

**APPLYING A “HYPOCRISY” STRATEGY TO IMPROVE FOOD SAFETY  
PRACTICES IN RESTAURANTS**

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APPLYING A “HYPOCRISY” STRATEGY TO  
IMPROVE FOOD SAFETY PRACTICES IN RESTAURANTS

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# **APPLYING A “HYPOCRISY” STRATEGY TO IMPROVE FOOD SAFTY PRACTICES IN RESTAURANTS**

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## **ABSTRACT**

The purpose of this study is to examine the effect of hypocrisy approach on improving restaurant employees' handwashing behavior and glove behaviors by using the completely randomized design (CRD) and also to provide recommendations on food safety trainings. Participants in this study were categorized into four groups based on the interventions assigned to them, including promoting food safety flyers and self-check survey. Attitudes and behavioral intention of conducting correct handwashing and glove practices were measured through implicit attitude measure, direct attitude measure and behavioral intention measure. The one-way ANCOVA was used to analyze and compare results among four groups. Results on this study showed that the “hypocrisy” strategy can influence participants' implicit attitudes towards handwashing and glove use behaviors and intentions of using gloves, which improved restaurant employees' food safety practices. In addition, the educational level, restaurant type and working positions were found to impact some outcome variables. Based on findings, some interventions guided by the “hypocrisy” strategy could be used to improve food safety practices in American restaurants

# CHAPTER 1 INTRODUCTION

## 1.1 Research Background

Food, a basic need for humans, provides energy and nutrition, but its safety is also a significant concern worldwide (Wandolo, 2016). Centers for Disease Control and Prevention (CDC, 2010) defined foodborne illness as an illness resulting from consuming food or drink contaminated with microorganisms or chemicals. In addition, food contamination not only happens in developing countries but also in developed countries, such as the United States (Thelwell-Reid, 2014), and foodborne illnesses threaten both one's health and also cause a heavy financial burden for the whole society. According to Scallan et al. (2011), an estimated 48 million people get sick, 127,830 are hospitalized, and 3,037 die due to foodborne illnesses each year in the US. The financial costs, including productivity losses and medical expenses, caused by foodborne illnesses are tremendous. Based on a report from the United States Department of Agriculture (USDA, 2014), the financial loss of foodborne illness outbreaks caused by campylobacter has reached two billion dollars.

According to the Centers for Disease Control and Prevention (CDC, 2013), almost half of foodborne illness outbreaks happened in restaurants or delis, and a small percentage of outbreaks happened at home. In other words, public restaurants have a higher food safety risk than private homes. Today, more and more Americans choose to dine out in restaurants rather than at home. Eating away from home has increased in prevalence among US adults and now comprises about 50% of food expenditures (Harnack & French, 2008). From 1998–2013, among the 17,445 foodborne illnesses that occurred, 9,788 cases were related to food prepared in restaurants, which accounted for

56% of all foodborne illnesses (Angelo, Nisler, Hall, Brown, & Gould, 2017). Hence, there is a need to prevent the spread of foodborne illnesses in restaurants.

There are many risk factors responsible for foodborne illness outbreaks, such as improper cooking procedures, cross contamination, and poor personal hygiene (World Health Organization, 2008). According to Hall et al. (2012), improper practice is one of the most important risk factors that leads to the transmission of foodborne pathogens. Furthermore, among many potential agents of foodborne pathogens, employees' contaminated hands serve as one of the carriers, accounting for 40.9% of foodborne illnesses annually (United States Food and Drug Administration, 2009). Therefore, restaurant managers need to make a greater effort to improve restaurant employees' hand hygiene practices.

Handwashing as one of the hand hygiene practices refers to one of the most effective methods to prevent the spread of microbial infection (Fendler, Dolan, & Williams, 1998). Many researchers have highlighted the application of good handwashing practices to prevent the spread of foodborne illnesses (Ansari, Springthorpe, & Tostowaryk, 1988). Meanwhile, wearing gloves is another effective way to prevent the spread of foodborne illnesses and researchers have indicated that it is essential for employees to change their gloves at the right time (Snyder, 1999) to prevent foodborne illnesses, for example, changing gloves when switching tasks. However, based on the study conducted by Arendt, Strohbehn, and Jun (2015), only 61% of food workers used gloves when handling food. Furthermore, the rate of employees using gloves correctly was even lower, at only 9.5% (Arendt, Strohbehn, & Jun, 2015). Hence, encouraging restaurant employees to wash hands and wear gloves appropriately and effectively would

significantly contribute to the improvement of the general food safety practices thereby preventing the spread of foodborne illnesses.

Training always plays an important role to change employees' attitudes and even behaviors in any career (Wandolo, 2016). In the food industry, training for the food handler is considered as one of the most effective strategies to improve employees' attitude and behaviors of food safety practices (Green et al., 2006). For example, knowledge-based food safety training is heavily relied on provision of knowledge to employees in order to change their attitudes and behaviors of food safety practices (Egan et al., 2007). This type of training is based on the Knowledge, Attitude, and Practice (KAP) model, which assumes that the provision of knowledge automatically alters the attitude and behaviors (Yu, Neal, Dawson, & Madera, 2018). However, this model has been criticized by many researchers since knowledge alone may not trigger practices directly (Yu, Neal, Dawson, & Madera, 2018). In addition, many studies have showed that the knowledge-based training did not really change employees' food safety behaviors (Rennie, 1995; Chapman, Eversley, Fillion, MacLaurin, & Powell, 2010).

Some researchers have tried to apply persuasion strategies to improve certain behaviors, such as energy conservation behaviors (e.g., Kantola, Syme, & Campbell, 1984) and hand hygiene practices (e.g., Yu, Neal, Dawson, & Madera, 2018). In most current food handlers' hand hygiene trainings, educational strategies are related to providing information or knowledge, hoping to improve their attitudes (Egan et al., 2007). However, in a typical situation when persuasion is heavily reliant upon information, people may change their attitudes once given additional information, which presents an unstable and temporary change of attitude (Dickerson, Thibodeau, Aronson,

& Miller, 1992).

