, n.d.) has stated that when estimating test-retest reliability, the same instrument should be administered to the same or similar samples on two different occasions. Responses from the pilot test (n = 8) were used as Time 1 with randomly selected responses from survey respondents (n = 8) used as Time 2 (Appendix F).

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## CHAPTER 4

### EXPLORING THE DEVELOPMENT OF A MODEL TO IDENTIFY CHILDCARE CENTER DIRECTORS' AND EMPLOYEES' BELIEFS ABOUT HACCP-BASED FOOD SAFETY PROGRAMS

#### **Abstract**

**Objectives:** To explore the development of an instrument to assess food safety beliefs and perceptions of Childcare Center directors and foodservice employees and using the instrument, test a modified Health Belief Model that would evaluate behavioral intentions to follow a HACCP based food safety program.

**Design:** The experimental instrument was developed by reviewing literature and previous research, reviewed by a focus group, expert panel, and pre-tested. The instrument was mailed to participants with results used to test the modified model.

**Subjects/setting:** The sample population included directors and foodservice employees at accredited Childcare Centers in six Midwestern states.

**Statistical analyses:** Exploratory principal component analysis determined model factors and multivariate regression examined relationships between constructs.

**Results:** Significant correlations in the instrument resulted in the modified Health Belief Model that identified only two factors that significantly affected behavioral intention.

**Conclusions/applications:** The instrument measured beliefs and perceptions about following HACCP-based food safety programs, even though there were constructs with low reliabilities. To analyze the model's effectiveness the instrument should be modified and tested with a group more knowledgeable about HACCP. The major conclusion is

that Childcare Center employee responses suggest that they do not consider food safety an important issue.

**Keywords:** childcare, HACCP, food safety, Health Belief Model

## **Introduction**

Childcare Centers are defined as institutions or facilities licensed to provide nonresidential childcare services to enrolled children, primarily of pre-school age (1). Children who attend these centers are at a higher risk for foodborne diseases because of their less developed immune systems, lower weight, limited control over food risks, and exposure to a variety of pathogens by secondary sources (2, 3). Between 1990 and 2004 in the United States (U.S.), 43 foodborne disease outbreaks that affected 1,276 children in Childcare Centers were confirmed (4). In Childcare Centers, outbreaks are spread by person-to-person contact, contaminated inanimate objects or substances (e.g. clothing, soap), and contaminated environmental surfaces (5). Because young children may not be able to recall where or what food they have eaten, estimating transmission by food is challenging (6), making it crucial that food safety systems be maintained.

The Food and Drug Administration (FDA) identified specific food safety behaviors needing priority attention (7). These were: 1) cold holding of potentially hazardous food; 2) cold holding of ready-to-eat, potentially hazardous food; 3) commercially processed ready-to-eat, potentially hazardous food date marked; 4) clean, sanitized surfaces and utensils; and 5) proper, adequate handwashing. In a subsequent study by the FDA, the same practices and behaviors continued to be inadequate (8). These practices and behaviors can be improved by implementing a Hazard Analysis and Critical Control Points (HACCP) system.

Scholastic literature recognizes HACCP as a proactive food safety program that, when properly implemented and maintained, reduces the number of foodborne disease

outbreaks (9). Since HACCP has been required in processing industries, the rate of foodborne disease outbreaks has decreased which indicates that taking a proactive position against foodborne diseases has been successful (10). HACCP is not required for retail and most non-commercial foodservice operations (11), however, amendments made to the Richard B. Russell National School Lunch Act required implementation of food safety programs that comply with established HACCP systems for school foodservices (12).

The American Academy of Pediatrics, the American Public Health Association, and the National Resource Center for Health and Safety in Child Care (NRCHSCC) collaborated to develop and publish health and safety criterion for Childcare Centers (13). These criteria or standards are measures of quality and do not specifically address food safety. The standard for food safety is that Childcare Centers follow state and local health department guidelines, which vary from state to state and do not require a HACCP-based food safety program (14). No research in Childcare Centers has been conducted to determine the status of food safety programs.

However, in school foodservice prior to regulatory changes, Giampaoli, Sneed, Cluskey, and Koenig (15) examined directors' attitudes and perceived challenges to HACCP implementation. Results indicated that the majority of school foodservices had not implemented a HACCP program and some respondents were unaware of the definition of HACCP. Respondents who were knowledgeable indicated that the greatest barriers to HACCP implementation were time, money, employee attitudes, lack of adequate facilities, and lack of staff (15).



Strohbehn, Gilmore, and Sneed (16) assessed perceptions of Registered Dietitians and dietary managers about food safety practices and HACCP implementation. Barriers to HACCP implementation identified by both Registered Dietitians and dietary managers were factors related to employees (knowledge, supervision, and turnover), time (to develop/implement HACCP and conduct training), and commitment (monitoring HACCP and value perception of HACCP) (16).

Sneed, Strohbehn, and Gilmore (17) evaluated food safety practices and readiness to implement HACCP programs in 40 Iowa assisted living facilities. They found that for food safety programs to be implemented correctly, behaviors of employees needed to be changed (17). Research indicated that common foodborne disease risk factors are directly related to food handling and sanitation practices of foodservice employees (7, 8).

A way to identify and understand the food safety behaviors and practices of foodservice directors and employees is to study behavior-change theories. A key concept of behavior-change theories is that "...what we know and think affects how we act" (18). Glanz, Lewis, and Rimer (19) found that the Health Belief Model (Health Belief Model) was the most commonly used in health-behavior research. Rosenstock (20) reported that the Health Belief Model was developed for preventative health behaviors and was based on the following constructs:

1. **Perceived susceptibility** - the risk that one considers them self as susceptible to a health condition.
2. **Perceived severity** - how severe one sees the consequences of the health condition.

3. **Perceived benefit** - the belief that certain behaviors will reduce the susceptibility and/or severity of the health condition.
4. **Perceived barriers** - obstacles one encounters in performing the behavior (21).

The Health Belief Model has been used in previous food safety research. Hanson and Benedict (22) investigated associations between perceived threat (which is perceived susceptibility plus perceived severity) and safe food-handling behaviors among older adults. The findings suggested that not all health behaviors have the same association with perceived threat, indicating other predictors may exist (22).

No previous research has been found that addressed food safety in Childcare Centers or directors' and foodservice employees' beliefs and perceptions about food safety. Therefore, it is necessary to explore the possibility of modifying existing models and instruments to accomplish research objectives. The purposes of this exploratory research were to:

- 1) To develop an instrument to assess food safety beliefs and perceptions of Childcare Center directors and foodservice employees and using the instrument, test a modified Health Belief Model that would evaluate behavioral intentions to follow a HACCP based food safety program;
- 2) Determine risks, consequences, beliefs, barriers, self-efficacy, and behavioral intentions of child care center directors and employees about following HACCP-based food safety programs in Childcare Centers;
- 3) Assess relationships between constructs in the exploratory model; and
- 4) Determine validity and reliability for the experiential model;

## Methodology

### Instrument Development

By reviewing previous questionnaires used in the Health Belief Model and food safety research (15, 23, 24), an experimental instrument was developed specifically for Childcare Centers to reflect beliefs and perceptions about HACCP-based food safety programs. Items focused on either the Childcare Center, the children at the Childcare Center, or HACCP-based food safety programs and measured the four Health Belief Model constructs, a construct from the Theory of Reasoned Action, behavioral intention; which was added because intention is the immediate predecessor of behavior (25, 26), and the construct self-efficacy. Self-efficacy states that if a person believes they can successfully perform a behavior; there is a greater likelihood of that person performing the behavior (27, 28). Previous research with self-efficacy and the health belief model demonstrated that when other psychosocial constructs were examined, self-efficacy was a distinct and powerful predictor of behavior (29, 30). The instrument was available in both paper and electronic formats.

The theoretical constructs, as used in this research, were:

**Perceived susceptibility:** Perceptions and beliefs of the likelihood of children contracting foodborne diseases at the Childcare Center.

**Perceived severity:** Perceptions and beliefs about the amount of harm expected or seriousness of foodborne diseases to a child.

**Perceived benefits:** Perceptions and beliefs that following HACCP-based food safety programs would reduce foodborne diseases.

**Perceived barriers:** Perceptions and beliefs about obstacles that prevents one from following HACCP-based food safety programs.

**Self-efficacy:** Degree of beliefs that one can follow HACCP-based food safety programs successfully.

**Behavioral intention:** A substitute for actual behavior, it is the intention to follow HACCP-based food safety programs.

The instrument contained 33 items based on the proposed constructs. Six items measured the construct perceived susceptibility and focused on either the Center or the children as it related to foodborne diseases. Perceived severity, which was measured with eight items, addressed the severity of consequences to either the Center or the children in the event of a foodborne disease occurring. Perceptions of benefits and barriers to following a HACCP based food safety system were measured with four and nine items, respectively. The items included benefits and barriers identified in research conducted in other segments of the foodservice industry ((15-17)). Self-efficacy items (n = 3) were worded to assess general agreement about confidence, skills, and knowledge level related to following HACCP-based food safety programs. Three items measured behavioral intention and asked about plans to follow HACCP-based food safety programs in the future.

Statements were measured on a five-point Likert scale (one being strongly disagree to five being strongly agree). A second section of the instrument obtained demographic information. The questionnaire and research protocol were reviewed and approved by the Human Subjects Committee for the Institutional Review Board (Kansas State University, Manhattan).

## **Focus Group**

Innovative methods were required to conduct a focus group because Childcare Center directors lacked time to travel to a central location to participate. Borrowing from business marketing research methodology and utilizing technology, a telephone focus group (n = 7) was conducted via conference call (31). Participants were selected by contacting Childcare Center directors in Kansas (n = 32) who were not included in the sample population. The focus group reviewed the instrument and based on their comments and recommendations the instrument was modified by adding definitions for HACCP and HACCP-related terms.

## **Pilot Test**

Twenty randomly selected childcare facilities from the sample population were contacted and invited to participate and provide an e-mail address. Since the pilot test was only available electronically, the URL for the electronic version of the instrument was sent to those who agreed to participate. Additional questions asked about content, clarity, and applicability of the subject matter to Childcare Centers. Minor wording changes were made to HACCP definitions based on pilot participant (n = 8, 40%) recommendations.

## **Sample Population**

The population for this exploratory study included directors and foodservice employees of Childcare Centers. The sampling frame used was the membership database of the National Association for the Education of Young Children (NAEYC). Criteria for inclusion in the sample population were location, accreditation through NAEYC, and providing lunch to children as part of daily childcare services. The sample included 528

facilities located in Colorado (n = 122), Iowa (n = 99), Kansas (n= 64), Nebraska (n = 58), Missouri (n = 100), and Oklahoma (n = 80).

### **Data Collection**

Two cover letters explaining the objectives of the research (one each for the director and foodservice employee), two copies of the instrument, and a postage paid return envelope were mailed to the Child Care Centers. The cover letters and instruments included the survey website address for those participants who might prefer to complete the survey electronically. To encourage participation, reminder postcards were sent at two and five weeks after the initial mailing.

### **Data Analysis**

All data analysis procedures used the Statistical Package for Social Sciences (SPSS) (version 12.0, 2003, SPSS, Inc., Chicago: IL). Descriptive statistics computed were frequencies, means, and standard deviations. Exploratory principal component analysis with varimax rotation determined item loading on factors. The number of factors represented by the instrument was determined based on a minimum eigenvalue of 1.0 and an examination of the scree plot. Reliability coefficients were computed using Cronbach's alpha with the recommended value of 0.70 as the threshold to demonstrate consistency (32).

All factor scores ranged from one to five and were computed by summing items and dividing by the number of items. Multiple linear regression determined relationships between factors.

## Results

### Response Rate

A total of 28 survey packages were returned as undeliverable, reducing the number of Childcare Centers to 500. Based on focus group comments, it was assumed that half of the Childcare Centers would not have a designated foodservice employee. Therefore, the sample population was estimated at 750 (500 facilities multiplied by 1.5 staff members). Due to incomplete and missing data, a usable response rate was 17.5% (n = 131) with 78 directors and 53 foodservice employees responding.

### Respondent Characteristics

Demographic information indicated that respondents were primarily employed as directors (n = 78), were female (95.4%), and reported being between 40 and 49 years of age (26.7%,  $\mu = 43$ ). Most directors had a Bachelor's degree (45.9%) and foodservice employees, a high school diploma (35.7%) (See Table 1).

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Insert Table 1

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### Instrument Item Responses

For the six items developed to measure the construct perceived susceptibility, respondents agreed that children have an increased chance of complications from getting a foodborne disease ( $\mu = 3.95 \pm 0.79$ ). However, respondents did not believe that the chances of children getting a foodborne disease at their Center were great ( $\mu = 1.62 \pm 0.81$ ). Respondents agreed that a foodborne disease could cause severe consequences for

children ( $\mu = 4.32 \pm 0.67$ ), but an outbreak would not affect their employment at the Center ( $\mu = 2.66 \pm 1.12$ ) (See Table 2).

Responses to perceived benefits indicated that the benefits of food safety certification increased safe food-handling practices ( $\mu = 4.17 \pm 0.76$ ) and that by following HACCP-based food safety programs, food safety problems could be reduced ( $\mu = 3.81 \pm 0.94$ ). The highest mean score for perceived barriers to following HACCP-based food safety programs was lack of time for proper training ( $\mu = 4.05 \pm 0.97$ ) and the least was that others at their center did not care about food safety issues ( $\mu = 1.91 \pm 1.00$ ).

For items relating to self-efficacy and intentions, respondents generally agreed they had the confidence ( $\mu = 4.06 \pm 0.71$ ) and skills necessary ( $\mu = 3.89 \pm 0.89$ ) to follow HACCP-based food safety programs and disagreed with the statement “I need to learn more to be able to follow a HACCP-based food safety program”. Overall responses for behavioral intention were high neutral (mean scores ranged from 3.54 to 3.77).

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Insert Table 2

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### **Instrument Validity**

A committee of experts in food safety, HACCP, and childcare operations ( $n = 5$ ) and the responses of the focus group ( $n = 7$ ) confirmed content validity. Convergent and discriminant validity were determined by examining the correlation matrix for the instrument items. This correlation analysis found that most items were significantly correlated within constructs, but also there was a significant correlation between some



constructs, which might indicate that the constructs were measuring the same concept (See Appendix E).

To address these concerns and to determine if the developed instrument measured the constructs intended, reliability and exploratory factor analysis were conducted. Exploratory factor analysis was selected because the instrument had not been tested with the target population and modifications had been made to the Health Belief Model.

The analysis resulted in the deletion of 12 items to improve the reliability coefficients. The construct self-efficacy contained only one item and was not included in the factor analysis. The remaining 20 items loaded on six factors. The majority of items loaded as expected with the exception of items measuring severity of consequences. These items split on two factors based on the item being specific either to the center or to children. The variable was reconfigured and an additional factor created. Final factors included perceived susceptibility, center consequences, child consequences, perceived benefits, perceived barriers, and behavioral intentions and accounted for 70.07% of the variance. Self-efficacy was not included in the model at this point.

Cronbach's alpha calculated reliability for the identified factors (See Table 3) (32). Although two factors (susceptibility and behavioral intention) had reliability coefficients lower than 0.70, research methodology (33, 34) has stated that in exploratory research a threshold of 0.60 is acceptable.

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Insert Table 3

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As self-efficacy was reduced to one item in the factor analysis, an alternative reliability measure was used. The test-retest coefficient estimated reliability. Authors (35, 36) of assessment methods have stated that when estimating test-retest reliability, the same instrument should be administered to the same or similar samples on two different occasions. Responses from the pilot test (n = 8) were used as Time 1 with randomly selected responses from survey respondents (n = 8) used as Time 2. The result of the estimated reliability for self-efficacy was 0.46.

Constructs within the model significantly correlated were behavioral intention and self-efficacy ( $r = 0.43, p < 0.01$ ), perceived benefits and child consequences ( $r = 0.33, p < 0.01$ ), perceived barriers and perceived susceptibility ( $r = -0.36, p < 0.01$ ), and perceived barriers and perceived benefits ( $r = 0.21, p < 0.01$ ). Multicollinearity diagnostics for the model showed tolerance levels of 0.87 or greater and variance inflation factors ranged from 1.00 to 1.15 (See Table 4).

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Insert Table 4

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## **Discussion**

The response rate was below the expected 25%, which may be due to several factors. One is that the URL for the instrument website may not have been easily accessible, since only 11 responses were submitted electronically. Another may be that the sample population did not have time, did not consider the topic important, and/or they were not knowledgeable about HACCP-based food safety programs.

## **Item Analysis**

Items measuring perceived susceptibility and perceived severity showed that respondents agreed that children were more vulnerable to foodborne illnesses and that the consequences of those illnesses could be very serious; however, they did not believe a foodborne illness would occur at their Center. Respondents agreed that using a HACCP-based program would have benefits but indicated some uncertainty as to whether the program would reduce food safety problems. Items measuring perceived barriers indicated that the respondents agreed that time, resources, money, and training were barriers to implementing HACCP-based food safety programs, which is consistent with previous research in other segments of the non-commercial foodservice industry (15, 16, 17).

For items measuring self-efficacy, responses showed that respondents agreed they have the confidence and skills to follow HACCP-based food safety programs and indicated disagreement when asked if they needed to learn more to follow the program. Behavioral intention item responses were mid-range, which might suggest that respondents may not want to commit to following HACCP-based programs.

## **Instrument and Model**

The present study found that some items in different constructs either had significant correlations and or no correlation. Research has stated that if the items are highly correlated, they may be measuring the same concepts and conversely, if no associations exist, items may not be measuring the intended concept (36). Either of these occurrences lowers the validity of an instrument. If an instrument has significant problems concerning either the validity or reliability, the results of model testing and

conclusions of the research are questionable. Therefore, in this study an exploratory factor analysis was used to determine if the instrument fit the model. Based on the results of reliability and factor analysis, 12 items were deleted from the instrument to improve construct reliability. Self-efficacy was reduced to one item because the reliability coefficient for the original three items was very low with two items being shown invalid. Consequently, an alternate measure assessed self-efficacy's reliability. This creates a problem with the instrument because the reliability of a single measure cannot be assessed with precision nor can it be an accurate reflection of the construct being measured. To improve reliability for this construct, more items need to be developed.