Therefore, applying persuasion strategies effectively to improving restaurant employees' hand hygiene practices might greatly contribute to the prevention of foodborne illnesses. Based on the literature, one effective persuasion strategy is through cognitive dissonance (O'Keefe, 2002), which was defined as the inconsistency between an individual's thoughts and actions or between what he says and he does (Festinger, 1957). Festinger (1957) first mentioned the term cognitive dissonance, stating that when a person has two conflicting cognitions, he or she would have the experience of dissonance and try to reduce this feeling.

Hypocrisy is a cognitive dissonance-related technique, which is defined as a combination of two factors: advocating a position and then being made mindful of one's failure to act in accordance with previous advocacy (Fointiat, 2004). When people fail to act what they preach, their actions of hypocrisy can cause cognitive dissonance, which makes them feel uncomfortable (Stone & Fernandez, 2008). To reduce this uncomfortable feeling, people usually change their behaviors automatically to match what they preach. It has also been stated that persuasion-related dissonance, such as hypocrisy, is more effective than straightforward persuasive appeals, such as only providing information or knowledge. Since cognitive dissonance motivates individuals to change their behaviors effectively, it has been successfully applied in many fields (e.g., Aronson, Fried, & Stone, 1991; Kantola, Syme, & Campbell, 1984).

Previous findings on hypocrisy showed that when people take public stands on pro-social behaviors and simultaneously realize past failures of implementing these behaviors, it creates the two factors (commitment factor and mindfulness factor), and

combining those two factors can yield four conditions: only commitment condition, only mindfulness condition, hypocrisy condition (both commitment and mindfulness factors are made) and control condition (neither commitment nor mindfulness factor) (Stone & Fernandez, 2008). There have been several studies that successfully applied hypocrisy to change people's attitudes and behaviors (e.g., Aronson, Fried, & Stone, 1991; Kantola, Syme, & Campbell, 1984). In most of those studies, all participants were categorized into four groups, and each group corresponded to one of those four conditions (only mindfulness condition, only commitment condition, hypocrisy condition and control condition) in which participants were either required to take a public stand on one prosocial behavior (such as giving a public speech or signing a flyer), to realize their past failures to take this action (such as taking an oral survey or describing past failures) or both. Later, participants would examine participants' intention or behaviors of conducting this prosocial behavior and compare the results between those four groups.

In the most previous food handlers' hand hygiene trainings, the effectiveness of those trainings was measured by self-report only about their knowledge or direct attitudes (e.g., Lillquist, McCabe, & Church, 2005). However, it has been found that the improvement of knowledge cannot always lead to change of attitudes and behaviors, and there is also some social bias when using direct attitude measures (Chapman, Eversley, Fillion, MacLaurin, & Powell, 2010). To address this limitation, direct attitude measures, implicit attitude measures, and behavioral intention measures were utilized together to examine the effectiveness of a hypocrisy approach on improving food handlers' attitudes toward handwashing and glove practices.

## **1.2 Research Questions**

Even though cognitive dissonance and hypocrisy have been applied in many fields, which have changed individual's behaviors successfully (Stone & Fernandez, 2008), the hypocrisy procedures have never been applied empirically in the promotion of food safety practices. Therefore, based on the research background, the research questions of this study are as follows:

RQ1: Does applying hypocrisy approach help to improve food service employees' attitudes toward handwashing behaviors significantly?

RQ2: Does applying hypocrisy approach help to improve food service employees' attitudes toward glove behaviors significantly?

RQ3: Does applying hypocrisy approach help to improve food service employees' practices toward handwashing behaviors significantly?

RQ4: Does applying hypocrisy approach help to improve food service employees' practices toward glove behaviors significantly?

## **1.3 Purpose of the Study**

The general purpose of this study is to examine the application of hypocrisy to improve food service employees' food safety practices in restaurants. More specifically, the study (1) assessed food service employees' attitudes and practices toward handwashing and glove behaviors, (2) used the hypocrisy approach to influence attitudes and behavioral intentions related to such behaviors, and (3) provided recommendations on employees' handwashing and glove behaviors to foodservice management.

## **1.4 Significance of the Study**

With the development of the restaurant industry in the US, its food safety has

been challenged gravely. The restaurant-associated foodborne illness has caused serious harms to victims and also great losses for restaurants (Hussain & Dawson, 2013).

Outbreaks of foodborne illnesses in restaurants have been directly associated with employees' poor food safety practices (Bryan, 1988). According to Clayton and Griffith (2004), only 9% of food workers washed their hands after touching their face or hands.

To improve the low compliance rate, food handler training was frequently applied (Green et al., 2006). Those trainings were mainly based on provision of knowledge, which did not work very well (Chapman, Eversley, Fillion, MacLaurin, & Powell, 2010). Hence, an effective training strategy will contribute to food safety practices in restaurants.

Cognitive dissonance and hypocrisy have rarely been used to change employees' food safety practices. In general, this study is vital because it offers a new strategy of motivating employees to conduct a better food safety practice. First of all, cognitive dissonance has never been applied to food safety training, so this study represents an innovation in the field of food safety management. Previous studies hoped to change employees' attitudes by providing more food safety knowledge or information (Egan et al., 2007). Training programs based on the principle of cognitive dissonance can be developed to enhance food safety practices and contribute to the prevention of foodborne illness in restaurants. Secondly, when people try to change their behaviors due to the cognitive dissonance, this action involves a process of self-justification, which forced the person highly involved in the process of attitudinal change or behavioral change (Aronson, Chase, Helmreich, & Ruhnke, 1974). Hence, by adding self-justification as part of the hypocrisy, the effectiveness of food safety training will be strengthened in the current study.



Furthermore, since this study assessed food handlers' attitudes and behavioral intention of personal hygiene, it contributes to a better understanding of food handlers' food safety behaviors. With a better understanding of their behaviors, a well-target policy can be developed to support food handlers to improve their food safety practices. For example, the use of the Hazard Analysis Critical Control (HACCP) system greatly contributed the prevention hazards before reaching to customers, improving American food safety (Starbird, 2005). Lastly, although this study is the first study to apply cognitive dissonance to the area of hospitality, it contributes to the knowledge and literature review in restaurant food safety.

## **1.5 Outline of Subsequent Chapters**

Chapter 2 reviewed the knowledge about the foodborne illness in the US, and it also focused on outbreaks of foodborne illnesses in restaurants. Furthermore, the overall of restaurant employees' hand hygiene practices and related trainings were introduced. In addition, previous studies about using cognitive dissonance and hypocrisy were discussed. Last part of this chapter introduced the measurements of attitude and intention.

Chapter 3 provided more details of the research's preparation and implementation of the study. This study was designed based on referencing previous researches about applying hypocrisy, which was a completely randomized design research. In addition, the development and validation of research instruments were discussed, and instruments were modified based on results of the pilot study held in the graduate student office. Furthermore, the recruitment of the sample and the process of the data analysis were illustrated in the chapter.

# **CHAPTER 2 LITERATURE REVIEW**

## **2.1 Introduction**

This chapter reviewed literature related food safety, cognitive dissonance, and attitude and behavioral intention measures. Food safety in restaurants in the US was discussed in detail. For cognitive dissonance, the chapter focused on hypocrisy and how it can be applied to change people's behaviors. The review of literature also introduced attitude and behavioral intention measures.

## **2.2 An Overview of Food Safety in the US**

No one can live without food. Human beings are provided nutrition and energy by food to survive, so the safety of the food is related to everyone. Food safety involves multiple aspects, including avoidance of foodborne pathogens, chemical toxicants, and physical hazards as well as nutrition and food quality (Institute of Medicine, 1998). Even with more detection tools, regulations, and education about food safety, global food safety still faces many challenges, such as increasing outbreaks of foodborne illnesses (Mitchell, Fraser, & Bearon, 2007). America, like other countries is not exempt from the rapid spread of foodborne illnesses. It has been estimated that 48 million people get sick, 128,000 are hospitalized, and 3000 die due to foodborne illnesses each year in the US (CDC, 2016). In addition, one out of every six Americans gets sick due to the consumption of contaminated food (Marder et al., 2018).

### **2.2.1 Foodborne Illnesses in the US**

It has been estimated that 31 major pathogens, such as norovirus, nontyphoidal *Salmonella* spp, and *costridium perfringens*, are acquired in the US causing about 9.4 million episodes of foodborne illnesses each year (Scallan et al., 2011). In 2018, 10 US

sites of the Foodborne Disease Active Surveillance Networks monitored cases of foodborne illnesses happened in 2017 and results indicated that the incidence of infection per 1000,000 population was highest for *Campylobacter* (19.2), which means that 9,421 cases of foodborne illnesses out of every 1000,000 people were caused by it (Marder et al., 2018). The World Health Organization (WHO, 2018) listed the common clinical symptoms of *Campylobacter* as follows: diarrhea, abdominal pain, fever, headache, nausea, and/or vomiting. *Campylobacter* infection is mostly due to the consumption raw or undercooked poultry. Most victims infected with it can recover by themselves, but some will require medical treatment (CDC, 2017a).

The second leading pathogen to cause foodborne illnesses in 2017 was *Salmonella*; the incidence of *Salmonella* infection per 1000,000 population was 16.0, and around 8,000 cases of foodborne illnesses were due to *Salmonella* out of every 1000,000 population (Marder et al., 2018). In addition, *Salmonella* species are also a main cause of acute gastroenteritis (Majowicz et al., 2010). *Salmonella* infections often happened after a person consumes food contaminated with the feces of animals or humans that are carrying the bacteria (Marler, 2018).

The CDC (2017b) defined an outbreak of foodborne illness as the occurrence of two or more cases of similar illness caused by ingestion of a common food. According to the Surveillance for Foodborne Disease Outbreaks United States 2015 Annual Report (CDC, 2017b), the median rate per million population was 3.5 outbreaks; the highest rate was .6 in Mississippi, while the lowest rate was 14.1 in Kansas.

## **2.2.2 Consequences Caused by Foodborne Illnesses in the US and US**

### **Restaurants**

Foodborne illnesses cause thousands of hospitalizations and deaths each year in the US and are considered a serious public health issue (Mead et al., 1999). The severity of actual foodborne diseases varies greatly and depends on the pathogen and also the vulnerability of the infected person. Children, the elderly, and pregnant women are more likely to develop serious cases of foodborne illnesses than others (Center for Foodborne Illness Research & Prevention, 2009). The most common symptoms of infection with foodborne illnesses are diarrhea and vomiting, which last for a few days. However, some pathogens of foodborne illness, such as *Campylobacter* can cause very serious acute illnesses, which can lead to serious health complications or even premature death (Mead et al., 1999).

Foodborne illness not only harms public health but also places a huge economic burden on society (Scharff, 2012). Hoffmann, Batz, and Morris (2012) estimated that the cost of illness caused by just 14 pathogens accounts for 95% of foodborne illnesses, which has reached \$14 billion. In addition, foodborne illnesses impact quality of life. The quality-adjusted life year (QALY) is one type of measure that uses psychometric scales to measure the relative impact of different health states on people's comfort and ability to engage in normal activities. It has been estimated that a loss of 61,000 QALYs was caused by 14 major pathogens mentioned by Scallan et al. in 2011. (Hoffmann, Batz, & Morris 2012).

Although news of foodborne illness outbreaks in restaurants is reported often in the media (Lee, 2016), individual restaurants may not realize how much a foodborne

illness could cost them (Bartsch, Asti, Nyathi, Spiker, & Lee, 2018). The impact of food safety outbreaks on one company can be devastating (Hussain & Dawson, 2013). In the early 1970s, a foodborne illness outbreak happened at a local restaurant in a small American town and caused 11 people to be hospitalized. It is estimated that the losses associated with this outbreak amounted to \$18,413 due to lost salaries and productivity of the ill wage earners. In addition, there was an estimated \$2,965 for the medical and hospital expenses. The economic impact on the restaurant owner was also substantial at around \$5,000 (Levy & McIntire, 1974). Bartsch, Asti, Nyathi, Spiker, and Lee (2018) developed a computation simulation model to estimate the cost of a foodborne illness outbreak in their study, and the results indicated the cost of a single foodborne illness outbreak is substantial but it varies depending on the type of restaurants. Among all types of restaurants, the cost for fine-dining restaurant (\$8,273–\$2.6 million) is the most expensive, followed by fast-causal restaurant (\$8,030–\$2.2 million) and fast-food restaurant (\$6,330–\$2.1 million).