Because perceived susceptibility and behavioral intentions had lower reliability coefficients, this exploratory model may not determine beliefs and perceptions of a similar sample. There are several possible reasons for the lower reliabilities. One is that respondents may have overrated their abilities to follow a HACCP-based food safety system, which resulted in a positive skew. This is manifest in attitudinal research involving self-efficacy because it can be moderately correlated with behavioral intention and susceptibility (37) and in this study the correlation was positive ( $r = 0.40, p < .01$ ).

A second factor in the lower reliabilities may be due to social desirability bias where subjects responded based on perceived accepted norms rather than to what was actually occurring (37). A third explanation might be that the instrument contained terms unfamiliar to the sample population. Several focus group members, pre-test participants, and pilot respondents indicated that they had never heard of HACCP and were not familiar with the term. Additionally, approximately a third of mean scores were between 2.50 and 3.50 indicating either a lack of caring or knowledge of the subject matter.

Another concern with the instrument may be the negative statements used in items measuring perceived barriers. Di Lorio (37) purports that negative statements do not work for all concepts. Although perceived barriers had an acceptable reliability ( $\alpha = 0.86$ ) and had a significant correlation ( $r = 0.25, p < .01$ ) with behavioral intention, it did not affect behavioral intention in regression analysis. The researchers had assumed that perceived barriers would have a negative influence on behavioral intention, but previous research has shown that perceived barriers has had a positive correlation with behavioral intention (38, 39). Another issue is that nearly a third of questionnaire items had mean scores in mid-range (between 2.50 and 3.50), signifying that a large portion of respondents had selected the mid-point. In survey research, this type of response pattern may indicate a lack of caring and/or knowledge of the subject matter (40).

The exploratory model was revised based on results of the factor analysis. Items loaded on five of the six constructs included. Items proposed to measure perceived severity loaded on two factors. The final exploratory model contained seven constructs. These were perceived susceptibility, child consequences, center consequences, perceived benefits, perceived barriers, self-efficacy, and behavioral intentions (See Figure 1). Researchers (20, 38) have suggested that items in the Health Belief Model are situation specific. Because of the setting, it was reasonable that severity split on two dimensions – the children and the Center.

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Insert Figure 1

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Perceived benefits and self-efficacy significantly affected behavioral intentions to follow HACCP-based food safety programs. In addition, self-efficacy had a moderating effect on the relationship between perceived benefits and behavioral intentions. No other factors were significant in either regression model.

Because perceived benefits and self-efficacy were significant, it suggests that those Childcare Center directors and foodservice employees who either perceive that following HACCP-based food safety programs have greater benefits (usefulness of food safety certification and checklists) or those who have the confidence and skills to follow the programs, are more likely to do so. The moderating effect of self-efficacy suggests that for those who both perceive benefits and have the confidence and skills to follow HACCP programs have a greater likelihood of doing so than those with just one or the other.

Because there was no other significant impact on behavioral intentions, these items may not have measured the intended constructs. Responses did indicate that directors and foodservice employees were aware of the susceptibility and severity of foodborne illnesses to children, but did not believe that a foodborne disease could occur at their Center or, if it did, would not have negative consequences to them personally or to the Center. Additionally, responses suggested that following HACCP-based food safety programs would not be practical. This is similar to a study with children and vaccinations that found mothers did not believe their children were at risk for preventable diseases and felt the consequences and barriers of getting vaccinations were no greater than the diseases themselves (41).

## **Conclusions and Applications**

This research was exploratory but based on results; the developed instrument and the revised Health Belief model have the potential to measure willingness to follow a HACCP based food safety program. The instrument did measure beliefs and perceptions about following HACCP-based food safety programs, even though there were constructs with low reliabilities. To improve the reliability, another study needs to be conducted with a population that has more knowledge about food safety and HACCP. To improve the instrument, scales developed should use an even-response format because odd numbered responses can diminish reliability when most items receive a large proportion of neutral responses (40), as was the case in this study. Another modification to increase effectiveness of the instrument would be to remove negative items and a third would be to reword items for constructs with lower reliabilities.

Analysis demonstrated the model accounted for 70.07% of the variance for a six-factor solution. The modified Health Belief Model identified two factors that had significant effects on behavioral intention; these were perceived benefits and self-efficacy. However, with a revised instrument and more knowledgeable population, all constructs could significantly identify behavioral intentions to follow a HACCP based food safety program.

A finding of major concern in this study was that even though Center directors and foodservice employees understood the vulnerability of children to foodborne disease, they were not convinced that following HACCP-based food safety programs would improve food safety at their Center. Additionally, responses indicated that directors and foodservice employees may have had little knowledge about HACCP-based food safety

programs and do not think food safety is an important issue. This could be confirmed by adding items to the instrument that measure knowledge to determine if Childcare Center directors and foodservice employees are aware of basic food safety practices (i.e. internal cooking temperatures, cooling procedures, and labeling requirements).

These results should be of interest to childcare and federal and state regulatory agencies because Childcare Centers serve a more vulnerable population than do school foodservices, yet this study finds that little attention is paid to food safety. The CACFP federal regulations are very specific about the nutritional content of meals; however, for food safety guidelines, CACFP defers to state and local regulations, which vary from state to state (42). Current inspections are not adequate as evidenced by a recent outbreak of *E. coli* at a Childcare Center in Omaha, Nebraska (43). Based on the findings of this study, CACFP should consider adopting more stringent food safety requirements. Additionally, to reinforce the importance of food safety for young children, accrediting agencies should require a nationally recognized food safety certification for foodservice personnel and include, as a criterion for accreditation, the implementation of a HACCP-based food safety program.



**Table 1**  
***Respondent Characteristics***

<b>Gender</b>	<b>N</b>	<b>%</b>
Male	5	3.8
Female	125	95.4
No response	1	0.8
<b>Age Ranges</b>		
29 or less	18	13.7
30 – 39	30	22.9
40 – 49	35	26.7
50 – 59	31	23.7
60 or more	6	4.6
No response	11	8.4
<b>Education</b>		
HS/GED	21	16.0
Some College	21	16.0
Associates	14	10.7
Bachelors	40	30.5
Masters	29	22.1
No response	6	4.6
<b>Position</b>		
Kitchen Staff	53	38.9
Director	78	57.3
<b>Food Safety Certification</b>		
Yes	43	32.8
No	83	63.4
No response	5	3.8
<b>Certification Program</b>		
ServSafe®	7	5.3
Health Depart	15	11.5
CACFP	12	9.2
Other	4	4.8
No response	91	69.5

Table 2  
*Overall Responses to Items by Construct (n = 131)*

Construct	Statement <sup>c</sup>	Overall	
		M	SD
Perceived Susceptibility	A child has an increased chance of having complications that come from getting a foodborne illness.	3.95	0.79
	When I think about a foodborne illness occurring at my center, I feel concerned.	3.83	1.26
	Children, in general, have a greater chance of getting a foodborne illness than adults.	3.67	1.03
	I worry a lot about some of the children at my Center getting a foodborne illness.	1.99	1.02
	Within the next year, the children at my Center will get a foodborne illness.	1.66	0.76
	The chances of children at my Center getting a foodborne illness are great.	1.62	0.81
Perceived Severity	A foodborne illness could cause severe consequences for young children.	4.32	0.67
	Problems children would experience from a foodborne illness could last a long time.	3.81	1.03
	I am afraid to even think about the possibility of a foodborne illness outbreak at my Center.	3.41	1.26
	If children acquire a foodborne illness, their whole life could change.	3.35	0.98
	If the children developed a foodborne illness, it could be more serious than other diseases.	3.22	0.94
	The Center's financial security would be in jeopardy if any child got a foodborne illness.	2.92	1.10
A foodborne illness outbreak would endanger the relationship I have with my fellow employees.	2.82	1.16	
If the children at my Center contracted a foodborne illness, my job would be endangered.	2.66	1.12	

*(table continues)*

Table 2 (Continued)  
Overall Responses to Items by Construct (n = 131)

Construct <sup>a</sup>	Statement <sup>b,c</sup>	Overall	
		M	SD
Perceived Benefits	Employees with food safety certification are more likely to use safe food handling practices.	4.17	0.76
	Food safety checklists may locate a problem before it is discovered by regular health inspections.	4.17	0.60
	A HACCP-based food safety program is important for maintaining food safety effectively.	4.06	0.77
	Following a HACCP-based food safety program at work would greatly reduce future food safety problems for me.	3.82	0.93
Perceived Barriers	We lack the time required to train employees properly in food safety.	4.05	0.97
	We do not have the resources to improve food safety at my center.	4.02	1.00
	Foodservice employees lack training in food safety issues.	3.71	1.06
	I would be less anxious about foodborne illness if I followed a HACCP-based food safety program.	3.65	0.92
	We lack the funding to pay for additional food safety training.	3.61	1.29
	We do not have the time for the additional paperwork a HACCP-based food safety program would require.	3.47	1.13
	Staff and employees of child care centers do not feel comfortable with change.	3.33	1.11
	Completing HACCP-based food safety program requirements would involve developing new habits, which is difficult.	3.30	1.06
	Other than myself, Center employees do not care about food safety issues.	1.91	1.00
	I am confident that I can follow a HACCP-based food safety program.	4.06	0.71
Self-efficacy	I have the skills necessary to follow a HACCP-based food safety program.	3.88	0.89
	I need to learn more to be able to follow a HACCP-based food safety program.	2.57	1.07

(table continues)

Table 2 (Continued)  
**Overall Responses to Items by Construct (n = 131)**

Construct <sup>a</sup>	Statement <sup>b,c</sup>	Overall	
		M	SD
Behavioral Intentions	I would not use a food safety self-inspection form unless mandated.	3.77	0.94
	I would follow a voluntary HACCP-based food safety program.	3.77	0.81
	I would use recipes modified for HACCP-based food safety practices.	3.54	0.86

<sup>a</sup> Construct names

<sup>b</sup> All statements were preceded by the instructions to "Circle the response that corresponds to the way you feel about each statement. There is no right or wrong answers, please be honest."

<sup>c</sup> All statements were measured on a 5-point Likert scale with 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

<sup>d</sup> Item reverse scored

Table 3  
*Exploratory Model Construct Correlations*

Factor	PSu <sup>a</sup>	CdCon <sup>b</sup>	CtCon <sup>c</sup>	PBen <sup>d</sup>	PBar <sup>e</sup>	BI <sup>f</sup>	M	SD	Cronbach's alpha
PSu <sup>a</sup>	1.00						1.64	0.67	0.66
CdCon <sup>b</sup>	0.11						3.86	0.67	0.76
CtCon <sup>c</sup>	0.09	0.33**					2.75	0.98	0.81
PBen <sup>d</sup>	0.03	0.33**	0.31**				4.01	0.63	0.73
PBar <sup>e</sup>	-0.31**	0.11	0.04	0.20*			3.79	0.92	0.86
BI <sup>f</sup>	0.00	0.04	0.01	0.38**	0.25**		3.69	0.67	0.68
SE <sup>g</sup>	-0.09	0.07	0.02	0.35**	0.28**	0.40**	4.06	0.71	0.46 <sup>h</sup>

<sup>a</sup> Perceived Susceptibility

<sup>b</sup> Perceived Child Consequences

<sup>c</sup> Perceived Center Consequences

<sup>d</sup> Perceived Benefits

<sup>e</sup> Perceived Barriers

<sup>f</sup> Behavioral Intentions

<sup>g</sup> Self-efficacy

<sup>h</sup> Test-retest reliability coefficient

\*\* Correlation is significant at the 0.01 level (1-tailed).

\* Correlation is significant at the 0.05 level (1-tailed).

Table 4

***Multivariate Regression Results for Revised Exploratory Model***

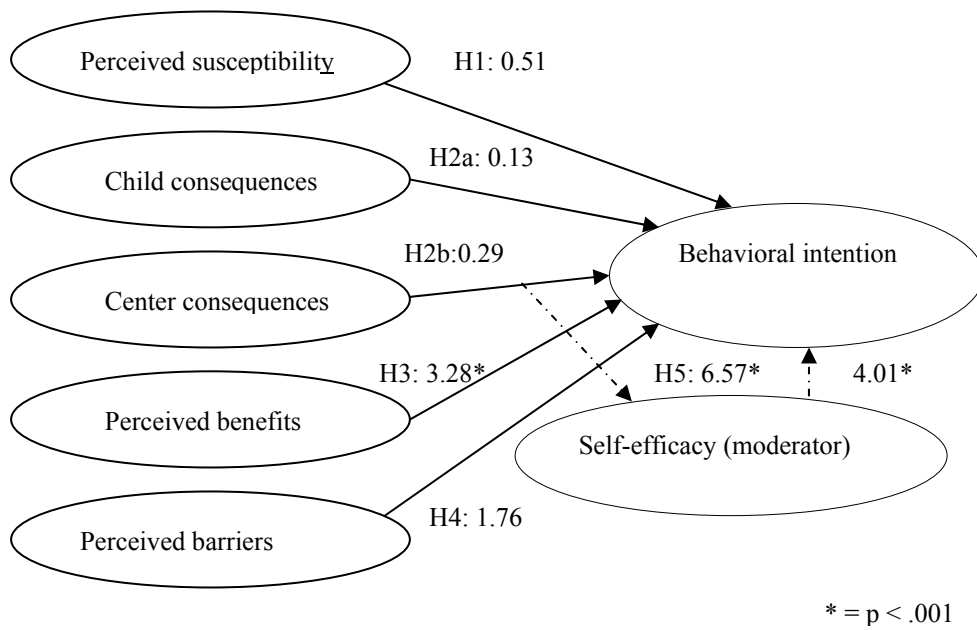
Predictors <sup>c</sup>		Sum of Squares	Df	Mean Square	F	t	R <sup>2</sup>	Tolerance	VIF
Self, <sup>a</sup> PBe, <sup>a</sup>	Regression	14.75	5	7.38	20.87*	4.012*	0.18	0.87	1.15
	Residual	45.25	128	.354		3.28*	0.25	0.87	1.15
	Total	60.01	130						
IntPBe <sup>b</sup>	Regression	15.06	1	15.06	43.21*	6.57*	0.25	1.00	1.00
	Residual	44.95	129	.35					
	Total	60.01	130						

<sup>a</sup> Predictors: (Constant), Self, PBe ( Self-efficacy , Total Benefits)

<sup>b</sup> Predictors: (Constant), IntPBe(Interaction term: Self-efficacy multiplied by Perceived Benefits)

<sup>c</sup> Dependent Variable: TBI (Total behavioral intentions)

\* p < .00



**Figure 1** *Regression Analysis of Exploratory Model Factor Effects*

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## CHAPTER 5

### BENEFITS AND BARRIERS TO FOLLOWING HACCP-BASED FOOD SAFETY PROGRAMS IN CHILDCARE

#### **Abstract**

Before HACCP can be implemented in Childcare Centers, it is important to identify existing prerequisite programs and the barriers to implementing. Studying the food safety beliefs and perceptions of directors and foodservice employees in Childcare Centers is the first step in the process. By reviewing previous questionnaires used in Health Belief Model and food safety research, an instrument was developed that focused on the Childcare Center, the children at the Childcare Center, and HACCP-based food safety behaviors. The population for this study included Childcare Center directors and foodservice employees in six Midwestern states.

Overall, respondents agreed they could follow HACCP-based programs, however, foodservice employees indicated more confidence in their abilities than did directors. The least implemented prerequisite programs were equipment maintenance, food safety training, and kitchen operation procedures. For all nine prerequisite programs, significant differences were found based on certification status with those with a food safety certification implementing more programs. It appears that Childcare Centers could easily adapt existing programs to follow a HACCP-based food safety program, but additional food safety training is needed. Future research conducted with directors and employees of Childcare Centers should assess knowledge levels and attitudes about HACCP-based food safety programs.

**KEYWORDS:** HACCP, food safety, training, childcare.

## Introduction

Regulatory authorities define Childcare Centers as licensed facilities that provide childcare services to pre-school age children (Federal Register, 2006). Children attending Childcare Centers are at a higher risk for contracting foodborne diseases because of their less developed immune systems, lower weight, and the possibility of being exposed to pathogens transmitted by secondary sources (United States (U. S.) General Accounting Office, 2003; Buzby, 2001).

Between 1990 and 2004 in the United States (U.S.), 43 foodborne disease outbreaks affecting 1,276 children in Childcare Centers were confirmed (Centers for Disease Control and Prevention (CDC), 2006). Childcare attendance has been reported as associated with a number of infections and outbreaks. Reeves, et al. (1990) found that fecal colonization of a strain of *E. Coli* was higher among children in childcare (30%) than among control children (6%) or medical students (8%). Stroup and Thacker (1995) proposed increased surveillance of Childcare Centers because children had diarrheal incidents 1.6 to 3.5 times greater than those who were cared for in their homes. Wilde, Van, Pickering, Eiden, and Yolken (1992) stated that *rotaviruses* are rampant in day care facilities during diarrheal outbreaks.

Hedberg and Osterholm (1993) reported that Norwalk-like viruses (*rotaviruses*, *caliciviruses*, and *astroviruses*) had become the most common cause of viral *gastroenteritis* outbreaks in young children. Matson (1994) identified factors that promote the spread of viral *gastroenteritis* in childcare centers: these were the high



infectious rate of viruses, recognition that infections occur most often during outbreaks, and asymptomatic infections are more common than symptomatic infections.

Tucker, Haddix, Bresee, Holman, Parashar, and Glass (1998) reported that nearly 1.5 million doctor visits, 200,000 hospitalizations, and 300 deaths of children per year were caused by *acute gastroenteritis* and almost one third of all hospitalizations of children less than five years old are for *rotavirus* diarrhea. Foodborne disease costs in direct medical care for these children are almost \$250 million per year, with an additional societal cost estimated at \$1 billion per year (Tucker, et al).

CDC (2004) confirmed cases of *Shigella sonnei* in six states: Virginia (876), Maryland (250 plus one death), New Jersey (254), South Carolina (95), Delaware (200), and North Carolina (935). High portions of these outbreaks were associated with day care attendance (CDC). These reports are examples of why it is important that a food safety system be implemented in Childcare Centers. Literature recognizes HACCP as an effective, proactive food safety system with decreases in foodborne disease outbreaks occurring since USDA and FDA mandated its implementation in processing industries (National Advisory Committee on Microbiological Criteria for Foods (NACMCF), 1998; CDC, 2005).

Food safety prerequisite policies and programs are the foundation for the development and implementation of HACCP. Examples of prerequisite programs include personal hygiene, cleaning and sanitation, pest control, and food safety training. Without these prerequisite programs in place, the successful implementation of a HACCP-based food safety program is uncertain (NACMCF, 1998).

Prerequisite programs are important in HACCP implementation; however, understanding the barriers to implementation can be just as critical. Several researchers have investigated barriers to implementing HACCP in different sectors of the foodservice industry. In Iowa retail operations, Roberts & Sneed (2003) found that of 13 barriers, the greatest barriers to prerequisite and HACCP implementation included employee training and employee motivation, managers' time to implement programs, costs associated with food safety and taking time to follow food safety practices. In a follow-up study, Roberts, Barrett, & Sneed (2005) found that sanitarians in Iowa and Kansas identified the greatest barriers as employee knowledge and time. Riggins, Roberts, and Barrett (2005) indicated that employee training (77%), employee motivation (70%), and time for managers to monitor activities (63%) were the barriers identified by managers in college and university foodservice.

In school foodservice, Hwang, Almanza, and Nelson (2001) found that of 162 school foodservice managers surveyed, 22 (14%) had implemented HACCP programs. Of those who did not currently have a HACCP program, 28% had plans to implement HACCP in the future. The majority (69%) either did not know what a HACCP program was, or had no plans of implementing HACCP. Other researchers (Giampaoli, Sneed, Cluskey, & Koenig, 2002; Youn & Sneed, 2002, 2003; Sneed, Strohbehm, & Gilmore, 2004; Strohbehm, Gilmore & Sneed, 2004) examined barriers to HACCP implementation in school foodservice. Time was the greatest barrier to prerequisite and HACCP program implementation.

The Child Nutrition Program (108th Congress, 2004) mandated HACCP-based food safety programs for schools; however, there are no requirements for HACCP-based

food safety programs in Childcare Centers. The National Resource Center for Health and Safety in Child Care (NRCHSCC, 2002) publishes standards for health and safety in Childcare Centers. Analogous to the Child and Adult Food Program regulations (Federal Register, 2006), the standards require that state and local food safety laws and regulations be followed (Almanza, 2004).

Before implementation of HACCP in Childcare Centers, it is important to identify existing prerequisite programs and the barriers to implementation. Studying the food safety beliefs and perceptions of directors and foodservice employees in Childcare Centers is the first step in the process.

The primary purposes of this research were to determine beliefs and perceptions of directors and foodservice employees about benefits, barriers, and intentions to follow HACCP-based food safety programs and to examine differences based on employment status, educational level, and food safety certification. Additionally, this study sought to determine the status of prerequisite programs in Childcare Centers and to identify differences in prerequisite program status based on certification status.

## **Methodology**

### **Instrument Development**

By reviewing previous belief and perception questionnaires used in Health Belief Model and food safety research (Giampaoli, Sneed, Cluskey, & Koeing, 2002; Glantz, Lewis, & Rimer, 1997; Schafer, Schafer, Bultena, & Hoiberg, 2004), an instrument was developed specifically for Childcare Centers to reflect beliefs and perceptions about HACCP-based food safety programs. Items focused on either the Childcare Center, the children at the Childcare Center, or HACCP-based food safety programs and measured

perceived susceptibility, severity, benefits, barriers, self-efficacy and behavioral intentions to follow a HACCP based food safety program. The instrument was available in both paper and electronic formats.

The first section of the questionnaire contained 33 items. Six items measured perceived susceptibility and focused on either the Center or the children becoming ill from a foodborne disease. Perceived severity (8 items) focused on the severity of consequences to either the Center or the children in the event of a foodborne disease. Using previous research from other segments of the foodservice industry, perceptions of benefits and barriers were measured with four and nine items, respectively (Giampaoli, et al, 2002; Strohbehm, Gilmore, & Sneed, 2004; Sneed, Strohbehm, & Gilmore 2004).

Self-efficacy items (n = 3) were worded to assess general agreement about confidence, skills, and knowledge related to following HACCP-based food safety programs. Three items measured behavioral intention and asked about plans to follow HACCP-based food safety programs in the future. Statements were measured on a five-point Likert scale (one being strongly disagree to five being strongly agree). Part II requested information about prerequisite program implementation and Part III obtained demographic information about the respondents and the facilities. The questionnaire and research protocol were reviewed and approved by the Human Subjects Committee for the Institutional Review Board (Kansas State University, Manhattan).

### **Population and Sample**

The population for this study included Childcare Center directors and foodservice employees who were members of the National Association for the Education of Young Children (NAEYC) (NAEYC, 2005). To be included in the study, the center had to be

located in one of six Midwestern states and provide lunch to children participating in full-day care. The final sample included 528 centers in Colorado (122), Iowa (99), Kansas (64), Missouri (100), Nebraska (58), and Oklahoma (80).

### **Pilot Test**

Childcare facilities (n = 20) were randomly selected from the sample database and contacted to review the instrument. Additional questions asked about content, clarity, and applicability of the subject matter to Childcare Centers. Minor wording changes to HACCP definitions were made based on pilot participant (n = 8, 40%) recommendations.

### **Data Collection**

Two cover letters explaining the objectives of the research (one each for the director and foodservice employee), two copies of the instrument, and a postage-paid, coded return envelope were mailed to participants. The cover letters and paper instruments included the website address for those participants who might prefer to complete the survey electronically. Reminder postcards were sent two and five weeks after the initial mailing to encourage participation.

### **Data Analysis**

All data analysis procedures used the Statistical Package for Social Sciences (SPSS) (version 12.0, 2003, SPSS, Inc., Chicago: IL). Descriptive statistics computed were frequencies, means, and standard deviations. Independent samples t-tests determined differences in item mean scores based on position title, location, level of education, and food safety certification. Chi-square determined proportional differences for categorical data. An alpha level of .05 was set as the level of significance.

## Results

A total of 28 survey packages were returned as undeliverable, reducing the number of facilities in the sample population to 500. An overall facility response rate of 17.2% (n = 86) was obtained. Based on the assumption that only half the centers would have a designated foodservice employee, the sample population was estimated at 750 (500 facilities multiplied by 1.5 staff members). Due to incomplete and missing data, the final overall response rate was 17.5% (n = 131).

### Demographics

Demographics indicated that respondents were primarily employed as directors (n = 78), were female (95.4%), and most frequently reported being between 40 and 49 years of age (26.7%,  $\mu = 43$ ). Directors had a Bachelor's degree (45.9%) and most foodservice employees, a high school diploma (35.7%). Most facilities were located in areas with populations over 50,000 (43.7%) and 60.9% received reimbursement from the Child and Adult Care Food Program (See Table 1).

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Insert Table 1

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### Overall Item Responses

For items measuring perceived susceptibility, respondents agreed that children have an increased chance of complications from getting a foodborne disease ( $\mu = 3.95 \pm 0.79$ ), but did not believe that the chances of children getting a foodborne disease at their Center were great ( $\mu = 1.62 \pm 0.81$ ). Respondents also agreed that a foodborne disease

could cause severe consequences for children ( $\mu = 4.32 \pm 0.67$ ), but disagreed that an outbreak would affect their employment ( $\mu = 2.66 \pm 1.12$ ) (See Table 2).

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Insert Table 2

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Respondents thought that the benefits of food safety certification increased safe food-handling practices ( $\mu = 4.17 \pm 0.76$ ) and that by following HACCP-based food safety programs, food safety problems could be reduced ( $\mu = 3.81 \pm 0.94$ ). Lack of time for proper training ( $\mu = 4.05 \pm 0.97$ ) received the most agreement for perceived barriers to following HACCP-based food safety programs. The least agreed with barrier was that others at their center did not care about food safety issues ( $\mu = 1.91 \pm 1.00$ ).

For self-efficacy and intentions, respondents agreed they had the confidence ( $\mu = 4.06 \pm 0.71$ ) and skills necessary ( $\mu = 3.89 \pm 0.89$ ) to follow HACCP-based food safety programs and disagreed that they needed to learn more. Respondents were noncommittal about behavioral intentions with item mean scores ranging from 3.54 to 3.77.

Independent samples t-tests determined differences in item responses between directors and foodservice employees (See Table 2). Significant differences were found for the statement “if children develop foodborne illness, it could be more serious than other diseases” ( $t = -1.67, p = 0.05$ ) and following a HACCP program reduces food safety problems ( $t = 1.74, p = .04$ ) with directors rating the items higher. Other item differences found significant were the benefit of using food safety checklists ( $t = 2.46, p = 0.01$ ), the lack of funding for additional food safety training ( $t = 1.98, p = 0.03$ ), the time to complete additional paperwork the program would require ( $t = 1.90, p = 0.03$ ), and the

development of new skills ( $t = 2.08, p = 0.02$ ). For these items, foodservice employees had higher mean scores. Foodservice employees also indicated having higher levels of confidence ( $t = 2.23, p = 0.01$ ) and skills necessary ( $t = 2.69, p = .004$ ) to follow a HACCP-based food safety program.

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Insert Table 3

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Independent samples t-tests determined differences in beliefs and perceptions between those respondents based on level of education (See Table 3). For perceived susceptibility of children to foodborne illness, a significant difference was found for the item “Within the next year, the children at my Center will get a foodborne illness” ( $t = 2.61, p = .01$ ); those with more education had higher mean scores.

Three items measuring perceived severity had significant differences. These related to job endangerment in the event of a foodborne illness ( $t = -2.29, p = .02$ ) and the severity of consequences to children from foodborne illnesses ( $t = -2.30, p = .02$ ). Those with less education had higher mean scores. Conversely, for the item stating that foodborne illnesses were more serious for children than other diseases ( $t = 2.90, p = .00$ ), those with higher levels of education had higher mean scores.

For items measuring perceived benefits and perceived barriers, those with less education had higher mean scores for four items. These were certification increasing safe food handling practices ( $t = -2.28, p = .02$ ), HACCP being important to maintain food safety effectively ( $t = -2.42, p = .02$ ), time for additional paperwork required by HACCP ( $t = -2.85, p = .01$ ), and the difficulty of developing new habits ( $t = -2.61, p = .01$ ). For



self-efficacy, those with less education had higher mean scores for confidence to follow HACCP-based program ( $t = -2.83, p = .01$ ) and needing to learn more to follow the program ( $t = -2.01, p = .05$ ). There were no differences for behavioral intentions.

Analysis of differences in beliefs and perceptions between those who reported having food safety certification and those reporting no certification showed that for every significant difference noted, certified respondents had the higher mean score. Just over half (52%) of the items in the questionnaire showed significant differences (See Table 4).

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Insert Table 4

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### **Prerequisite Program Implementation Status**

Participants indicated the implementation status of nine prerequisite programs by specifying “Not Implemented”, “Partially Implemented”, or “Completely Implemented” (See Table 5). Frequency distributions showed most prerequisite programs as fully or partially implemented. The programs implemented by most Childcare Centers were personal hygiene (94.3%), pest control (87.4%), and chemical storage (90.8%). The least often implemented were kitchen operations procedures (80.5%), food safety training (74.7%), and equipment maintenance (60.9%).

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Insert Table 5

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There were significant differences in those who reported complete implementation of each of the nine prerequisite programs based on reported certification status in food safety. The analysis indicated that those with food safety certification had higher rates of implementation (See Table 6).

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Insert Table 6

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### **Discussion**

This research determined beliefs and perceptions of Childcare Center directors and foodservice employees about benefits, barriers, and intentions to follow HACCP-based food safety programs. Overall, respondents agreed that children were vulnerable to foodborne diseases and that consequences for children could be severe, but they believed that a foodborne disease would not occur at their Center and if it did, there would be no consequences to themselves or the Center.

For barriers, respondents indicated they lacked time for proper employee training, resources to improve food safety, and funding to pay for training. These results are consistent with previous research (Giampaoli, et al, 2002; Youn & Sneed, 2002; Strohbehm, et al, 2004; Roberts & Sneed, 2003; Roberts, et al, 2005; Hwang, et al, 2001; Riggins, et al, 2005; Sauer, 1998) who also found that time, money, resources, and training were barriers to implementing prerequisite and HACCP-based food safety programs.

Respondents agreed they could follow a HACCP-based food safety program, however, foodservice employees indicated more confidence in their abilities than did directors. This is an expected finding because employees should perceive themselves as

more confident since directors may lack the practical foodservice experience to estimate performance requirements accurately.

Other differences in beliefs and perceptions found between directors and foodservice employees included directors agreeing more strongly than foodservice employees that a foodborne disease would be serious, which may reflect their accountability as the director. Foodservice employees agreed more strongly that a lack of time and funding for training were barriers than did directors. Foodservice employees indicated the need for additional food safety training, however, due to budget constraints; directors may be reluctant to allow additional training unless required by accrediting agencies or health departments.

Differences based on level of education indicated that those with higher education agreed that foodborne illnesses were more serious than other diseases for children. Respondents with less education agreed that the consequences of foodborne illnesses for children are severe. For eight of nine barrier items, those respondents with less education had higher mean scores than those with more education. The exception had nearly identical mean scores (3.62 and 3.63) and was the item “I would be less anxious about foodborne illness if I followed a HACCP-based food safety program”. These results indicate that less educated directors and foodservice employees perceive more barriers to implementation of HACCP-based programs than do those with higher levels of education. Interestingly, those with less education also indicated more confidence in being able to follow a HACCP-program and had less disagreement about needing to learn more about HACCP-programs.

Just over half of the questionnaire items confirmed significant differences in beliefs and perception about HACCP-based food safety programs based on food safety certification status. In all cases, those with certification had the higher mean scores, which would indicate that those with food safety certification have a greater understanding of the importance of food safety and implementing a HACCP-based food safety program. All groups agreed that time for additional HACCP paperwork was a barrier to implementing HACCP-based programs.

### **Implementation Differences**

Most Centers in this study had implemented personal hygiene policies (94.3%) and 90% had policies covering chemical storage. These policies are among those required for accreditation through the NAEYC (NAEYC, 2005). The least implemented prerequisite programs were kitchen operation procedures and food safety training. These programs are essential for safe food preparation; however, size of operation and numbers fed may influence implementation. Since most respondents indicated they served less than 50 children, directors and foodservice employees may not consider these programs important

However, having a food safety certification significantly impacted implementation. Those who were certified had implemented all nine programs. This finding is consistent with previous research that has indicated that food safety certification has an impact on program implementation (Roberts & Sneed, 2003).

### **Conclusions and Applications**

Results of this study are consistent with previous research. It appears that noncommercial foodservices, regardless of segment, report the same barriers to

implementing prerequisite and HACCP-based food safety program: time, money, resources, and training (Barrett, Penner, & Blakeslee, 1996; Giampaoli, et al, 2002; Henroid & Sneed, 2004; Hwang, et al, 2001; Riggins, et al, 2005; Roberts & Sneed, 2003; Sauer, 1998; Strohbehm, et al, 2004; Youn & Sneed, 2002). Overall, respondents agreed with the above barriers, regardless of level of education or certification status.

Most respondents had partially or fully implemented the prerequisite programs. It appears that Childcare Centers could easily adapt existing programs to include requirements for the implementation of HACCP-based food safety programs. Written procedures for kitchen operations and food safety training were implemented least and should be addressed. The lower implementation rate of these programs reinforces the findings of this study that directors were not as concerned about food safety training as the foodservice employees. However, those with food safety certification had implemented the nine programs, which would indicate that certification does have an impact on childcare center food safety.

Respondents generally disagreed that they needed to learn more to follow a HACCP-based food safety program; however, the number of neutral responses may indicate a lack of knowledge in this population. For HACCP implementation, Childcare Center directors may need more education on food safety practices. Future research conducted with Childcare Center directors and employees should include determining knowledge levels and attitudes about HACCP-based food safety programs. Focus groups and individual interviews could determine requirements to integrate a HACCP-based food safety program into existing programs. Because of the highly susceptible population served, Childcare Centers should be concerned about the safety of the food

prepared and implement the best possible systems to insure that no child becomes ill from a foodborne disease.

Results of this research indicate the need to develop food safety and training materials specifically for Childcare Centers. Additionally, as the majority of respondents indicated they prepared meals using convenience foods instead of cooking from “scratch”, a model HACCP program should be developed considering this and other factors unique to childcare.

These findings are useful to regulatory and accrediting agencies because child care facilities serve a higher-risk population than do school foodservices, yet food safety issues do not appear to be a concern. Training in food safety is limited and HACCP is not a requirement for licensing. Federal agencies should revise current regulations governing Childcare Centers and state agencies should emphasize food safety in Childcare Centers and perform inspections similar to those at other non-commercial operations. Since it was significant that those with food safety certification had implemented prerequisite programs, it would be important for accrediting agencies to require nationally recognized food safety certification for foodservice personnel. Additionally, for accreditation purposes, the inclusion of a criterion requiring implementation of a HACCP-based food safety program should be investigated.