### **2.2.3 Methods of Preventing Foodborne Illnesses**

Improper holding cold or hot, inadequate cooking, cross contamination, unsafe food scores, and poor personal hygiene are leading factors associated with foodborne illness outbreaks in the US; avoidance of these failures and conducting food safety practices can significantly contribute to the prevention of foodborne illnesses (McCabe-Sellers & Beattie, 2004). For example, handwashing can prevent the spread of pathogens (Fendler, Dolan, & Willians 1998). Based on the Food code published by the U. S. Food and Drug Administration (FDA, 2013), proper handwashing can reduce 2 to 3 log in transient viruses and protozoa. Furthermore, Robinson et al. (2016) highlighted the use of

gloves to prevent the spreading of foodborne illness. Results of this study showed that dicing tomatoes while wearing gloves significantly reduced the incidence of contaminated tomatoes than when the same process was carried out without gloves.

In addition, advanced technologies also contribute to the improvement of food safety and have prevented the spread and outbreak of foodborne illness (McCabe-Sellers & Beattie, 2004). For example, new packaging and processing techniques, including vacuum sealing and flash chilling, can improve the freshness and quality of food sold on store shelves. Food labeling with purchase and use dates (e. g, “best used by”) is another example, and it can help customers know the safe period within which to consume the food purchased (Ben-Guirey, De Sousa, Villa & Barros-Valazquez, 1998; Blist & Borch, 2002; Mello & Kubota, 2002; Silvertsvik, Jeksrud, & Rosnes, 2002).

### **2.3 An Overview of Food Safety Practices in US Restaurants**

Outbreaks of foodborne illnesses can happen in many places, but dining at restaurants is a risk factor for being infected with a foodborne illness (Jones & Angulo, 2006). According to the CDC (2013), almost half of foodborne outbreaks occur in restaurants or delis, while only a small part of outbreaks took place at home. In other words, there is a higher possibility of foodborne illness outbreaks happening in public restaurants than in home. The Food and Drug Administration (FDA, 2000; FDA, 2004; FDA, 2009) carried out three observation studies in 1998, 2003, and 2008 that aimed to explore foodborne illness risk factors in different settings, including hospitals, nursing homes, schools, and restaurants, and the restaurant industry had the lowest overall compliance scores in each study.

Furthermore, it has been found that most outbreaks of foodborne illnesses were

due to employees' improper preparation practices (Bryan, 1988). Many studies have identified the top three factors that contribute to foodborne illness: improper holding temperature, poor personal hygiene, and cross contamination, which are directly related to employees' food practices (Bean & Griffin, 1990; Olsen, Mackinon, Goulding, Bean, & Slutsker, 2000). However, food workers in US restaurants often conducted unsafe food practices (Clayton & Griffith, 2004). For example, Green et al. (2006) mentioned that employees' glove use is far below the standard, and employees are less likely to change their gloves when they are busy in their shift. In another observation study that assessed food workers' handwashing practices, the results showed that rates of food workers' handwashing were relatively low.

### **2.3.1 Foodborne Illnesses in US Restaurants**

During the period from 1998–2013, outbreaks of foodborne diseases in restaurants were mostly reported, nearly 60% of all cases foodborne illnesses (Angelo, Nisler, Hall, Brown, & Gould, 2017). According to the CDC (2017b), 469 outbreaks of foodborne illness and 4,757 associated illnesses were contributed to foods prepared in restaurants, which account 60% and 39% respectively of all outbreaks and illnesses due to foods prepared in the single location of US in 2015. In addition, among 457 foodborne illness outbreaks from 2006 to 2007 reported by FoodNet sites, 300 (60%) cases were related to restaurants (Gould, Rosenblum, Nicholas, Phan, & Jones, 2013).

In particular, the sit-down dining-style restaurant was the kind of restaurant where most outbreaks of foodborne illness happened (CDC, 2017b). From 2009–2013, 1463 outbreaks of foodborne illnesses happened in sit-down dining establishments, nearly 80% of all cases, but only 246 cases happened in fast-food restaurants, nearly 15% of all cases

(Angelo, Nisler, Hall, Brown, & Gould, 2017).

In the study investigating restaurant-associated foodborne disease outbreaks in US conducted by Gould, Rosenblum, Nicholas, Phan and Jones (2013), it has been found that more than half (60%) of those cases were caused by norovirus, and 17% of outbreaks in restaurants were due to the Salmonella, following by Clostridium perfringens (7%) and histamine fish poisoning (7%) and other pathogens (9 %). In addition, among 300 cases of foodborne diseases outbreaks in American restaurants investigated, 64% of outbreaks were associated with employees' personal hygiene and health; 34% of cases were related with preparation practices within restaurants; 22% of outbreaks were due to other factors.

#### *2.3.1.1 Potential Causes of Foodborne Illnesses in US Restaurants*

In one study to explore risk factors of sporadic campylobacter infection in the US, the major risk factor of getting the infection was consuming the chicken prepared from restaurants, which led to 24% of campylobacter infections. Apart from the factor, eating non-poultry meat prepared from restaurants was another main risk factor of the foodborne illness, causing 21% of campylobacter (Friedman et al., 2004).

In another study to examine risk factors for Escherichia coli O157:H7 infection, farm exposure, cattle exposure, eating a pink hamburger (both at home and away from home), eating at a table-service restaurant, using immunosuppressive medication, and obtaining beef through a private slaughter arrangement were considered as risk factors of getting infection (Kassenborg et al., 2004).

#### *2.3.1.2 Barriers of American Restaurant Employees' Food Safety*

##### *Practices in US Restaurants*

Many factors have been found to influence employees' food safety practices even



after receiving safety training (Howells, Roberts, Shanklin, Brannon, & Barrett, 2008). A study explored barriers to implementing the three food safety practices of handwashing, using thermometers, and cleaning work surfaces showed that time constraints, inconvenience, inadequate training, inadequate resources, lack of space, and lack of manager monitoring prevented employees from carrying out food safety practices (Howells, Roberts, Shanklin, Brannon, & Barrett, 2008). In another qualitative study aiming to examine factors impacting food workers' implementation of seven food preparation practices (e.g., handwashing, prevention of cross contamination, glove use, determining food doneness, hot and cold holding, cooling, and reheating), many factors were identified by participants, such as time pressures, structural environments, equipment, and resources; management and coworker emphasis on food safety; worker characteristics; food safety education and training; restaurant procedures; glove and sanitizer use (Green & Selman, 2005).