**Table 1**  
***Respondent Characteristics***

	<u>N</u>	<u>%</u>
<b>Gender:</b>		
Male	5	3.8
Female	125	95.4
No response	1	0.8
<b>Age Ranges:</b>		
29 or less	18	13.7
30 – 39	30	22.9
40 – 49	35	26.7
50 – 59	31	23.7
60 or more	6	4.6
No response	11	8.4
<b>Education:</b>		
HS/GED	21	16.0
Some College	21	16.0
Associates	14	10.7
Bachelors	40	30.5
Masters	29	22.1
No response	6	4.6
<b>Position:</b>		
Foodservice Employee	53	38.9
Director	78	57.3
<b>Food Safety Certification:</b>		
Yes	43	32.8
No	83	63.4
No response	5	3.8
<b>Certification Program:</b>		
ServSafe®	7	5.3
Health Depart	15	11.5
CACFP	12	9.2
Other	4	4.8
No response	91	69.5
<b>Location:</b>		
Colorado	14	16.28
Iowa	13	15.1
Kansas	22	25.6
Nebraska	6	7.0
Missouri	15	17.4
Oklahoma	9	10.5
No response	7	8.1

Table 2  
**Beliefs and Perceptions of Susceptibility, Severity, Benefits, Barriers, Self-efficacy, and Intention Based on Position Title**

Item	Statement <sup>a,d</sup>	Overall (n = 131)		Directors (n = 78)		Foodservice (n = 53)		t	Sig.
		M <sup>b</sup>	SD	M <sup>b</sup>	SD	M <sup>b</sup>	SD		
1	A child has an increased chance of having complications that come from getting a foodborne illness.	3.95	0.79	4.01	0.76	3.87	0.83	-1.03	0.15
2	When I think about a foodborne illness occurring at my center, I feel concerned.	3.85	1.24	3.87	1.18	3.81	1.33	-0.27	0.39
3	Children, in general, have a greater chance of getting a foodborne illness than adults.	3.67	1.03	3.64	1.08	3.72	0.95	0.41	0.34
4	I worry a lot about some of the children at my Center getting a foodborne illness.	1.99	1.02	1.99	0.99	2.00	1.07	0.07	0.47
5	Within the next year, the children at my Center will get a foodborne illness.	1.66	0.76	1.72	0.82	1.59	0.66	-0.98	0.16
6	The chances of children at my Center getting a foodborne illness are great.	1.62	0.81	1.59	0.78	1.66	0.85	0.49	0.31
7	A foodborne illness could cause severe consequences for young children.	4.32	0.67	4.24	0.72	4.43	0.57	1.60	0.06
8	Problems children would experience from a foodborne illness could last a long time.	3.81	1.03	3.83	0.96	3.77	1.14	-0.32	0.37
9	I am afraid to even think about the possibility of a foodborne illness outbreak at my Center.	3.41	1.26	3.37	1.25	3.47	1.30	0.44	0.33
10	If children acquire a foodborne illness, their whole life could change.	3.35	0.98	3.39	0.92	3.30	1.07	-0.48	0.32
11	If the children developed a foodborne illness, it could be more serious than other diseases.	3.22	0.94	3.33	0.86	3.06	1.03	-1.67	0.05*
12	The Center's financial security would be in jeopardy if any child got a foodborne illness.	2.92	1.10	2.87	1.12	2.98	1.07	0.56	0.29
13	A foodborne illness outbreak would endanger the relationship I have with my fellow employees.	2.82	1.16	2.77	1.12	2.89	1.22	0.57	0.29
14	If the children at my Center contracted a foodborne illness, my job would be endangered.	2.66	1.12	2.54	1.08	2.85	1.17	1.57	0.06

(table continues)



Table 2 (Continued)  
**Beliefs and Perceptions of Susceptibility, Severity, Benefits, Barriers, Self-efficacy, and Intention Based on Position Title**

Item	Statement <sup>a,d</sup>	Overall (n = 131)		Directors (n = 78)		Foodservice (n = 53)		t	Sig.
		M <sup>b</sup>	SD	M <sup>b</sup>	SD	M <sup>b</sup>	SD		
15	Employees with food safety certification are more likely to use safe food handling practices.	4.17	0.76	4.17	0.69	4.17	0.85	0.02	0.49
16	Food safety checklists may locate a problem before it is discovered by regular health inspections.	4.17	0.60	4.06	0.61	4.32	0.55	2.46	0.01*
17	A HACCP-based food safety program is important for maintaining food safety effectively.	4.05	0.78	3.96	0.84	4.19	0.65	1.65	0.05
18	Following a HACCP-based food safety program at work would greatly reduce future food safety problems for me.	3.81	0.94	3.69	0.96	3.98	0.89	1.74	0.04*
19	We lack the time required to train employees properly in food safety.	4.05	0.97	4.05	0.91	4.06	1.06	0.03	0.49
20	We do not have the resources to improve food safety at my center. <sup>e</sup>	4.02	1.00	3.96	0.96	4.11	1.05	0.86	0.20
21	Foodservice employees lack training in food safety issues.	3.71	1.06	3.69	1.05	3.74	1.10	0.23	0.41
22	I would be less anxious about foodborne illness if I followed a HACCP-based food safety program.	3.64	0.91	3.64	0.91	3.64	0.92	0.00	0.50
23	We lack the funding to pay for additional food safety training.	3.61	1.29	3.44	1.36	3.87	1.18	1.98	0.03*
24	We do not have the time for the additional paperwork a HACCP-based food safety program would require. <sup>e</sup>	3.47	1.13	3.32	1.10	3.70	1.14	1.90	0.03*
25	Staff and employees of child care centers do not feel comfortable with change. <sup>e</sup>	3.33	1.11	3.24	1.13	3.45	1.08	1.06	0.15
26	Completing HACCP-based food safety program requirements would involve developing new habits, which is difficult.	3.30	1.06	3.14	1.02	3.53	1.09	2.08	0.02*
27	Other than myself, Center employees do not care about food safety issues.	1.91	1.00	1.87	1.02	1.96	0.98	0.51	0.31

(table continues)

Table 2 (Continued)  
**Beliefs and Perceptions of Susceptibility, Severity, Benefits, Barriers, Self-efficacy, and Intention Based on Position Title**

Item	Statement <sup>a, d</sup>	Overall (n = 131)		Directors (n = 78)		Foodservice (n = 53)		t	Sig.
		M <sup>b</sup>	SD	M <sup>b</sup>	SD	M <sup>b</sup>	SD		
28	I am confident that I can follow a HACCP-based food safety program.	4.06	0.71	3.95	0.75	4.23	0.61	2.23	0.01*
29	I have the skills necessary to follow a HACCP-based food safety program.	3.88	0.89	3.72	0.95	4.11	0.73	2.69	0.00*
30	I need to learn more to be able to follow a HACCP-based food safety program.	2.57	1.07	2.49	1.09	2.70	1.05	1.10	0.14
31	I would not use a food safety self-inspection form unless mandated.	3.77	0.94	3.73	0.98	3.83	0.90	0.59	0.28
32	I would follow a voluntary HACCP-based food safety program.	3.77	0.81	3.72	0.84	3.85	0.77	0.91	0.18
33	I would use recipes modified for HACCP-based food safety practices.	3.54	0.86	3.49	0.91	3.62	0.79	0.88	0.19

<sup>a</sup> All statements were preceded by the instructions to "Circle the response that corresponds to the way you feel about each statement. There is no right or wrong answers, please be honest."

<sup>b</sup> All statements were measured on a 5-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*).

<sup>c</sup> Item reverse scored.

\* p-value < .05

<sup>d</sup> Items numbered 1-6 measured susceptibility, 7-14 severity; 15-18 benefits; 19-27 barriers; 28-30 self-efficacy; and 31-33 behavioral intentions

Table 3

**Beliefs and Perceptions of Susceptibility, Severity, Benefits, Barriers, Self-efficacy, and Intention Based on Education Level**

Item	Statement <sup>a, d</sup>	Associates or less					Bachelors or higher				
		n	M <sup>b</sup>	SD	n	M <sup>b</sup>	SD	n	M <sup>b</sup>	SD	t
1	The chances of children at my Center getting a foodborne illness are great.	56	1.46	0.71	69	1.70	0.77	1.72	0.09		
2	Children, in general, have a greater chance of getting a foodborne illness than adults.	56	3.64	1.02	69	3.62	1.04	-0.11	0.92		
3	A child has an increased chance of having complications that come from getting a foodborne illness.	56	3.95	0.88	69	3.93	0.73	-0.13	0.90		
4	I worry a lot about some of the children at my Center getting a foodborne illness.	56	1.89	1.02	69	2.01	0.95	0.69	0.49		
5	Within the next year, the children at my Center will get a foodborne illness.	56	1.45	0.66	69	1.78	0.78	2.61	0.01*		
6	When I think about a foodborne illness occurring at my center, I feel concerned.	56	3.73	1.43	68	3.88	1.09	0.66	0.51		
7	If the children at my Center contracted a foodborne illness, my job would be endangered.	56	2.89	1.23	69	2.43	1.01	-2.29	0.02*		
8	A foodborne illness outbreak would endanger the relationship I have with my fellow employees.	56	2.96	1.19	69	2.67	1.12	-1.44	0.15		
9	A foodborne illness could cause severe consequences for young children.	56	4.46	0.57	69	4.19	0.73	-2.30	0.02*		
10	I am afraid to even think about the possibility of a foodborne illness outbreak at my Center.	56	3.52	1.39	68	3.34	1.17	-0.78	0.44		
11	The Center's financial security would be in jeopardy if any child got a foodborne illness.	56	2.96	1.06	69	2.86	1.13	-0.55	0.58		
12	Problems children would experience from a foodborne illness could last a long time.	56	3.71	1.12	69	3.86	0.94	0.76	0.45		
13	If the children developed a foodborne illness, it could be more serious than other diseases.	56	2.95	0.90	69	3.42	0.91	2.90	0.00*		
14	If children acquire a foodborne illness, their whole life could change.	56	3.38	1.09	69	3.30	0.88	-0.40	0.69		

*(table continues)*

Table 3 (Continued)  
**Beliefs and Perceptions of Susceptibility, Severity, Benefits, Barriers, Self-efficacy, and Intention Based on Education Level**

Item	Statement <sup>a, d</sup>	Associates or less			Bachelors or higher			t	Sig.
		n	M <sup>b</sup>	SD	n	M <sup>b</sup>	SD		
15	Following a HACCP-based food safety program at work would greatly reduce future food safety problems for me.	56	3.91	0.88	68	3.66	0.97	-1.48	0.14
16	Employees with food safety certification are more likely to use safe food handling practices.	56	4.32	0.81	69	4.01	0.70	-2.28	0.02*
17	A HACCP-based food safety program is important for maintaining food safety effectively.	56	4.21	0.71	68	3.88	0.80	-2.42	0.02*
18	Food safety checklists may locate a problem before it is discovered by regular health inspections.	56	4.21	0.62	69	4.09	0.56	-1.20	0.23
19	I would be less anxious about foodborne illness if I followed a HACCP-based food safety program. <sup>c</sup>	55	3.62	0.97	68	3.63	0.88	0.08	0.93
20	We do not have the resources to improve food safety at my center.	55	4.18	1.02	69	3.91	0.97	-1.50	0.14
21	We lack the time required to train employees properly in food safety. <sup>c</sup>	56	4.16	1.04	69	3.94	0.94	-1.23	0.22
22	We lack the funding to pay for additional food safety training. <sup>c</sup>	56	3.79	1.22	69	3.43	1.34	-1.51	0.13
23	We do not have the time for the additional paperwork a HACCP-based food safety program would require. <sup>c</sup>	56	3.77	1.08	69	3.20	1.12	-2.85	0.01*
24	Foodservice employees lack training in food safety issues. <sup>c</sup>	56	3.75	1.08	69	3.62	1.07	-0.65	0.51
25	Staff and employees of child care centers do not feel comfortable with change. <sup>c</sup>	56	3.48	1.08	69	3.20	1.11	-1.42	0.16
26	Completing HACCP-based food safety program requirements would involve developing new habits, which is difficult. <sup>c</sup>	56	3.59	1.12	68	3.10	0.95	-2.61	0.01*
27	Other than myself, Center employees do not care about food safety issues. <sup>c</sup>	56	1.86	0.98	69	1.88	0.95	0.16	0.88

(table continues)

Table 3 (Continued)  
**Beliefs and Perceptions of Susceptibility, Severity, Benefits, Barriers, Self-efficacy, and Intention Based on Education Level**

Item	Statement <sup>a, d</sup>	Associates or less			Bachelors or higher			t	Sig.
		n	M <sup>b</sup>	SD	n	M <sup>b</sup>	SD		
28	I am confident that I can follow a HACCP-based food safety program.	56	4.25	0.61	69	3.90	0.75	-2.83	0.01*
29	I have the skills necessary to follow a HACCP-based food safety program.	56	3.95	0.94	69	3.80	0.85	-0.93	0.35
30	I need to learn more to be able to follow a HACCP-based food safety program.	56	2.80	1.13	69	2.42	0.99	-2.01	0.05*
31	I would follow a voluntary HACCP-based food safety program.	56	3.75	0.86	69	3.75	0.77	0.02	0.98
32	I would use recipes modified for HACCP-based food safety practices.	56	3.54	0.85	69	3.55	0.80	0.10	0.92
33	I would not use a food safety self-inspection form unless mandated.	56	3.70	0.97	69	3.83	0.92	0.76	0.45

<sup>a</sup> All statements were preceded by the instructions to "Circle the response that corresponds to the way you feel about each statement. There is no right or wrong answers, please be honest."

<sup>b</sup> All statements were measured on a 5-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*).

<sup>c</sup> Item reverse scored.

\* p-value < .05

<sup>d</sup> Items numbered 1-6 measured susceptibility, 7-14 severity; 15-18 benefits; 19-27 barriers; 28-30 self-efficacy; and 31-33 behavioral intentions

Table 4

**Beliefs and Perceptions of Susceptibility, Severity, Benefits, Barriers, Self-efficacy, and Intention Based on Certification Status**

Item	Statement <sup>a, d</sup>	Certified			Not Certified			F	Sig.
		n	M <sup>b</sup>	SD	n	M <sup>b</sup>	SD		
1	The chances of children at my Center getting a foodborne illness are great.	43	1.79	0.86	83	1.52	0.77	3.27	0.07
2	Children, in general, have a greater chance of getting a foodborne illness than adults.	43	3.91	1.00	83	3.57	1.04	3.14	0.08
3	A child has an increased chance of having complications that come from getting a foodborne illness.	43	4.19	0.66	83	3.83	0.84	5.80	0.02*
4	I worry a lot about some of the children at my Center getting a foodborne illness.	43	2.07	1.12	83	1.92	0.95	0.66	0.42
5	Within the next year, the children at my Center will get a foodborne illness.	43	1.72	0.70	83	1.64	0.81	0.32	0.57
6	When I think about a foodborne illness occurring at my center, I feel concerned.	43	4.02	1.06	83	3.77	1.33	1.17	0.28
7	If the children at my Center contracted a foodborne illness, my job would be endangered.	43	2.95	1.09	83	2.52	1.12	4.36	0.04*
8	A foodborne illness outbreak would endanger the relationship I have with my fellow employees.	43	3.23	1.11	83	2.61	1.14	8.53	0.00*
9	A foodborne illness could cause severe consequences for young children.	43	4.49	0.67	83	4.24	0.67	3.84	0.05*
10	I am afraid to even think about the possibility of a foodborne illness outbreak at my Center.	43	3.51	1.20	83	3.36	1.31	0.39	0.53
11	The Center's financial security would be in jeopardy if any child got a foodborne illness.	43	3.21	1.12	83	2.75	1.05	5.26	0.02*
12	Problems children would experience from a foodborne illness could last a long time.	43	4.14	0.89	83	3.63	1.06	7.42	0.01*
13	If the children developed a foodborne illness, it could be more serious than other diseases.	43	3.49	0.94	83	3.07	0.92	5.72	0.02*
14	If children acquire a foodborne illness, their whole life could change.	43	3.56	0.98	83	3.24	0.97	3.00	0.09

*(table continues)*

Table 4 (Continued)  
**Beliefs and Perceptions of Susceptibility, Severity, Benefits, Barriers, Self-efficacy, and Intention Based on Certification Status**

Item	Statement <sup>a, d</sup>	Certified			Not Certified			F	Sig.
		n	M <sup>b</sup>	SD	n	M <sup>b</sup>	SD		
15	Following a HACCP-based food safety program at work would greatly reduce future food safety problems for me.	43	4.12	0.73	83	3.66	1.02	6.76	0.01*
16	Employees with food safety certification are more likely to use safe food handling practices.	43	4.28	0.55	83	4.11	0.84	1.45	0.23
17	A HACCP-based food safety program is important for maintaining food safety effectively.	43	4.21	0.60	83	3.99	0.85	2.32	0.13
18	Food safety checklists may locate a problem before it is discovered by regular health inspections.	43	4.33	0.47	83	4.07	0.64	5.24	0.02*
19	I would be less anxious about foodborne illness if I followed a HACCP-based food safety program. <sup>c</sup>	42	3.88	0.86	82	3.56	0.93	3.45	0.07
20	We do not have the resources to improve food safety at my center.	43	4.19	0.82	83	3.95	1.06	1.60	0.21
21	We lack the time required to train employees properly in food safety. <sup>c</sup>	43	4.30	0.74	83	3.95	1.02	3.96	0.05*
22	We lack the funding to pay for additional food safety training. <sup>c</sup>	43	3.95	1.13	83	3.46	1.32	4.39	0.04*
23	We do not have the time for the additional paperwork a HACCP-based food safety program would require. <sup>c</sup>	43	3.79	1.06	83	3.29	1.12	5.88	0.02*
24	Foodservice employees lack training in food safety issues. <sup>c</sup>	43	4.05	0.82	83	3.54	1.14	6.64	0.01*
25	Staff and employees of child care centers do not feel comfortable with change. <sup>c</sup>	43	3.37	1.22	83	3.25	1.07	0.32	0.57
26	Completing HACCP-based food safety program requirements would involve developing new habits, which is difficult. <sup>c</sup>	43	3.23	1.23	83	3.31	0.96	0.16	0.69
27	Other than myself, Center employees do not care about food safety issues. <sup>c</sup>	43	1.93	1.08	83	1.90	1.00	0.02	0.89

(table continues)

Table 4 (Continued)  
**Beliefs and Perceptions of Susceptibility, Severity, Benefits, Barriers, Self-efficacy, and Intention Based on Certification Status**

Item	Statement <sup>a, d</sup>	Certified			Not Certified			F	Sig.
		n	M <sup>b</sup>	SD	n	M <sup>b</sup>	SD		
28	I am confident that I can follow a HACCP-based food safety program.	43	4.23	0.61	83	3.96	0.76	4.05	0.05*
29	I have the skills necessary to follow a HACCP-based food safety program.	43	4.12	0.76	83	3.73	0.94	5.29	0.02*
30	I need to learn more to be able to follow a HACCP-based food safety program.	43	2.70	1.01	83	2.52	1.12	0.78	0.38
31	I would follow a voluntary HACCP-based food safety program.	43	3.93	0.83	83	3.67	0.80	2.83	0.09
32	I would use recipes modified for HACCP-based food safety practices.	43	3.84	0.78	83	3.39	0.88	8.00	0.01*
33	I would not use a food safety self-inspection form unless mandated.	43	4.05	0.87	83	3.64	0.96	5.46	0.02*

<sup>a</sup> All statements were preceded by the instructions to "Circle the response that corresponds to the way you feel about each statement. There is no right or wrong answers, please be honest."