Furthermore, insufficient time, inaccessible supplies, and insufficient information showing how to conduct correct food practices were mentioned by Pragle, Harding, and Mack (2007). Clayton, Griffith, Price, & Peters (2002) reported that the main barriers to carrying out food safety actions are time constraints and a lack of staff. In addition, participants in that study indicated that they expected a better designed workplace, more resources and the recognition of management (Clayton, Griffith, Price, & Peters, 2002). In another study conducted by Strohbenhn et al. (2014) to identify barriers of nonsupervisory food service employees' food safety practices, the results showed that the most important barriers were a lack of time and workplace organization. Similar barriers, such as time pressures and availability of resources, were mentioned in the study, which

used interviews and observations to assess food workers' barriers (Arendt, Strohbehn, & 2015).

## **2.4 Food Safety Training Programs in US Restaurants**

To prevent outbreaks of foodborne illnesses in restaurants, many training sessions have been applied to improve food safety practices (Medeiros, Cavalli, Salay, & Proenca, 2011). The ServSafe program is the most widely used training program in US restaurants, which was developed by the National Restaurant Association in conjunction with foodservice industry experts. The core materials are based on working experiences and knowledge of the food industry, and they are intended to help employees prepare for sanitation risks. All trainings and exams of the ServSafe program are available both online and in the classrooms, and these materials have been translated into many different languages (National Restaurant Association Educational Foundation, 2018).

Apart from the main food safety training ServSafe programs, other regular trainings can be categorized based on many criteria. For example, trainings can be divided into food handler trainings and manager trainings based on the target population (Medeiros, Cavalli, Salay, & Proenca, 2011). For example, a study that assessed 14 food safety trainings conducted from 2004–2009 found that most (93%) trainings focused on food handlers, while only a small proportion of trainings (7%) were concerned with managers.

In addition, trainings can also be clustered into knowledge-based trainings and behavior-based trainings according to the model applied in these trainings (Geller, 2001). Knowledge-based training draws from the knowledge, attitude, and practice (KAP) model and assumes that an individual has been offered proper knowledge, he or she will

proactively change any problem behaviors. Therefore, knowledge-based training is defined as a training method offering knowledge and information to change employees' attitudes and behaviors (Egan et al., 2007; Ehiri, Morris, & McEwen, 1997). In contrast, the foundation of behavior-based training is the “antecedent-behavior-consequence” (ABC) analysis, which holds that both antecedents and consequences can impact people's behaviors, but consequences have more power to trigger certain behaviors than antecedents (Krause, Hadley, & Hudson, 1992).

Most trainings covered the topics of personal hygiene, handwashing, and glove use (Medeiros, Cavalli, Salay, & Proenca, 2011). In addition, many different training methods were adopted. Among food safety trainings studied by Medeiros, Cavalli, Salay, and Proenca (2011), lectures or presentations were the most common method. Reading materials, booklets, and leaflets were also used in many training sessions. In addition, recreational activities, such as games and animations, were carried out during these trainings. However, few studies conducted hands-on activities to improve food safety practices.

#### **2.4.1 Current Restaurant Employees' Hand Hygiene Practices**

Food handlers can spread foodborne illnesses in restaurants through their hands with pathogens of foodborne illnesses (Paulson, 2000). According to the FDA (2009), poor personal hygiene was one major risk factor for foodborne illnesses, leading to almost half (40.9%) of foodborne disease outbreaks. A few studies have revealed that food workers in restaurants always showed bad hygiene practices (Clayton & Griffith, 2004; Green et al., 2006). Therefore, proper hand hygiene in food preparation facilities is becoming more and more important to prevent the outbreak of foodborne illness in

restaurants (Pragle, Harding, & Mack 2007).

#### *2.4.1.1 Handwashing and Glove Practices*

Both handwashing and glove use are very important methods of maintain good hygiene practices and preventing cross contamination (Robinson et al., 2016).

Handwashing has been referred to as one of the most effective methods of stopping the spread of microbial infection (Fendler, Dolan, & Willians, 1998). In addition, the FDA Food Code also stated highlighted the importance of handwashing to prevent the spread of foodborne illness pathogens, stating that proper handwashing can cause a 2 to 3 log reduction in transient bacteria and a 2-log reduction in the transmission of both viruses and protozoa (FDA, 2013). However, if employees did not wear or change their gloves frequently and correctly, foodborne illness still can be transferred; therefore, it is essential for employees to change their gloves at the right time (Snyder, 1999).

Handwashing and glove behaviors of restaurant employees have been found to be poor in many studies (e.g., Arendt, Strohbahn, & Jun, 2015; Clayton & Griffith, 2004), Based on a report from the FDA (2009), the rate for conducting food safety behaviors, including handwashing and glove practices, varied from 57.3% (full-service restaurants) to 93.7% (deli). In another study to assess restaurant employees' food safety practices by observation and interview, and the observational data indicated that observed employees only washed their hands approximately 36% (258/721) of the times they were supposed to. In addition, of the times they washed their hands, 18.6% (48/258) were in compliance with the Food Code procedure. Regarding the glove behaviors, those employees used gloves 63.1% (169/268) of times they should have, and the amount of time that they used the gloves correctly (compliance with the recommendations) was only 9.5% (16/169)

(Arendt, Strohbahn, & Jun, 2015). In another observation of food safety practices that monitored 150 food handlers who were performing 31,050 food preparation actions, the food handlers were required to wash their hands 21 times per 270 food preparation actions; the results indicated that only 14% of the participants washed their hands adequately, and these food workers washed their hands only after 9% of those instances in which they touched their face or hair (Clayton & Griffith, 2004). In another study that assessed 321 food workers' handwashing practices conducted by Green et al. (2006), all participants in this study conducted 8.6 work activities for which handwashing is recommended per hour, but these food workers made handwashing attempts after only 32% of these activities. Furthermore, Arendt, Strohbahn, and Jun (2015) also found that the attempts of employees to follow proper hand hygiene, such as handwashing and glove use, did not follow the Food Code requirements, and the non-compliance rate of personal hygiene practices was 23.5%.