<sup>b</sup> All statements were measured on a 5-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*).

<sup>c</sup> Item reverse scored.

\* p-value < .05

<sup>d</sup> Items numbered 1-6 measured susceptibility, 7-14 severity, 15-18 benefits, 19-27 barriers, 28-30 self-efficacy, and 31-33 behavioral intentions



Table 5

***Overall Implementation Status of Prerequisite Programs Based on Facility (n = 86)***

Program <sup>a</sup>	<u>Completely</u> <sup>b</sup>		<u>Partially</u> <sup>b</sup>		<u>Not</u> <sup>b</sup>		No Response	
	n	%	n	%	n	%	n	%
Personal Hygiene	82	94.3	3	3.4	0	0.0	2	2.3
Pest Control Program	76	87.4	5	5.7	5	5.7	1	1.1
Chemical Storage	798	90.8	3	3.4	4	4.6	1	1.1
Purchasing Procedures	74	85.1	10	11.5	2	2.3	1	1.1
Food Allergy Procedures	76	87.4	9	10.3	1	1.1	1	1.1
Equip Cleaning Procedures	70	80.5	15	17.2	1	1.1	1	1.1
Kitchen Operation Policies	70	80.5	10	11.5	5	5.7	2	2.3
Food Safety Training Program	65	74.7	17	19.5	3	3.4	2	2.3
Equip Maintenance Program	53	60.9	25	28.7	7	8.0	2	2.3

<sup>a</sup> Percentages may not add to 100% due to rounding

<sup>b</sup> As reported by one respondent per facility. Director responses were used when possible.

Table 6

***Implementation of Prerequisite Programs by Certification Status of All Respondents***

Program <sup>a</sup>	Certified <sup>c</sup>		Not Certified <sup>c</sup>		$\chi^2$	Sig.
	n <sup>b</sup>	%	n <sup>cb</sup>	%		
Personal Hygiene	42	0.98	79	0.95	13.45	0.00*
Pest Control Program	38	0.88	78	0.94	15.54	0.00*
Chemical Storage	41	0.95	79	0.95	13.67	0.00*
Purchasing Procedures	38	0.88	73	0.88	12.67	0.00*
Food Allergy Procedures	41	0.95	71	0.86	9.47	0.00*
Equipment Cleaning Procedures	36	0.84	71	0.86	13.13	0.00*
Kitchen Operation Policies	39	0.91	66	0.80	8.33	0.00*
Food Safety Training Programs	34	0.79	64	0.77	10.78	0.00*
Equipment Maintenance Program	31	0.72	52	0.63	6.79	0.01*

<sup>a</sup> Percentages may not add to 100% due to non-response.

<sup>b</sup> Completely implemented program

<sup>c</sup> As reported by respondents

\* p-value < .05

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## CHAPTER 6

### SUMMARY AND CONCLUSIONS

Children attending Childcare Centers are at a greater risk for foodborne diseases and may be exposed daily to a variety of pathogens (Buzby, 2001; U. S. General Accounting Office, 2003). Between 1990 and 2004 in the United States (U.S.), 43 foodborne disease outbreaks that affected 1,276 children in Childcare Centers were confirmed (Centers for Disease Control and Prevention (CDC), n.d.). Because young children may not recall where or what food they have eaten and have underdeveloped immune systems (Hedberg & Osterholm, 1993), it is important that a food safety system be implemented in Childcare Centers.

Hazard Analysis and Critical Control Points (HACCP) is a scientifically based food safety system that focuses on preventing those practices and behaviors that cause foodborne diseases. Before implementing a HACCP program in a foodservice operation, it is helpful to understand employees' perceptions and beliefs about food safety behaviors and intentions to follow a HACCP based food safety program. To date, the researcher has found no published research that discusses these beliefs and perceptions about food safety behaviors or intentions to follow HACCP-based food safety programs in Childcare Centers.

The purposes of this research were to develop an instrument and test an exploratory model based on the Health Belief Model to assess beliefs and perceptions of Childcare Center directors and foodservice employees about HACCP-based food safety programs and to investigate the status of HACCP prerequisite programs. Additionally,



the study examined differences in perceptions about benefits, barriers, and intentions to follow HACCP-based food safety programs by position title, educational level, and certification status of Childcare Center directors and foodservice employees. Further, this study sought to determine the status of prerequisite programs in Childcare Centers and to identify differences in prerequisite program status based on food safety certification.

The sample population frame included 528 Childcare Centers located in Colorado, Iowa, Kansas, Missouri, Nebraska, and Oklahoma. Instruments were sent to the director and foodservice employee (if applicable) of the Centers. Due to incomplete and missing data, the final response rate was 17.5% (n = 131).

### **Major Findings**

This section describes the major findings of the research.

#### **Instrument Validity**

Content validity was confirmed by a committee of experts in food safety, HACCP, and childcare operations (n = 5) and the responses of the focus group (n = 7). Examination of the correlation matrix for the instrument items determined convergent and discriminant validity, which found that most items within constructs were significantly correlated and between 10 of a possible 49 combinations of constructs, which might indicate that the constructs were measuring the same concept (See Appendix F).

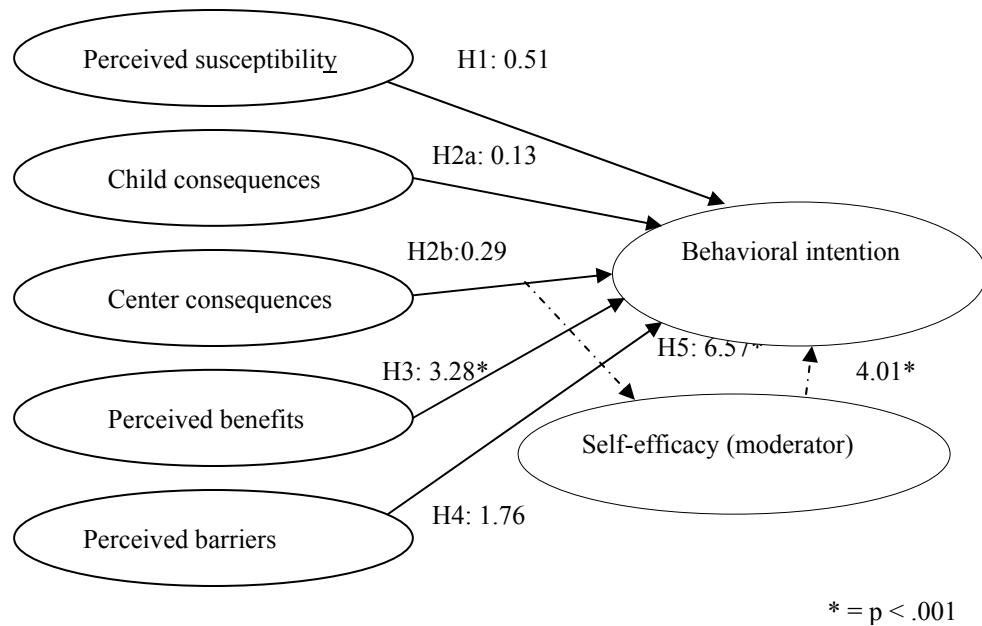
Reliability and exploratory factor analysis were conducted to address these concerns. Exploratory factor analysis was selected because the instrument had not been

tested with the target population and modifications had been made to the Health Belief Model (See Appendix F).

### **Model Testing**

Reliability analysis resulted in the removal of 12 items, leaving one item to measure self-efficacy. In factor analysis, the majority of remaining 20 items loaded as expected except for severity, which split on two factors. The final factor names included perceived susceptibility, center consequences, child consequences, perceived benefits, perceived barriers, self-efficacy, and behavioral intentions.

Cronbach's alpha (Cronbach, 1951) calculated reliability for the initial scale (0.796) and for six factors: perceived barriers, 0.865; center consequences, 0.810; child consequences, 0.764; perceived benefits, 0.733; behavioral intention, 0.676; and perceived susceptibility, 0.657. The model accounted for 70.07% of the variance. Although factors measuring susceptibility and behavioral intention generated reliability coefficients lower than 0.70, in exploratory research a break off point of 0.60 is commonly accepted (Droge, 1996; Garson, n.d.). Self-efficacy was reduced to one item requiring an alternative reliability measure: test-retest reliability coefficient, which found a reliability of 0.463. Reliability for the final revised instrument was 0.673, which is located below.



**Figure 6.1 Revised Model**

### Hypothesis Testing

Results of the hypotheses tests are summarized below.

H<sub>1</sub>: Perceived susceptibility of foodborne illness will have a positive association with behavioral intentions related to willingness to follow a HACCP-based food safety program.

The results did not support the hypothesis that perceived susceptibility would have a positive association with behavioral intention. Previous research with Hepatitis A vaccination (Rhodes & Arceo, 2004) found similar results.

H<sub>2</sub>: Perceived severity of foodborne illness consequences will have a positive association with behavioral intention related to willingness to follow a HACCP-based food safety program.

The severity hypothesis was not supported by the results. The construct split on two factors and the model reconfigured to include an additional factor. This may indicate that for this population, several dimensions are included in the severity construct.

H<sub>3</sub>: Perceived benefits of following HACCP-based food safety programs will have a positive association with behavioral intention.

Hypothesis three was supported. A significant, positive association was found between perceived benefits and behavioral intention ( $r = .389, p < 0.05$ ). This finding is also consistent with HAV vaccination research (Rhodes & Arceo, 2004).

H<sub>4</sub>: Perceived barriers to following a HACCP-based food safety program will have a negative association with behavioral intentions.

The fourth hypothesis was not supported because perceived barriers had a positive association with behavioral intentions. Previous research (Kirscht, 1974; Rosenstock, 1974) indicated that perceived barriers were the best predictors of behavior across studies. In this study, confounding variables or respondent's lack of knowledge may be the reasons for non-support.

H<sub>5</sub>: Self-efficacy to follow HACCP-based food safety programs will have a moderating effect on the relationship between independent variables (perceived susceptibility, perceived severity, perceived benefits, and perceived barriers) and behavioral intention related to willingness to follow a HACCP-based food safety program.

The results partially corroborated the moderator hypothesis. Multiple stepwise regressions found that self-efficacy ( $t = 4.012, p < 0.001$ ) and perceived benefits ( $t = 3.283, p = 0.001$ ), separately and in combination ( $t = 6.573, p < 0.001$ ) had significant direct effects on behavioral intentions while self-efficacy had a moderating effect on the relationship between perceived benefits and behavioral intentions. No other significant effects were found. Previous research (Von Ah, Ebert, Ngamviroj, Park, & Kang, 2004) found that perceived barriers was a mediator and perceived benefits was a moderator between self-efficacy and various health behaviors (See Appendix F).

Because perceived susceptibility, perceived severity, and perceived barriers did not have a significant impact on behavioral intentions, these constructs may not have been measured. Responses did indicate that directors and foodservice employees were aware of the susceptibility and severity of foodborne illnesses to children, but did not believe that a foodborne disease could occur at their Center or, if it did, would have no negative consequences to them personally or to the Center. Additionally, individual responses to items suggested that following HACCP-based food safety programs would not be practical.

### **Differences Between Groups**

Independent samples t-tests determined differences in item responses between directors and foodservice employees with foodservice employees having the higher means for most differences. Differences in beliefs and perceptions between those respondents based on level of education were also determined. Those with lower levels of education were found to have the higher mean score for most items with differences.

Analysis of differences in beliefs and perceptions between those who reported having food safety certification and those reporting no certification showed that for every significant difference noted, certified respondents had the higher mean score. Just over half (52%) of the items in the questionnaire showed significant differences.

### **Status of Prerequisite Programs**

Participants were asked to indicate the implementation status of nine prerequisite programs by specifying “Not Implemented”, “Partially Implemented”, or “Completely Implemented”. Frequency distributions showed most prerequisite programs as fully or partially implemented. The programs implemented by most Childcare Centers were personal hygiene (94.3%), pest control (87.4%), and chemical storage (90.8%). The least often implemented were kitchen operations procedures (80.5%), food safety training (74.7%), and equipment maintenance (60.9%).

There were significant differences in the proportion of Childcare Centers that reported complete implementation of each of the nine prerequisite programs based on food safety certification. Results of the analysis found that those with food safety certification had higher rates of implementation for all nine prerequisite programs.

### **Limitations of the Study**

Results of this study are not generalizable due to the low overall response rate, the sample population confined to accredited Childcare Centers in six states, and the ambiguity of self-reported data. This also is exploratory research, which might be interpreted as a limitation.

Although the questionnaire was offered electronically, only 11 of 131 respondents utilized the electronic format. This may be due to a lack of computer knowledge or

access to a computer. Some respondents indicated they could not open the electronic survey. In addition, the low response rate affected statistical analysis because the numbers of responses were too small to perform advanced analyses such as Structural Equation Modeling.

Further, because the instrument was experimental, this can also be considered a limitation. The instrument items measuring self-efficacy need to be rewritten to improve the reliability.

The focus group and pre-test respondents indicated a lack of knowledge about HACCP and this was reinforced by the sample population because item responses received a high portion of neutral answers. This is a limitation of the study and with a more knowledgeable population; the results could be more significant.

### **Conclusions and Applications**

The experimental instrument and modified Health Belief Model appeared to measure beliefs and perceptions about following HACCP-based food safety programs. However, it may not be suited for this population as there were indications that the sample population lacked knowledge of the subject matter. A better test of the model might be with a population that has more knowledge about HACCP-based food safety programs. Additionally, beliefs and perceptions about severity may need further study to identify specific dimensions for the population under study. Analysis demonstrated the model accounted for 70.07% of the variance for a six-factor solution. The modified Health Belief Model identified two factors that had significant effects on behavioral intention; these were perceived benefits and self-efficacy.

The modified model found that perceived benefits and self-efficacy are not sufficient to change behaviors. Perceived barriers, which had previously been shown to predict behaviors, did not do so in this study. Perceived benefits and self-efficacy were the only significant factors that influenced intent to follow a HACCP-based food safety program, which may indicate that if directors and employees do not believe the benefits are great enough to outweigh the barriers (extra paperwork or the difficulty of developing new habits), they will be less likely to follow a HACCP-based food safety program. However, with a revised instrument and more knowledgeable population, all constructs could significantly identify behavioral intentions to follow a HACCP based food safety program.

Applying this modified Health Belief Model to other types of foodservice operations may help determine beliefs and perceptions that influence those employees who do not follow safe food-handling procedures. Once beliefs and perceptions about food safety practices and behaviors are identified, interventions can be tailored to address specific misconceptions resulting in improved food safety practices and behaviors.

Overall, Childcare Center directors and foodservice employees agreed that they lacked time for proper employee training, resources to improve food safety, and funding to pay for training. Foodservice employees perceived the need for additional food safety training; however, directors may be reluctant to allow additional training unless required by the accrediting agency or local health department. Responses indicated that directors and foodservice employees may have had little knowledge about HACCP-based food safety programs and do not think food safety is an important issue. This could be confirmed by adding items to the instrument that measure knowledge to determine if



Childcare Center directors and foodservice employees are aware of basic food safety practices (i.e. internal cooking temperatures, cooling procedures, and labeling requirements).

Prerequisite programs had been fully or partially implemented in most Centers due to accreditation requirements. Written procedures for kitchen operations, food safety training, and equipment maintenance programs were the least implemented indicating Childcare Centers may lack information about requirements to implement HACCP-based food safety programs and available resources. It appears that Childcare Centers could easily adapt existing programs to include requirements for the implementation of HACCP-based food safety programs. The lower implementation rate of these programs reinforces the findings of this study that directors were not as concerned about food safety training as the foodservice employees.

Analysis of items measuring beliefs and perceptions of directors and foodservice employees about HACCP-based food safety programs found significant differences for over half of the items between those who had or did not have food safety certification. Those with food safety certification had implemented the nine programs, which would indicate that certification does have an impact on Childcare Center food safety. These findings support previous research that has found similar results (Roberts & Sneed, 2003).

These findings are useful to regulatory and accrediting agencies because childcare facilities serve a higher-risk population than do school foodservices, yet food safety issues do not appear to be a concern. Training in food safety is limited and HACCP is not a requirement for licensing. Federal agencies should revise current regulations

governing Childcare Centers and state agencies should emphasize food safety in Childcare Centers and perform inspections similar to those at other non-commercial operations. Since it was significant that those with food safety certification had implemented prerequisite programs, it would be important for accrediting agencies to require nationally recognized food safety certification for foodservice personnel. Additionally, for accreditation purposes, the inclusion of a criterion requiring implementation of a HACCP-based food safety program should be investigated.

These results suggest the need to develop food safety and training materials specifically for Childcare Centers. Any materials developed will need to take into consideration the unique characteristics of childcare operations.