#### **2.4.2 Employee Training in Hand Hygiene Practices in US Restaurants**

Among the many topics covered in food safety trainings, hand hygiene is one of the most important, which explains why many trainings focus on improving food workers' hand hygiene practices (Egan et al., 2007). Various teaching methods were employed in the hand hygiene trainings; for example, in one training, videos, lectures, written materials, and practical handwashing techniques were utilized to improve 66 corporate food handlers' hand hygiene (Lillquist, McCabe, & Church, 2005). In addition, recreational activities, such as games, music and balloons, were incorporated into the hand hygiene trainings in the United Kingdom in an attempt to improve more than 2,700 fast-food workers' hand hygiene practices (Pollitt, 2008). What's more, materials from

ServSafe Employee Guide Workbooks were also used in the hand hygiene trainings (Howells, Roberts, Shanklin, Brannon, & Barrett, 2008). Although different methods are used in the current hand hygiene trainings, the focus of those trainings is to increase employees' knowledge or to offer more information rather than to change their attitudes (Egan et al., 2007).

#### *2.4.2.1 Trainings for Employees' Handwashing and Glove Behaviors*

The improvement of handwashing and glove behaviors were the focus of many hand hygiene training sessions (e.g., Lillquist, McCabe, & Church, 2005; Malhotra, Lal, Prakash, Daga, & Kishore, 2008; Rajagopal & Strohbehn, 2013). Standardized training for food handlers' handwashing and glove behaviors are always included in a lecture or presentation to offer more information about improving safe food handling practices (Luskin, Somers, Wooding, & Levenstein, 1992). For example, Malhotra, Lal, Prakash, Daga and Kishore (2008) used a poster with some information about food safety to motivate participants to wash their hands. The poster was also utilized in the training to motivate university dining hall workers (Rajagopal & Strohbehn, 2013). In their study, posters with an image of gloves and the statement, "*I'm gloving it*" were used as the intervention to impact subjects' glove behaviors. In addition, some interactive trainings were utilized to improve food handlers' handwashing practices. In the training conducted by Lillquist, McCabe, and Church (2005), participants were required to observe the instructor performing an FDA handwashing demonstration and then perform this procedure themselves. Yu, Neal, Dawson, and Madera (2018) applied behavior-based trainings to motivate food service employees to wash their hands more frequently and properly. In their study, an infrared soap dispenser and a motion sensor speaker were

used to encourage participants to wash their hands. More specifically, the study incorporated a motion sensor to trigger the speaker to play music every time the participant applied soap.

## **2.5 Persuasive Strategies**

The process of persuasion involves changing an individual's mental status and serves as a precursor to a change in behavior (Nabi & Oliver, 2009). In addition, attitude change is always very important in persuasion; there are numerous theories regarding attitude and persuasion. The belief-based model (e.g., Fishbein, 1967), the functional model (Katz, 1960), and cognitive dissonance theory (Festinger, 1957) are the most popular theories of attitude in the persuasion process.

In the belief-based model, the key theme is that one's attitude toward an object is a function of the beliefs that one has about the object (O'Keefe, 2002). In keeping with this theme, Fishbein (1967) proposed a summative model of attitude, a particular belief-based approach. To put it simply, one's attitude toward an object is equal to the sum of each belief strength multiplied by belief evaluation. Based on the summative model, many strategies were developed for persuasion. For example, adding a new salient belief toward an object may contribute to inducing a more positive attitude to the receivers (O'Keefe, 2002).

Katz (1960) proposed the functional model, stating that attitudes had four functions: utilitarian, ego-defensive, value-expressive, and knowledge. The utilitarian function helps people maximize rewards and minimize punishments. The ego-defensive function plays a role in defending one's self-image. The value expressive function allows people to be satisfied with holding and expressing their attitudes. The knowledge

function attempts to understand information and events. This model indicated that persuasion would be more effective after determining which function of attitude dominated the person at first and then applying the persuasion appeal.

### **2.5.1 The History and Development of Cognitive Dissonance**

In 1957, Festinger first introduced and defined the concept of cognitions and cognitive dissonance. Festinger (1957) defined cognitions as elements of knowledge that people have about their behaviors, attitudes, and environment and cognitive dissonance as an uncomfortable feeling caused by holding two conflict cognitions. He also stated that individuals would try to reduce this dissonance to achieve consonance, which may involve a change of actions. It is a very important theory in psychology, and many scholars like Aronson (1968), Cooper and Fazio (1984), and Steele (1988), have revised the original version of cognitive dissonance.

Aronson (1968) modified the original version by associating cognitive dissonance with the “self-concept,” which means that cognitive dissonance was not due to two different cognitions but instead to differences between an individual’s self-concept and his or her actions. In addition, Cooper and Fazio (1984) believed that cognitive dissonance was not caused by inconsistencies between cognitions but instead by an unwanted consequence. In other words, an aversive consequence caused by people’s actions can explain cognitive dissonance. Steele (1988) also gave his explanation of cognitive dissonance, indicating that it was caused by behaving in a manner against one’s sense of moral integrity.

Apart from those revisions, some researchers also developed alternative theories (Bem, 1972; Tedeschi, Schlenker, & Bonoma, 1971). Bem (1972) stated that people



would observe their behaviors as if they were outsiders and infer their underlying attitude from observations of their own overt behaviors or the circumstances in which this behavior occurred. Tedeschi, Schlenker, and Bonoma (1971) also proposed another alternative theory: “impression management theory,” which suggested that people change their attitudes to be consistent with their behaviors in an attempt to give others a good impression.

### **2.5.2 Introduction of Hypocrisy**

It was proposed that being confronted with the fact that you are not practicing what you preach induces a feeling of hypocrisy, which is a form of cognitive dissonance (Festinger, 1957). According to Stone and Fernandez (2008), the commitment condition and the mindfulness condition are two necessary conditions that can produce hypocrisy. In the commitment condition, participants advocate a pro-social course of action, such as water conservation and reducing discrimination. It was found that making a personal commitment is very important in this condition (Fried & Aronson, 1995; Fried, 1998; Stone, Aronson, Crain, & Winslow, 1994). More specifically, people should hold themselves as an example of practicing those pro-social actions and make some commitments in preach. However, advocating one certain behavior in the commitment condition only by reading the importance of it on the writing or speech without recording or audience does not make the greatest effect of hypocrisy on change people’ behaviors. Making a public stand of the importance of the target behavior, such as the promotion speech recorded in videotape, can most likely motivate people to change their behaviors.