### **Recommendations for Future Study**

The instrument used a five-point scale which resulted in the over selection of the mid-point and may have affected the reliability which can be diminished when most scale items receive a large proportion of neutral responses (De Lorio, 2005). Research suggests either omitting the mid-point or offering more response choices to decrease middle selection (De Lorio). Future research should be conducted to include a six or eight point scale to determine if the instrument can identify the constructs of this model.

Because of a possible lack of knowledge of respondents, this instrument should be tested with a more knowledgeable population such as healthcare or school foodservice operations. However, the instrument would need to be modified by using language and situations specific to the population. For example, schools feed children that are, generally at least age six, but are not considered as “young children”. In healthcare, issues related to having diseases other than foodborne diseases may effect beliefs and

perceptions about food safety practices. Methods to determine if items are appropriate for inclusion given a particular population would involve conducting focus groups and pilot tests and could help in determining wording choices to maximize understanding of the questionnaire items.

Specific dimensions that make up the severity construct need to be investigated for each population studied using the Health Belief Model. Beliefs and perceptions are guided in part, by how people have lived. It is also guided by the amount and type of information that is available to them. Consequently, research should consider comparing samples of the same populations based on rural or urban living as well as other demographics.

Another possible avenue would be to use Structural Equation Modeling (SEM) with a larger population sample. Using path analysis, this model could be compared to results with another population to determine specific dimensions of constructs.

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## **Appendix A**

### **Initial Instrument**

## Definitions

**Center:** A child care facility.

**Certify, certification, certified:** The designation given to those who have taken the required training and testing recognized by the Conference for Food Protection. The best known example is the National Restaurant Associations' ServSafe® that requires 8 hours of training.

**Employee(s):** Any person who works at a childcare facility including teachers, teachers' aides, foodservice personnel, managers, and directors.

**HACCP:** Acronym for Hazard Analysis Critical Control Points. This is a system that addresses food safety concerns in foodservice operations. The system is scientifically based and designed to reduce illnesses caused by food.

**HACCP-Based Food Safety Program:** A written document that explains, in detail, the policies, practices, and procedures to be used throughout a facility to reduce the likelihood of having an illness caused by food.

**HACCP Recordkeeping and checklists:** Recordkeeping for HACCP programs include, but may not be limited to, recording cooking temperatures of foods, refrigerators and freezer, and serving temperatures of foods. Documentation is also required for procedures to cool foods for storage, sanitizer strength, or final rinse temperature of dishwasher, and of food safety training, illness complaints, and actions taken to correct any food safety problems

**Hazard:** Any biological (bacteria and viruses; for example E. coli, Salmonella, and Hepatitis A), chemical (examples are cleaners, sanitizers, and bleach), or physical (examples are bones and plastic) agent that could cause harm or death to a person if it were in the food they ate.

**Foodborne illness:** An illness caused by eating food that has been contaminated with one of the hazards described above. Examples are Salmonella in chicken, E. coli in hamburger, bleach mistaken for water and used in a recipe, and small bones found in some types of fish.

**Foodborne illness outbreak:** When two or more people have the same symptoms after eating the same foods.

**Potentially hazardous foods:** Foods considered potentially hazardous are those that are high in protein and carbohydrates. Examples are raw and undercooked meats, dairy products, cooked vegetables, cooked rice and potatoes, casserole type dishes, and cut melons. Examples of foods not considered potentially hazardous are whole fruits, raw vegetables, and baked goods.

### Child Care Food Safety Questionnaire

**PART 1 Directions:** Circle the response that corresponds to the way you feel about each statement. There is no right or wrong answers, please be honest. Words in **bold** are defined on page 1.

**SD = Strongly Disagree , D = Disagree, N = Neutral, A = Agree, and SA = Strongly Agree**

1	The chances of children at my Center getting a <b>foodborne illness</b> are great.	SD	D	N	A	SA
2	Children, in general, have a greater chance of getting a <b>foodborne illness</b> than adults.	SD	D	N	A	SA
3	A child has an increased chance of having complications that come from getting a <b>foodborne illness</b> .	SD	D	N	A	SA
4	I worry a lot about some of the children at my Center getting a <b>foodborne illness</b> .	SD	D	N	A	SA
5	Within the next year, the children at my Center will get a <b>foodborne illness</b> .	SD	D	N	A	SA
6	When I think about a <b>foodborne illness</b> occurring at my center, I feel concerned.	SD	D	N	A	SA
7	If the children at my Center contracted a <b>foodborne illness</b> , my job would be endangered.	SD	D	N	A	SA
8	A <b>foodborne illness outbreak</b> would endanger the relationship I have with my fellow employees.	SD	D	N	A	SA
9	A <b>foodborne illness</b> could cause severe consequences for young children.	SD	D	N	A	SA
10	I am afraid to even think about the possibility of a <b>foodborne illness outbreak</b> at my Center.	SD	D	N	A	SA
11	The Center's financial security would be in jeopardy if any child got a <b>foodborne illness</b> .	SD	D	N	A	SA
12	Problems children would experience from a <b>foodborne illness</b> could last a long time.	SD	D	N	A	SA
13	If the children developed a <b>foodborne illness</b> , it could be more serious than other diseases.	SD	D	N	A	SA
14	If children acquire a <b>foodborne illness</b> , their whole life could change.	SD	D	N	A	SA
15	Following a <b>HACCP-based food safety program</b> at work would greatly reduce future food safety problems for me.	SD	D	N	A	SA
16	Employees with food safety <b>certification</b> are more likely to use safe food handling practices.	SD	D	N	A	SA
17	A <b>HACCP-based food safety program</b> is important for maintaining food safety effectively.	SD	D	N	A	SA



<b>SD = Strongly Disagree , D = Disagree, N = Neutral, A = Agree, and SA = Strongly Agree</b>						
18	Food safety checklists may locate a problem before it is discovered by regular health inspections.	SD	D	N	A	SA
19	I would be less anxious about foodborne illness if I followed a <b>HACCP-based food safety program</b> .	SD	D	N	A	SA
20	We do not have the resources to improve food safety at my center.	SD	D	N	A	SA
21	We lack the time required to train employees properly in food safety.	SD	D	N	A	SA
22	We lack the funding to pay for additional food safety training.	SD	D	N	A	SA
23	We do not have the time for the additional paperwork a <b>HACCP-based food safety program</b> would require.	SD	D	N	A	SA
24	Foodservice employees lack training in food safety issues.	SD	D	N	A	SA
25	Staff and employees of child care centers do not feel comfortable with change.	SD	D	N	A	SA
26	Completing <b>HACCP-based food safety program</b> requirements would involve developing new habits, which is difficult.	SD	D	N	A	SA
27	Other than myself, Center employees do not care about food safety issues.	SD	D	N	A	SA
28	I am confident that I can follow a <b>HACCP-based food safety program</b> .	SD	D	N	A	SA
29	I have the skills necessary to follow a <b>HACCP-based food safety program</b> .	SD	D	N	A	SA
30	I need to learn more to be able to follow a <b>HACCP-based food safety program</b> .	SD	D	N	A	SA
31	I would follow a voluntary <b>HACCP-based food safety program</b> .	SD	D	N	A	SA
32	I would use recipes modified for <b>HACCP-based food safety practices</b> .	SD	D	N	A	SA
33	I would not use a food safety self-inspection form unless mandated.	SD	D	N	A	SA

**PART II Facility Characteristics**

**Directions:** Please provide the following information about your facility.

Accredited: NO IN PROGRESS YES By whom: \_\_\_\_\_  
 City/Town Population: less than 10,000 10,000-50,000 more than 50,000  
 No. of children served: Breakfast \_\_\_\_ A.M. Snack \_\_\_\_ Lunch \_\_\_\_ P.M. Snack \_\_\_\_  
 Age Groups of Children: 2 wks-2 years 2-3 years 4-5 years 6+ years  
 Children in each group: \_\_\_\_\_

**Directions:** Please circle all that apply.

Production: Breakfast Snacks Lunch We prepare our own food.  
 Breakfast Snacks Lunch Our meals are purchased/delivered by others  
 Breakfast Snacks Lunch We prepare and deliver meals to others

**Directions:** Please circle the number that indicates the implementation status of each of the following policies.

Policy	Status		
	Not implemented	Partially implemented	Completely implemented
Personal hygiene	1	2	3
Chemical storage	1	2	3
Purchasing procedures	1	2	3
Pest Control program	1	2	3
Equipment cleaning procedures	1	2	3
Kitchen operation polices	1	2	3
Equipment maintenance program	1	2	3
Food safety training programs	1	2	3
Food Allergy Procedures	1	2	3

**PART III Demographics**

**Directions:** Please circle or provide the information that best describes you.

Gender: Male Female Age in years: \_\_\_\_\_  
 Education: Some High School High school/GED Some college  
 Associates Bachelors Masters  
 Position: Manager Kitchen Staff Director Administrator Other: \_\_\_\_\_  
 Food Safety Certification: NO YES If yes, by whom: \_\_\_\_\_  
 (such as ServSafe)

**PART II Facility Characteristics**

**Directions:** Please provide the following information about your facility.

Accredited: NO IN PROGRESS YES By whom: \_\_\_\_\_

City/Town Population: less than 10,000 10,000-50,000 more than 50,000

No. of children served: Breakfast \_\_\_\_ A.M. Snack \_\_\_\_ Lunch \_\_\_\_ P.M. Snack \_\_\_\_

Age Groups of Children: 2 wks-2 years 2-3 years 4-5 years 6+ years

Children in each group: \_\_\_\_\_

**Directions:** Please circle all that apply.

Production: Breakfast Snacks Lunch We prepare our own food.  
 Breakfast Snacks Lunch Our meals are purchased/delivered by others  
 Breakfast Snacks Lunch We prepare and deliver meals to others

**Directions:** Please circle the number that indicates the implementation status of each of the following policies.

Policy	Status		
	Not implemented	Partially implemented	Completely implemented
Personal hygiene	1	2	3
Chemical storage	1	2	3
Purchasing procedures	1	2	3
Pest Control program	1	2	3
Equipment cleaning procedures	1	2	3
Kitchen operation polices	1	2	3
Equipment maintenance program	1	2	3
Food safety training programs	1	2	3
Food Allergy Procedures	1	2	3

**PART III Demographics**

**Directions:** Please circle or provide the information that best describes you.

Gender: Male Female Age in years: \_\_\_\_\_

Education: Some High School High school/GED Some college  
 Associates Bachelors Masters

Position: Manager Kitchen Staff Director Administrator Other: \_\_\_\_\_

Food Safety Certification: NO YES If yes, by whom: \_\_\_\_\_  
 (such as ServSafe)

## **Appendix B**

### **Human Subjects Approval**



University Research  
Compliance Office  
1 Fairchild Hall  
Manhattan, KS 66506 - 1107  
785-532-3224  
Fax: 785-532-5944  
<http://www.ksu.edu/research/>

TO: Elizabeth Barrett  
HRIMD  
107 Justin Hall

Proposal Number: 3574

FROM: Rick Scheidt, Chair  
Committee on Research Involving Human Subjects

DATE: August 22, 2005

RE: Proposal Entitled, "Development of a HACCP Based Food Safety Management Plan: Child Care"

The Institutional Review Board (IRB) for Kansas State University has reviewed the proposal identified above and has determined that it is exempt from further review.

This exemption applies only to the proposal currently on file with the IRB. Any change affecting human subjects must be approved by the IRB prior to implementation and may disqualify the proposal from exemption.

Exemption from review does not release the investigator from statutory responsibility for obtaining the informed consent of subjects or their authorized representatives, as appropriate, either orally or in writing, prior to involving the subjects in research. The general requirements for informed consent and for its documentation are set forth in the Federal Policy for the Protection of Human Subjects, 45 CFR 46.116-117, copies of which are available in the University Research Compliance Office and online at <http://ohrp.osophs.dhhs.gov/humansubjects/guidance/45cfr46.htm#46.116>. In cases of remote oral data collection, as in telephone interviews, oral consent is sufficient and the researcher is required to provide the respondent with a copy of the consent statement only if the respondent requests one. The researcher must, however, ask the respondent whether he or she wishes to have a copy. The initiative in requesting a copy must not be left to the respondent. Regardless of whether the informed consent is written or oral, the investigator must keep a written record of the informed consent statement, not merely of the fact that it was presented, and must save this documentation for 3 years after completing the research.

The identification of a human subject in any publication constitutes an invasion of privacy and requires a separate informed consent.

Injuries or any unanticipated problems involving risk to subjects or to others must be reported immediately to the Chair of the Committee on Research Involving Human Subjects, the University Research Compliance Office, and if the subjects are KSU students, to the Director of the Student Health Center.

## **Appendix C**

### **Moderator's Guide**

January 16, 2006

Dear Director:

Did you know that more than **900** children were afflicted with food-borne illnesses from food consumed in their childcare programs between 1990 and 2003? Two of the 29 confirmed outbreaks that occurred during this period were in the state of Kansas: **13** children became ill in 2002 and **11** in 2000. Food-borne illnesses can be prevented with appropriate food storage, preparation, and service procedures. As a food service sanitarian, I was surprised to learn that specific recommendations are not available to address the unique food service demands of childcare programs. Because I see this lack of information as a potential threat to the health and well being of children and staff, I have decided to focus my doctoral research on this topic. The Child Nutrition Foundation has confirmed the importance of this project and provided funding to ensure the development and evaluation of food safety management procedures appropriate for childcare programs.

I am writing to invite you to participate in this project. Specifically, I am asking you to participate in a Focus group conducted by telephone on January 19, 2006 at 1:30 PM. The toll free number is provided at the conclusion of this letter. Included with this letter is the questionnaire that I would like to use, however, I need your help in determining if it is appropriate for child care providers. **Program directors who participate in the Phone Focus Group will be given a digital thermometer and a \$10 Dillon's card for use at their center. It will be mailed to you after the focus group is completed.**

I expect that the time commitment for participation in the Focus Group will be about one hour. Thanks to your involvement in this project, a clear set of questions appropriate for child care will be developed to determine knowledge, beliefs, and perceptions about food safety management programs. Children attending your program and other childcare programs will all benefit from the results of this work by increasing food safety awareness.

By calling in, you have agreed to participate in this project, but your participation is completely voluntary. When you participate in this study, you may withdraw consent at any time, and stop participating at any time without explanation or penalty. If you have questions regarding this research, you may contact Rick Scheidt, Chair, Committee on Research Involving Human Subjects, 1 Fairchild Hall, Kansas State University, Manhattan, KS 66506, (785) 532-3224. If you have any specific questions about this research, you may contact my major professor, Dr. Betsy Barrett, 785-532-2208 or me at 785-532-5856.

Sincerely,

Lynn Riggins, Doctoral Student

Department of Hotel, Restaurant, Institution Management and Dietetics

**PHONE FOCUS GROUP INFO:** Thursday, January 19, 2006 at 1:30 PM

Toll-free: 1-866-825-8336

An operator will take your name and introduce you to the rest of the focus group participants.

## Focus Group

Pre screening focus group of Food Safety Management Plan Survey for Child Care Centers

January 19, 2006

Teleconference

Welcome & Introduction: (10 minutes)

1: Hi, my name is Sherry. Welcome and thank you for joining us. We have invited you to take part in a discussion around a child care food safety management plan. It is a research project.

I want to start by going through the informed consent form with you. (Go through point by point )

2: This is a focus group discussion. It will last approximately 1 hour. During this time, I ask that you are open and honest in sharing your experiences and opinions. What you say will not affect you or me in any way. There are no right or wrong answers.

3: If you find yourself having a totally different set of experiences or a different opinion than the rest of the group, I need to hear it, since you represent people out in the real world who just didn't happen to be in the group today to support your view. So, I hope you will speak up. If you don't speak up, I'll be seriously misleading my client, since an important view will not be represented.

4: We are interested in hearing what you are saying, not who is saying it. The report contains only your opinions. It will not reference you specifically.

5: I want all of your opinions. To ensure that I understand them, please talk clearly, one at a time, in a voice level about the same as what I'm using. We all want to hear what you are saying.

6: We tape record the sessions so be sure to say aloud what you feel.

7: I must hear from everyone, but you do not have to answer every question.

8: You are being paid for your time, opinions, and courage to voice your point of view.

9: Let's start this discussion by saying your first name, location and telling me how many children are at your facility?

10. How many meals do you serve on site? Is the food preparation done on site?

### **General Discussion**

What is your first reaction when someone talks about food safety?

What is a food borne illness? Have you yourself ever had a food borne illness? How do you think that you got the food borne illness?

Do you think about food safety or food borne illness as it relates to your childcare facility?

What are some specific food safety issues that you think of when you think about food safety and childcare centers?

At what priority level would you rate food safety as a part of a childcare facility? (Is it high priority, or are there some that are higher? What would be something higher? Why is \_\_\_\_\_ higher in priority?)



Has your facility made any changes recently in food preparation to reduce the risk of a food borne illness in your facility? What types of changes have you made?

### **Survey Discussion**

Now I would like to review the information that we emailed to you:

First of all, did you all have a chance to review all of the information.

Was there anything about the definitions that you did not understand or that you feel needs more clarification? Which ones? What about them needed more?

Now let's review Part 1 of the child care food safety questionnaire: Let's go through this question by question. Are there any of the points in (Q1) that you had difficulty understanding? Is this question a realistic one to answer for childcare?

How would you feel about answering these questions?

After reviewing all of the questions

What do you think would be needed to start a food safety program at a childcare facility?

What things might make it hard or difficult to start a food safety program?

What would be advantages to starting a food safety program at a childcare facility?

How much training is currently required at your facility for food preparation?

Where do your food preparers go for training?

Do they have to have any certification?

Would it be of benefit to have certification?

Close by summarizing the info shared

Thanks for your time

## **Appendix D**

### **Pilot Test**

Dear Directors,

I would like to thank you again for agreeing to participate in the pilot test of this survey. The link below will take you to the survey website. Once you have completed the survey, please ask your foodservice person to complete the survey also.

To do this you may go back to your e-mail account and follow the link again.

So that there is plenty of time, the survey is being offered from offered **Feb 20, 2006** through **Mar 03, 2006**.

To participate in the survey, please follow the link below.