In the mindfulness condition, participants perceive their behaviors as inconsistent with what they preach in the commitment condition (Stone & Fernandez, 2008). To

realize this inconsistency, Stone, Wiegand, Cooper, and Aronson (1997) stated that participants should focus on how they personally failed to practice those actions instead of on other people's reasons for not doing so. In their study, only 26% of participants changed their behaviors after being asked to recall reasons that other people failed to conduct one certain pro-social behavior. However, 78% of participants changed their behaviors after remembering their personal reasons for not doing the target behavior.

### **2.5.3 The Impact of Hypocrisy on Behaviors**

Typical persuasive campaigns normally rely on providing information with the hope of modifying people's behaviors. However, those informational campaigns do not work very well, and attitude and behavioral changes due to an external source, such as the information, cannot last long (Dickerson, Thibodeau, Aronson, & Miller, 1992). Dickerson Thibodeau, Aronson, and Miller (1992) explained the inconsistency of change by stating that if a person changes his or her attitudes or behaviors after hearing an effective persuasive argument, he or she was also more likely to change his or her attitude or behaviors after hearing a better argument that supports another position. In contrast, it was found that dissonance-related interventions (e.g., hypocrisy) can produce enduring behavior changes (Pallak, Cook, & Sullivan, 1980). In a study that applied hypocrisy to motivate people to decrease their consumption of energy, the results showed that people reduced their energy consumption for six months and more (Pallak, Cook, & Sullivan, 1980; Pallak, Sullivan, & Cook, 1976).

In the revision of cognitive dissonance, Aronson (1968, 1999) introduced another concept, the self-concept, to explain reasons for cognitive dissonance, stating that cognitive dissonance arises when the person's action violates his or her self-concept.

According to Aronson (1968, 1999), the individual's self-concept is directly involved in the process of attitude change or behavior change, and the hypocrisy persuasive strategy directly poses a challenge to one's self-concept, which forces the person under the hypocrisy condition to highly involve himself or herself in the process of changing attitudes or behaviors. Based on the central role of self-concept, Aronson (1968, 1999) indicated that persuasion related to cognitive dissonance, such as hypocrisy, was more likely to motivate people to change their behaviors than other persuasion strategies.

#### **2.5.4 Examples of Applying Hypocrisy in Different Fields**

Many researchers have applied hypocrisy in their studies, aiming to motivate participants to change their behaviors; all participants are normally categorized into four groups: one group in the mindfulness condition, one group in the commitment condition, one group both in the mindfulness condition and commitment condition (the hypocrisy condition), and the control group, which is not in any condition (e.g., Dickerson, Thibodeau, Aronson, & Miller, 1992).

A study aiming to motivate college students to use condoms to prevent acquired immunodeficiency syndrome (AIDS) was conducted by Aronson, Fried and Stone (1991). In their study, half of the participants were asked to think about their personal failures to use a condom and to explain their reasons for not doing to cause the "mindfulness condition." Later, participants in the "commitment condition" were asked to give a speech about practicing safer sex through condom use to prevent AIDS, and they were informed that this speech would be recorded and shown to high school students in the AIDS prevention program. Finally, all participants were asked about their intentions of using condoms in the future. The results showed that the participants under

both the “mindfulness condition” and the “commitment condition” had very high intentions of using condoms to prevent AIDS.

Based on the first study conducted by Aronson, Fried, and Stone (1991), Stone, Aronson, Crain, Winslow, and Fried (1994) carried out another study using hypocrisy to motivate people to use condoms. Procedures were similar with the first study except for some changes. Instead of making participants realize their past failures in the “mindfulness condition” first, participants were required to give the speech first; a behavioral measure of condom acquisition rather than the intention to use condoms served as the primary dependent variable. The results in this study showed that 83% of participants in the hypocrisy condition acquired condoms, significantly more than the number of condoms purchased by the other three groups.

Kantola, Syme, and Campbell (1984) also used a procedure similar to hypocrisy to promote energy conservation behavior in their study. Participants in this study were homeowners in Australia with a positive attitude toward the energy conservation who had agreed to allow the State Energy Commission to monitor their consumption of electricity. Researchers randomly sent one of four letters from the Energy Commission: 1) a letter informing the participants that they had consumed a great amount of electricity, but they said they believed in conservation (hypocrisy condition); 2) a letter informing they have consumed great amount of electricity along with a conservation pamphlet; 3) only a conservation pamphlet; 4) a thank you letter. All participants received a postage-paid postcard that they could return for more information about conservation. The participants’ home consumption of electricity over two sequential 2-week periods was measured as the dependent variable. The results showed that homeowners who received

the first letter (in the hypocrisy condition) consumed significantly less electricity during the next two weeks.

In another field experiment designed study, hypocrisy was used to motivate water conservation (Dickerson, Thibodeau, Aronson, & Miller, 1992). All participants were students who had just finished swimming in the campus recreation pool and were going to take a shower in the locker room. In the mindfulness condition, half of the participants were asked to do a survey to inform them of past failures of water conservation, and questions like “When you take showers in the locker room of the locker room, do you always make the shower as short as possible?” Later, half of the participants were asked to sign their names on a flyer promoting water conservation. The length of time that these participants used to take a shower was measured as the dependent variable, and the results indicated that participants in the hypocrisy condition spent less time significantly compared with other groups.

Fointiat (2004) also adopted hypocrisy as a strategy to motivate people to become safe drivers. In the beginning, all participants were required to sign a flyer promoting safe driving. Later, participants in the hypocrisy condition were asked to write down times of failing to follow the speed limit and reasons of driving too fast. The dependent variable is the percentage of participants who were willing to install a tachometer in their car that could record their driving behaviors. The results of this study also revealed that a higher percentage (35% of participants in the hypocrisy condition) would like to have the tachometer installed in their cars than other participants who were not in the hypocrisy condition. Main previous studies utilized the hypocrisy approach are shown in Table 1.