<https://surveys.ksu.edu/Survey/take/takeSurvey.do?offeringId=48117>

---

## Child Care Food Safety Pilot

---

### Survey Description

Dear Director: Did you know that more than 900 children were afflicted with food-borne illnesses from food consumed in their childcare programs between 1990 and 2003? Food-borne illnesses can be prevented with appropriate food storage, preparation, and service procedures. The Child Nutrition Foundation has confirmed the importance of this project and provided funding to ensure the development and evaluation of food safety management procedures appropriate for childcare programs. This project is research and your participation is completely voluntary. If you decide to participate in this study, you may withdraw consent at any time, and stop participating at any time without explanation or penalty. If you have questions regarding this research, you may contact Rick Scheidt, Chair, Committee on Research Involving Human Subjects, 1 Fairchild Hall, Kansas State University, Manhattan, KS 66506, (785) 532-3224. If you have any specific questions about this research, you may contact my major professor, Dr. Betsy Barrett, 785-532-2208 or me at 785-532-5856.

### Opening Instructions

Please answer the questions honestly. At the end of the food safety questionnaire are other questions relating to the content and clarity of the questions.

### Page 1

Indicate your answer based on the way you feel. There is no right or wrong answers, please be honest.

### Question 1

1 - Strongly Disagree | 2 - Disagree | 3 - Neutral | 4 - Agree  
5 - Strongly Agree

	1	2	3	4	5
1.1 The chances of children at my Center getting a foodborne illness are great.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.2 Children, in general, have a greater chance of getting a foodborne illness than adults.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.3 A child has an increased chance of having complications that come from getting a foodborne illness.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.4 I worry a lot about some of the children in my Center getting a foodborne illness.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.5 Within the next year, the children at my Center will get a foodborne illness.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<b>1.6</b> When I think about a foodborne illness occurring at my center, I feel concerned.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>1.7</b> If the children at my Center contracted a foodborne illness, my job would be endangered.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>1.8</b> A foodborne illness outbreak would endanger the relationship I have with my fellow employees.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>1.9</b> A foodborne illness could cause severe consequences for young children.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>1.10</b> I am afraid to even think about the possibility of a foodborne illness at my Center.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>1.11</b> The Center's financial security would be in jeopardy if any child got a foodborne illness.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>1.12</b> Problems children would experience from a foodborne illness could last a long time.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>1.13</b> If the children developed a foodborne illness, it could be more serious than other diseases.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>1.14</b> If children acquire a foodborne illness, their whole life could change.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>1.15</b> Following a HACCP-based food safety program at work would greatly reduce future food safety problems for me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>1.16</b> Employees with food safety certification are more likely to use safe food handling practices.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>1.17</b> A HACCP-based food safety program is important for maintaining food safety effectively.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>1.18</b> Food safety checklists may locate a problem before it is discovered by regular health inspections.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>1.19</b> I would not less anxious about foodborne illness if I followed a HACCP-based food safety program.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>1.20</b> We do not have the resources to improve food safety at my center.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>1.21</b> We lack the time required to train employees properly in food safety.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>1.22</b> We lack the funding to pay for additional food safety training.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>1.23</b> We do not have the time for the additional paperwork a HACCP-based food safety programs would require.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>1.24</b> Foodservice employees lack training in food safety	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

issues.					
1.25 Staff and employees of child care centers do not feel comfortable with change.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.26 Completing HACCP-based food safety requirements would involve developing new habits, which is difficult.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.27 Other than myself, Center employees do not care about food safety issues.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.28 I am confident that I can follow a HACCP-based food safety program.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.29 I have the skills necessary to follow a HACCP-based food safety program.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.30 I need to learn more to be able to follow a HACCP-based food safety program.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.31 I would follow a voluntary HACCP-based food safety program.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.32 I would use recipes modified for HACCP-based food safety practices.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.33 I would not use a food safety self-inspection form unless mandated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Page 2**

Please provide the following information about your Child Care Center

**Question 2**

Is your program accredited?

- Yes
- No
- In Progress

**Question 3**

If yes, please tell us the name of your certifying agency.

(maximum of 200 characters)

**Question 4**

What is the approximate population of your town or city?

- Less than 10,000
- 10,00 to 50,000
- More than 50,000

**Question 5**

1 - up to 25 | 2 - 26 to 50 | 3 - 51 to 75 | 4 - 76 to 100  
5 - 101 or more

	1	2	3	4	5
5.1 How many children eat breakfast at your center?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.2 How many children eat lunch at your center?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.3 How many children eat the A.M. Snack at your center?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.4 How many children eat the P.M. Snack at your center?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Question 6**

Please indicate how many children are in each age group in your facility.

1 - up to 25 | 2 - 26 to 50 | 3 - 51 to 75 | 4 - 76 to 100  
5 - 101 or more

	1	2	3	4	5
6.1 Children from 2 weeks to 2 years of age	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.2 Children from 2 to 3 years of age	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.3 Children from 4 to 5 years of age	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.4 Children that are 6 years old or more	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Question 7**

Please mark all that apply.

1 - Breakfast | 2 - Snacks | 3 - Lunch

	1	2	3
7.1 Our meals are purchased and delivered by others.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.2 We prepare our own food.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.3 We prepare and deliver meals to others.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Question 8**

Please indicate if your center has written policies concerning each of the following

1 - Yes | 2 - No

	1	2
8.1 Personal hygiene	<input type="checkbox"/>	<input type="checkbox"/>
8.2 Chemical storage	<input type="checkbox"/>	<input type="checkbox"/>
8.3 Purchasing procedures	<input type="checkbox"/>	<input type="checkbox"/>
8.4 Pest control program	<input type="checkbox"/>	<input type="checkbox"/>
8.5 Equipment cleaning procedures	<input type="checkbox"/>	<input type="checkbox"/>
8.6 Kitchen operation polices	<input type="checkbox"/>	<input type="checkbox"/>
8.7 Equipment maintenance program	<input type="checkbox"/>	<input type="checkbox"/>
8.8 Food safety training program	<input type="checkbox"/>	<input type="checkbox"/>
8.9 Food allergy procedures	<input type="checkbox"/>	<input type="checkbox"/>

**Page 3**

Please provide the following information about yourself.

**Question 9**

What is your gender?

- Male
- Female

**Question 10**

What is your age in years?

(maximum of 10 characters)

**Question 11**

What is your level of education?

- Some High School
- High school/GED
- Some college
- Associates
- Bachelors
- Masters



**Question 12**

What is your position within your facility?

- Kitchen Staff
- Manager
- Director
- Administrator
- Other
- Other:

**Question 13**

Do you have a food safety certification?

- Yes
- No

**Question 14**

If you are certified, please provide the name of the organization that you are certified by. (such as ServSafe)

(maximum of 50 characters)

**Page 4**

Please provide any insight you have concerning the content or clarity of the questions asked above. Also, please state if you think a certain question or practice is not applicable to child care foodservice operations.

**Question 15**

Did any of the questions seem to have content you did not understand?

(maximum of 2000 characters)

**Question 16**

Did any of the questions seem unclear to you? If so, how would you improve the question?

An empty text input field with a light beige background and a thin border. It features standard scrollbars on the right and bottom edges.

(maximum of 2000 characters)

**Question 17**

Did any part of this questionnaire seem inapplicable to child care operations?

An empty text input field with a light beige background and a thin border. It features standard scrollbars on the right and bottom edges.

(maximum of 2000 characters)

**Question 18**

Is there anything else that you would like to say about the survey? Are there any other changes you would make?

An empty text input field with a light beige background and a thin border. It features standard scrollbars on the right and bottom edges.

(maximum of 200 characters)

**Closing Message**

Thank you for participating in this pilot project. The results of this pilot survey will be used to improve the survey that will be sent to other child care operations. Your help is deeply appreciated. Sincerely, Lynn Riggins, Doctoral Student Department of Hotel, Restaurant, Institution Management and Dietetics

- End of Survey -

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Survey Reminder

Dear Directors,

I would like to thank you again for agreeing to participate in the pilot test of this survey. If you have not yet completed the survey, please do so soon. The link below will take you to the survey website. Once you have completed the survey, please ask your foodservice person to complete the survey also.

To do this you may go back to your e-mail account and follow the link again.

The pilot survey is available offered until **Mar 03, 2006**.

To participate in the survey, please follow the link below.

<https://surveys.ksu.edu/Survey/take/takeSurvey.do?offeringId=48117>

If you have already complete the survey, THANK YOU!!

## **Appendix E**

### **Final Instrument**

March 6, 2006

Dear Director:

Did you know that more than 900 children in the United States were afflicted with foodborne illnesses from food consumed in their childcare programs between 1990 and 2003? Two of the 29 confirmed outbreaks during this period occurred in the state of Kansas causing 24 children to become ill: 13 in 2002 and 11 in 2000. Foodborne illnesses can be prevented with appropriate food storage, preparation, and service procedures. The Child Nutrition Foundation has confirmed the importance of this project by providing funding to determine the beliefs and perceptions of childcare staff about food safety programs based on the Hazard Analysis Critical Control Point (HACCP) system.

I am writing to invite you to participate in this research by completing a survey. Specifically, I am asking that both you and your “cook” (or food service staff member) complete the survey. All information will be kept confidential; your names will not be associated with any information that you provide. This information will enable me to determine staff beliefs and perceptions of HACCP-based food safety programs. Based on the results of this research, directors will be able to address concerns and issues related to implementation of HACCP-based food safety programs.

It will only take you about 15 minutes to complete the survey. A stamped, addressed envelope is included for the return of the survey in paper format. You can also complete the survey on-line at <https://surveys.ksu.edu/Survey/take/takeSurvey.do?offeringId=48937> if you prefer.

This project is research and your participation is completely voluntary. If you decide to participate in this study, you may withdraw consent at any time and stop participating without explanation or penalty. If you have questions regarding this research, you may contact Rick Scheidt, Chair, Committee on Research Involving Human Subjects, 1 Fairchild Hall, Kansas State University, Manhattan, KS 66506, (785) 532-3224. If you have any specific questions about this research, you may contact my major professor, Dr. Betsy Barrett, 785-532-2208 or me at 785-532-5856.

Thank you for considering participating in this project.

Sincerely,

Lynn Riggins, Doctoral Student  
Department of Hotel, Restaurant, Institution Management and Dietetics

Betsy Barrett, Associate Professor  
Department of Hotel, Restaurant, Institution Management and Dietetics

March 6, 2006

Dear Foodservice Employee:

Did you know that more than **900** children in the United States got sick from food they ate in their childcare programs between 1990 and 2003? Illnesses caused by food can be prevented by following the right food storage, preparation, and service procedures.

Therefore, I am writing to invite you to complete the enclosed survey about food safety at your Childcare Center. All information will be kept confidential; your names will not be associated with any information that you provide. This information will enable me to determine staff beliefs and perceptions of food safety programs. Based on the results of this research, directors will be able to address concerns and issues related to implementation of food safety programs.

It will only take you about 15 minutes to complete the paper or on-line survey. A stamped, addressed envelope is included for the return of the survey in paper format. You can also complete the survey on-line at <https://surveys.ksu.edu/Survey/take/takeSurvey.do?offeringId=48937> if you prefer.

This is a research project and you do not have to participate. It is entirely up to you. If you decide to complete the survey, you can stop answering questions any time without explanation or penalty. If you have questions regarding this research, you may contact Rick Scheidt, Chair, Committee on Research Involving Human Subjects, 1 Fairchild Hall, Kansas State University, Manhattan, KS 66506, (785) 532-3224. If you have any specific questions about this research, you may contact my major professor, Dr. Betsy Barrett, 785-532-2208 or me at 785-532-5856.

Thank you for considering participating in this project.

Sincerely,

Lynn Riggins, Doctoral Student  
Department of Hotel, Restaurant, Institution Management and Dietetics

Betsy Barrett, Associate Professor  
Department of Hotel, Restaurant, Institution Management and Dietetics

## Child Care Food Safety

### Survey Description

Dear Director: Did you know that more than 900 children were afflicted with food-borne illnesses from food consumed in their childcare programs between 1990 and 2003? Two of the 29 confirmed outbreaks that occurred during this period were in the state of Kansas: 13 children became ill in 2002 and 11 in 2000. Food-borne illnesses can be prevented with appropriate food storage, preparation, and service procedures. As a food service sanitarian, I was surprised to learn that specific recommendations are not available to address the unique food service demands of childcare programs. Because I see this lack of information as a potential threat to the health and well being of children and staff, I have decided to focus my doctoral research on this topic. The Child Nutrition Foundation has confirmed the importance of this project and provided funding to ensure the development and evaluation of food safety management procedures appropriate for childcare programs. This project is research and your participation is completely voluntary. If you decide to participate in this study, you may withdraw consent at any time, and stop participating at any time without explanation or penalty. If you have questions regarding this research, you may contact Rick Scheidt, Chair, Committee on Research Involving Human Subjects, 1 Fairchild Hall, Kansas State University, Manhattan, KS 66506, (785) 532-3224. If you have any specific questions about this research, you may contact my major professor, Dr. Betsy Barrett, 785-532-2208 or me at 785-532-5856.

### Opening Instructions

Please answer the questions honestly.

#### Page 1

#### Question 1

Please provide the mailing code (letter and number combination) found at the top of your envelope mailing label.

(maximum of 10 characters)

#### Question 2 **\*\* required \*\***

Do you serve lunch at your facility?

- Yes
- No

#### Page 2

**Fill out this page only if you answered:**

- Yes on question 2. *Do you serve lunch at your facility..* on page 1 .

Indicate your answer based on the way you feel. There is no right or wrong answers, please be honest. Definitions of words you may not be familiar with are provided in the paper survey.

### Question 3

1 - Strongly Disagree | 2 - Disagree | 3 - Neutral | 4 - Agree  
5 - Strongly Agree

	1	2	3	4	5
<b>3.1</b> The chances of children at my Center getting a foodborne illness (see paper survey definition) are great.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.2</b> Children, in general, have a greater chance of getting a foodborne illness (see paper survey definition) than adults.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.3</b> A child has an increased chance of having complications that come from getting a foodborne illness (see paper survey definition).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.4</b> I worry a lot about some of the children in my Center getting a foodborne illness (see paper survey definition).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.5</b> Within the next year, the children at my Center will get a foodborne illness (see paper survey definition).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.6</b> When I think about a foodborne illness (see paper survey definition) occurring at my center, I feel concerned.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.7</b> If the children at my Center contracted a foodborne illness (see paper survey definition), my job would be endangered.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.8</b> A foodborne illness outbreak (see paper survey definition) would endanger the relationship I have with my fellow employees.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.9</b> A foodborne illness (see paper survey definition) could cause severe consequences for young children.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.10</b> I am afraid to even think about the possibility of a foodborne illness (see paper survey definition) at my Center.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.11</b> The Center's financial security would be in jeopardy if any child got a foodborne illness (see paper survey definition).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.12</b> Problems children would experience from a foodborne illness (see paper survey definition) could last a long time.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



<b>3.13</b> If the children developed a foodborne illness (see paper survey definition), it could be more serious than other diseases.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.14</b> If children acquire a foodborne illness (see paper survey definition), their whole life could change.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.15</b> Following a HACCP-based food safety program (see paper survey definition) at work would greatly reduce future food safety problems for me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.16</b> Employees with food safety certification (see paper survey definition) are more likely to use safe food handling practices.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.17</b> A HACCP-based food safety program (see paper survey definition) is important for maintaining food safety effectively.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.18</b> Food safety checklists may locate a problem before it is discovered by regular health inspections.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.19</b> I would be less anxious about foodborne illness if I followed a HACCP-based food safety program (see paper survey definition).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.20</b> We do not have the resources to improve food safety at my center.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.21</b> We lack the time required to train employees properly in food safety.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.22</b> We lack the funding to pay for additional food safety training.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.23</b> We do not have the time for the additional paperwork a HACCP-based food safety programs (see paper survey definition) would require.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.24</b> Foodservice employees lack training in food safety issues.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.25</b> Staff and employees of child care centers do not feel comfortable with change.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.26</b> Completing HACCP-based food safety(see paper survey definition) program requirements would involve developing new habits, which is difficult.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.27</b> Other than myself, Center employees do not care about food safety issues.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.28</b> I am confident that I can follow a HACCP-based food safety program (see paper survey definition).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<b>3.29</b> I have the skills necessary to follow a HACCP-based food safety program (see paper survey definition).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.30</b> I need to learn more to be able to follow a HACCP-based food safety program (see paper survey definition).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.31</b> I would follow a voluntary HACCP-based food safety program (see paper survey definition).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.32</b> I would use recipes modified for HACCP-based food safety practices (see paper survey definition).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.33</b> I would not use a food safety self-inspection form unless mandated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Page 3**

**Fill out this page only if you answered:**

- **Yes** on question **2. Do you serve lunch at your facilit..** on **page 1** .

Please provide the following information about your Child Care Center

**Question 4**

Do you receive CACFP reimbursement?

- Yes
- No

**Question 5**

What is the approximate population of your town or city?

- Less than 10,000
- 10,00 to 50,000
- More than 50,000

**Question 6**

Where is your facility located (state)?

(maximum of 10 characters)

**Question 7**

1 - up to 25 | 2 - 26 to 50 | 3 - 51 to 75 | 4 - 76 to 100  
5 - 101 or more

	1	2	3	4	5
<b>7.1</b> How many children eat breakfast at your center?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7.2 How many children eat lunch at your center?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.3 How many children eat the A.M. Snack at your center?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.4 How many children eat the P.M. Snack at your center?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Question 8**

Please indicate how many children are in each age group in your facility.

1 - up to 25 | 2 - 26 to 50 | 3 - 51 to 75 | 4 - 76 to 100  
5 - 101 or more

	1	2	3	4	5
8.1 Children from 2 weeks to 2 years of age	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.2 Children from 2 to 3 years of age	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.3 Children from 4 to 5 years of age	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.4 Children that are 6 years old or more	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Question 9**

Please mark all that apply.

1 - Breakfast | 2 - Snacks | 3 - Lunch

	1	2	3
9.1 Our meals are purchased and delivered by others.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.2 We prepare our own food.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.3 We prepare and deliver meals to others.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Question 10**

Please indicate if your center has written policies concerning each of the following

1 - Yes | 2 - No

	1	2
10.1 Personal hygiene	<input type="checkbox"/>	<input type="checkbox"/>
10.2 Chemical storage	<input type="checkbox"/>	<input type="checkbox"/>
10.3 Purchasing procedures	<input type="checkbox"/>	<input type="checkbox"/>

10.4 Pest control program	<input type="checkbox"/>	<input type="checkbox"/>
10.5 Equipment cleaning procedures	<input type="checkbox"/>	<input type="checkbox"/>
10.6 Kitchen operation polices	<input type="checkbox"/>	<input type="checkbox"/>
10.7 Equipment maintenance program	<input type="checkbox"/>	<input type="checkbox"/>
10.8 Food safety training program	<input type="checkbox"/>	<input type="checkbox"/>
10.9 Food allergy procedures	<input type="checkbox"/>	<input type="checkbox"/>

**Page 4**

**Fill out this page only if you answered:**

- **Yes** OR **No** on question **2. Do you serve lunch at your facilit..** on **page 1** .

Please provide the following information about yourself.

**Question 11**

What is your gender?

- Male
- Female

**Question 12**

What is your age in years?

(maximum of 10 characters)

**Question 13**

What is your level of education?

- Some High School
- High school/GED
- Some college
- Associates
- Bachelors
- Masters

**Question 14**

What is your position within your facility?

- Kitchen Staff
- Manager
- Director
- Administrator
- Other
- Other:

**Question 15**

Do you have a food safety certification?

- Yes
- No

**Question 16**

If you are certified, please provide the name of the organization that you are certified by.  
(such as ServSafe)

(maximum of 50 characters)

**Closing Message**

Thank you for participating in this project. The results of this survey will be used to improve implementation activities for food safety programs. Sincerely, Lynn Riggins,  
Doctoral Student Department of Hotel, Restaurant, Institution Management and Dietetics

- End of Survey -

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Kansas State University

Department of Hotel, Restaurant, Institution  
Management and Dietetics  
103 Justin Hall  
Manhattan, KS 66506-1404

## **REMINDER: CHILD CARE FOOD SAFETY SURVEY**

If you have not completed the Child Care Food Safety Survey, please take a few minutes to do so. You may either return the written survey that was mailed to you in the postage paid envelope provided, or you may complete the survey on-line at:

<https://surveys.ksu.edu/Survey/take/takeSurvey.do?offeringId=48937>

If you have already completed the survey, disregard this reminder and **THANK YOU!!!**



Department of Hotel, Restaurant, Institution Management and Dietetics

## REMINDER: CHILD CARE FOOD SAFETY SURVEY

I have been advised that some of you are unable to access the survey when you type in the survey URL. However, if you follow a link, the survey opens as it should. If you have not completed the Child Care Food Safety Survey and are willing to do so, please email me at [riggins@ksu.edu](mailto:riggins@ksu.edu) and I will reply with a link to the survey. Your e-mail address will be confidential and will not be used for any other purpose other than to send you the survey link. Or you may try again to open the survey on-line at (retype exactly as shown):

<https://surveys.ksu.edu/Survey/take/takeSurvey.do?offeringId=48937>

If you have already completed the survey, disregard this reminder and THANK YOU!!!

## **Appendix F**

### **Statistical Analysis Data**



Appendix F1

***Exploratory Model Construct Correlations***

Factor	PSu <sup>a</sup>	CdCon <sup>b</sup>	CtCon <sup>c</sup>	PBen <sup>d</sup>	PBar <sup>e</sup>	BI <sup>f</sup>	M	SD	Cronbach's alpha
PSu <sup>a</sup>	1.00						1.64	0.67	0.66
CdCon <sup>b</sup>	0.11						3.86	0.67	0.76
CtCon <sup>c</sup>	0.09	0.33**					2.75	0.98	0.81
PBen <sup>d</sup>	0.03	0.33**	0.31**				4.01	0.63	0.73
PBar <sup>e</sup>	-0.31**	0.11	0.04	0.20*			3.79	0.92	0.86
BI <sup>f</sup>	0.00	0.04	0.01	0.38**	0.25**		3.69	0.67	0.68
SE <sup>g</sup>	-0.09	0.07	0.02	0.35**	0.28**	0.40**	4.06	0.71	0.46 <sup>h</sup>

<sup>a</sup> Perceived Susceptibility

<sup>b</sup> Perceived Child Consequences

<sup>c</sup> Perceived Center Consequences

<sup>d</sup> Perceived Benefits

<sup>e</sup> Perceived Barriers

<sup>f</sup> Behavioral Intentions

<sup>g</sup> Self-efficacy

<sup>h</sup> Test-retest reliability coefficient

\*\* Correlation is significant at the 0.01 level (1-tailed).

\* Correlation is significant at the 0.05 level (1-tailed).

## Appendix F2

**Table of Variance Explained by Factor and Revised Model**

Factor	Initial Eigenvalues		Extraction Sums of Squared Loadings		Rotation Sums of Squared Loadings	
	Total	% of Variance	Total	% of Variance	Total	% of Variance
1	4.196	22.084	4.196	22.084	2.989	15.730
2	3.168	16.673	3.168	16.673	2.438	12.834
3	2.125	11.184	2.125	11.184	2.345	12.340
4	1.629	8.572	1.629	8.572	2.185	11.498
5	1.167	6.140	1.167	6.140	1.863	9.805
6	1.029	5.415	1.029	5.415	1.494	7.861
7	.806	4.240				
8	.743	3.913				
9	.653	3.435				
10	.601	3.164				
11	.459	2.413				
12	.452	2.380				
13	.409	2.152				
14	.368	1.937				
15	.331	1.745				
16	.280	1.475				
17	.215	1.131				
18	.198	1.040				
19	.172	.905				
		100.000				
		22.084		22.084		22.084
		38.757		38.757		38.757
		49.941		49.941		49.941
		58.513		58.513		58.513
		64.654		64.654		64.654
		70.069		70.069		70.069
		74.309				
		78.222				
		81.657				
		84.821				
		87.234				
		89.614				
		91.767				
		93.704				
		95.449				
		96.924				
		98.055				
		99.095				

Extraction Method: Principal Component Analysis.

Appendix F3

**Correlation Matrix for All Survey Items**

Item <sup>a</sup>	Su1	Su2	Su3	Su4	Su5	Su6	Se1	Se2	Se3	Se4	Se5	Se6	Se7	Se8	Be1	Be2	Be3	Be4	Ba1	Ba2	Ba3	Ba4	Ba5	Ba6	Ba7	Ba8	Ba9	Self1	Self2	Self3	BI1						
Su2	0.14																																				
Su3	0.10	0.51																																			
Su4	0.32	0.09	0.10																																		
Su5	0.49	0.22	0.04	0.42																																	
Su6	0.08	0.24	0.27	0.27	0.21																																
Se1	0.08	0.18	0.10	0.09	0.12	0.09																															
Se2	0.04	0.11	0.12	0.08	0.13	0.10	0.72																														
Se3	0.04	0.32	0.49	0.09	0.02	0.35	0.18	0.22																													
Se4	-0.04	0.10	0.11	0.12	0.02	0.24	0.23	0.24	0.24																												
Se5	-0.02	0.02	0.05	0.05	0.02	0.15	0.52	0.28	0.28	0.28																											
Se6	0.06	0.28	0.46	0.18	0.11	0.27	0.15	0.14	0.52	0.21	0.39																										
Se7	0.14	0.07	0.04	0.07	0.29	0.35	0.24	0.19	0.05	0.11	0.21	0.29																									
Se8	-0.06	0.29	0.37	0.11	0.15	0.25	0.35	0.32	0.32	0.25	0.29	0.58	0.43																								
Be1	-0.04	0.27	0.19	0.01	0.12	0.37	0.28	0.29	0.22	0.29	0.31	0.19	0.27	0.17																							
BI2	-0.20	0.05	0.04	0.03	-0.09	0.12	0.25	0.30	0.04	0.10	0.15	0.01	0.12	0.17	0.29																						
Be3	-0.04	0.19	0.31	0.13	0.09	0.38	0.18	0.15	0.32	0.38	0.19	0.23	0.17	0.22	0.57	0.42																					
Be4	0.02	0.14	0.21	0.17	0.11	0.33	0.11	0.18	0.29	0.11	0.27	0.23	0.18	0.07	0.47	0.26	0.43																				
Ba1	0.11	0.25	0.28	0.02	0.16	0.32	0.20	0.24	0.13	0.24	0.12	0.24	0.29	0.27	0.48	0.38	0.47	0.36																			
Ba2	-0.27	0.03	0.07	-0.13	-0.36	0.04	-0.01	0.09	0.07	0.06	0.09	-0.08	-0.03	0.04	-0.02	0.27	0.15	0.15	-0.01																		
Ba3	-0.20	-0.06	0.09	-0.05	-0.32	0.04	0.04	0.06	0.14	0.02	0.16	0.05	-0.02	-0.03	-0.06	0.04	0.03	0.19	0.16	0.09	-0.06	0.70															
Ba4	-0.20	0.00	0.14	-0.04	-0.35	0.03	-0.05	0.10	0.05	0.05	-0.02	-0.03	-0.06	0.04	0.07	0.12	0.16	0.16	0.00	0.64	0.69																
Ba5	-0.16	0.08	0.26	-0.04	-0.27	0.20	-0.10	0.02	0.16	0.17	0.04	0.09	0.00	0.08	0.24	0.20	0.35	0.25	0.10	0.60	0.53	0.59															
Ba6	-0.22	0.05	0.18	-0.09	-0.17	0.09	0.03	0.06	0.10	0.09	-0.03	0.02	0.03	0.10	0.12	0.20	0.18	0.05	0.13	0.48	0.47	0.37	0.42														
Ba7	-0.23	-0.04	-0.02	-0.07	-0.18	-0.01	-0.03	-0.10	-0.06	-0.08	-0.03	0.08	0.01	0.07	-0.01	0.10	0.01	-0.07	-0.07	0.18	0.25	0.16	0.32	0.30													
Ba8	-0.12	-0.11	-0.11	-0.20	-0.31	0.03	-0.02	-0.01	0.02	0.05	0.02	-0.07	-0.19	-0.09	-0.08	0.05	0.03	0.05	-0.08	0.26	0.26	0.16	0.35	0.20	0.43												
Ba9	0.27	0.14	0.09	0.22	0.31	-0.05	-0.13	-0.02	0.01	0.05	-0.20	0.11	0.03	-0.02	0.01	-0.16	-0.02	-0.06	0.12	-0.46	-0.48	-0.25	-0.27	-0.31	-0.41	-0.28											
Self1	-0.09	0.08	0.11	0.02	-0.06	0.21	0.03	0.08	0.14	0.08	-0.05	-0.04	-0.06	0.06	0.30	0.14	0.33	0.25	0.19	0.17	0.15	0.21	0.40	0.04	0.15	0.20	-0.05										
Self2	0.03	0.07	0.04	0.02	-0.02	0.01	-0.05	0.02	0.05	0.03	-0.02	0.02	-0.04	0.01	0.07	-0.07	0.01	0.23	-0.05	0.11	0.16	0.21	0.25	0.00	0.04	0.15	0.03	0.55									
Self3	-0.06	0.09	0.19	-0.09	-0.14	0.06	0.08	-0.01	0.05	0.06	0.03	0.11	-0.04	0.12	0.08	-0.12	0.16	0.02	-0.02	-0.07	-0.01	0.11	0.01	0.01	-0.02	0.13	0.09	0.19	0.01								
BI1	0.08	0.19	0.08	0.05	0.07	0.25	-0.06	-0.03	0.01	-0.03	-0.04	-0.03	0.08	-0.19	0.32	0.06	0.31	0.21	0.24	0.07	0.09	0.09	0.42	0.08	0.14	0.11	0.04	0.51	0.34	-0.09							
BI2	0.10	0.03	0.10	0.05	-0.03	0.13	0.01	0.19	0.07	0.00	0.12	0.10	0.14	0.02	0.15	-0.03	0.17	0.24	0.30	0.05	0.03	0.13	0.24	0.05	-0.03	0.03	0.13	0.25	0.26	0.12	0.49						
BI3	-0.15	0.02	0.06	-0.04	-0.04	0.10	-0.07	0.03	0.08	0.04	0.03	0.05	0.12	-0.01	0.25	0.02	0.31	0.29	0.17	0.12	0.22	0.31	0.13	0.05	0.11	-0.01	0.26	0.35	0.01	0.43							

<sup>a</sup> Item abbreviations: Su = susceptibility; Cd = Child consequences; Ctr = Center Consequences; Be = Benefit; Ba = Barrier; BI = Behavioral intention. Numbers = question number by concept

Appendix F4

**Correlation Matrix for Revised Survey Items**

Item <sup>a</sup>	Su1	Su5	Cd1	Cd2	Cd3	Cd4	Ctrl	Ctrl2	Ctrl3	Be1	Be3	Be4	Ba2	Ba3	Ba4	Ba5	B11	B12
Su5		0.49																
Cd1	0.10		0.04															
Cd2	0.04	0.02		0.49														
Cd3	0.06	0.11	0.46		0.52													
Cd4	-0.06	0.15	0.37	0.32		0.58												
Ctrl	0.08	0.12	0.10	0.18	0.15		0.35											
Ctrl2	0.04	0.13	0.12	0.22	0.14	0.32		0.72										
Ctrl3	-0.02	0.02	0.05	0.28	0.39	0.29	0.52		0.52									
Be1	-0.04	0.12	0.19	0.22	0.19	0.17	0.28	0.29		0.31								
Be3	-0.04	0.09	0.31	0.32	0.23	0.22	0.18	0.15	0.19		0.57							
Be4	0.02	0.11	0.21	0.29	0.23	0.07	0.11	0.18	0.27	0.47		0.43						
Ba2	-0.28	-0.36	0.06	0.06	-0.09	0.05	-0.01	0.08	0.09	-0.01	0.16	0.15						
Ba3	-0.20	-0.32	0.09	0.14	0.05	0.04	0.04	0.06	0.16	0.03	0.16	0.09	0.70					
Ba4	-0.20	-0.35	0.14	0.05	-0.03	0.04	-0.05	0.10	-0.02	0.07	0.16	0.16	0.64	0.69				
Ba5	-0.16	-0.27	0.26	0.16	0.09	0.08	-0.10	0.02	0.04	0.24	0.35	0.25	0.60	0.53	0.59			
B11	0.08	0.07	0.08	0.01	-0.03	-0.19	-0.06	-0.03	-0.04	0.32	0.31	0.21	0.07	0.09	0.09	0.42		
B12	0.10	-0.03	0.10	0.07	0.10	0.02	0.01	0.19	0.12	0.15	0.17	0.24	0.06	0.03	0.13	0.24	0.49	
B13	-0.15	-0.04	0.06	0.08	0.05	-0.01	-0.07	0.03	0.03	0.25	0.31	0.29	0.18	0.12	0.22	0.31	0.43	0.33

<sup>a</sup> Item abbreviations: Su = susceptibility; Cd = Child consequences; Ctrl = Center Consequences; Be = Benefit; Ba = Barrier; Bl = Behavioral intention. Numbers = question number by concept

Appendix F5a

***Constructs Excluded in Multivariate Regression Models***

Model	Factors	Beta In	t	Sig.	Partial Correlation	Tolerance	VIF
1	Tsu <sup>a</sup>	.042(a)	.51	.61	.04	.99	1.01
	CdCon <sup>b</sup>	.016(a)	.20	.84	.02	.99	1.00
	CtCon <sup>c</sup>	.007(a)	.08	.93	.09	1.00	1.00
	TBen <sup>d</sup>	.274(a)	3.28	.00	.28	.88	1.14
	TBar <sup>e</sup>	.157(a)	1.87	.06	.16	.93	1.08
2	Tsu <sup>a</sup>	.025(b)	.32	.75	.03	.99	1.01
	CdCon <sup>b</sup>	-.075(b)	-.90	.37	-.08	.89	1.12
	CtCon <sup>c</sup>	-.088(b)	-1.06	.29	-.09	.89	1.12
	TBar <sup>e</sup>	.127(b)	1.56	.12	.14	.91	1.09

<sup>a</sup> Total Susceptibility

<sup>b</sup> Child Consequences

<sup>c</sup> Center Consequences

<sup>d</sup> Total Benefits

<sup>e</sup> Total Barriers

## Appendix F5b

**Constructs Excluded in Multivariate Regression Models**

Model	Factors	Beta In	t	Sig.	Partial Correlation	Tolerance	VIF
1	Tsu <sup>a</sup>	.02(a)	0.23	0.81	0.02	1.00	1.00
	CdCon <sup>b</sup>	-.08 (a)	-0.98	0.33	-0.09	0.95	1.05
	CtCon <sup>c</sup>	-.07(a)	-0.87	0.38	-0.08	0.97	1.03
	TBen <sup>d</sup>	-.00(a)	-0.02	0.99	-0.00	0.41	2.43
	TBar <sup>e</sup>	1.00(a)	1.24	0.22	0.11	0.91	1.09
	Intsu <sup>f</sup>	.05(a)	0.66	0.51	0.06	0.93	1.07
	IntChild <sup>g</sup>	-.09(a)	-0.85	0.40	-0.07	0.47	2.10
	IntCenter <sup>h</sup>	-.07(a)	-0.80	0.42	-0.07	0.72	1.40
	IntBar <sup>i</sup>	.08(a)	0.76	0.45	0.07	0.59	1.71

<sup>a</sup> Perceived Susceptibility<sup>b</sup> Perceived Child Consequences<sup>c</sup> Perceived Center Consequences<sup>d</sup> Perceived Benefits<sup>e</sup> Perceived Barriers<sup>f</sup> Interaction Susceptibility<sup>g</sup> Interaction Child Consequences<sup>h</sup> Interaction Center Consequences<sup>i</sup> Interaction Barriers