Table 1. Outline of the Main Studies Using Hypocrisy

<b>Author, year</b>	<b>Topic</b>	<b>Participants</b>	<b>Study design</b>	<b>Measurement</b>
Aronson, Fried, & Stone, 1991	Condom use for AIDS prevention	80 college students	Hypocrisy was induced by requiring participants to describe their failures of using condoms first and then to give a speech promoting condom use.	Self-report
Stone, Aronson, Crain, & Winslow, 1994	Condom use for AIDS prevention	80 college students	Hypocrisy was induced by requiring participants to give a speech promoting condom use first and then to describe their failures	The number of participants acquiring condoms
Kantola, Syme, & Campbell, 1984	Energy conservation	272 households in Perth	A letter informing participants that they showed a positive attitude towards energy conservation was sent when they were actually high consumers of electricity.	The amount of electricity consumption in the measurement period
Dickerson, Thibodeau, Aronson, & Miller, 1992	Water conservation	80 Female swimmers	Taking an oral survey about water waste and signing a flyer promoting water conservation were used to induce hypocrisy.	The length of shower time and the frequency of turning off the shower
Fointiat, 2004	Driving safety	156 housewives	Signing a flyer about the following the speed limit and describing the recent violations of the speed limit	The number of participants willing to install a free recording tachometer

## 2.6 An Overview of Attitudes and Behavioral Intention Measures

Ajzen (1991) defined an attitude as the degree to which a person has a favorable or unfavorable evaluation towards a behavior. According to Greenwald and Banaji (1995), direct attitudes are normally related with deliberate self-report evaluations, but implicit attitudes are under the control of automatically activated evaluations, even without the performer's awareness. Based on the types of attitudes measured (direct and

implicit attitudes), measures can be categorized into direct attitude measures and implicit attitude measures. In addition, the behavioral intention was regarded as the indication of an individuals' readiness to perform a behavior (Ajzen, 2002). Behavioral intention was measured as the predictor of certain behavior in many studies (e.g., Chow & Mullan, 2010; Hinsz & Nickell, 2015; Mullan & Wong, 2009).

### **2.6.1 Direct Attitude Measures**

According to Ajzen (1991), attitude shows the likelihood of putting a thought into real action, which indicates that attitude can influence behavior in some way. In most previous studies that have assessed attitudes towards food safety practices, direct attitudes towards food safety were mostly assessed by questionnaires or self-reports. For the measurement scale used in the questionnaire, 7-point Likert scales, 5-point Likert scales and 3-point Likert scale are the most common approaches. (e.g., Phillip & Anita, 2010; Pilling, Brannon, Shanklin, Roberts, & Howells, 2008; Rosnani, Son, Mohhidin, Toh, & Chai, 2014). In the study conducted by Pilling, Brannon, Shanklin and Howells (2008), 190 food service employees completed a questionnaire about knowledge, subjective norms, and attitudes towards food safety practices, and their attitudes were measured on a 7-point Likert scale, ranging from extremely bad to extremely good. In another study conducted by Phillip and Anita (2010), 249 food handlers completed a questionnaire using a single direct measure of attitude, ranging from very bad (-3) to very good (3). In addition, the 3-point Likert scale (1 = agree, 2 = not agree, and 3 = not sure) other studies applied to the direct attitude measure to assess food handlers' attitude towards food safety practices (Odeyemi et al., 2018; Rosnani, Son, Mohhidin, Toh, & Chai, 2014). In the study carried out by Rosnani, Son, Mohhidin, Toh, and Chai (2014), participants received

“5” points when they chose “agree” or “not agree,” and they were given “1” point when they chose “not sure.” The total scores ranged from 1–65, and participants whose scores were under 85% of the total (65) were considered to have a negative attitude towards food safety practices; otherwise, they were deemed to have a positive attitude. In a study conducted by Odeyemi et al. (2018), a 3-point Likert scale ranging from never to frequently was used to assess consumers’ attitudes towards food safety. In addition, Sani and Siow (2014) developed 23 questions to evaluate the attitude of 112 campus dining food handlers’ attitudes towards food safety by using the 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5), and participants who received scores under 50 were considered to have a poor attitude towards food safety practices. Ko (2013) also developed a 5-point Likert scale to assess food handlers’ attitudes towards food safety in Taiwan, with responses ranging from strongly disagree (1) to strongly agree (5). In a slightly different fashion, a 4-point Likert scale was applied in a study assessing food safety attitudes by Statev, Odeyemi, Pavlov, Kyuchukova, and Fatehi (2017) to a questionnaire (optional answers: “correct,” “wrong,” “I cannot remember,” and “I do not know”). Food safety studies using direct attitude measurements are shown in Table 2.



Table 2. Food Safety Studies Using Direct Attitude Measurements

<b>Author, year</b>	<b>The number of items</b>	<b>Measurement scale</b>	<b>Sample question</b>
Pilling, Brannon, Shanklin, Roberts, & Howells, 2008	NI	7-point Likert scale (1=extremely bad to, 7=extremely good)	“I properly wash my hands at work on a regular basis.”
Rosnani, Son, Mohhidin, Toh, & Chai, 2014	13	3-point Likert scale (1=agree, 2=not agree, and 3=not sure)	NI
Sani & Siow, 2014	20	5-point Likert scale (1=strongly disagree, 5=strongly agree)	“Safe food handling is an important part of my job responsibility.”
Odeyemi et al., 2018	20	3-point Likert scale (frequently, never, and sometimes)	“Do you wash your hands before and after cooking?”
Stratev et al., 2017	20	4-point Likert scale (correct, wrong, I cannot remember, and I do not know)	“Washing hands after going to the toilet prevents cross contamination.”
Ko, 2013	8	5-point Likert scale (1=strongly disagree, 5=strongly agree)	“Food handlers are responsible for preventing food poisoning.”
Abdul-Mutalib et al., 2012	13	3-point Liker-scale (1= disagree, 2=uncertain, and 3 = agree)	“Hands should be washed before starting work.”
Phillip & Anita, 2010	NI	7-point Likert-scale (-3= very bad, 3= very good)	“Carrying out safe good handling practices is...”

NI = Not informed

### 2.6.2 Implicit Attitude Measures

Due to disadvantages of direct attitude measures in assessing participants’ attitudes, such as dishonesty (Levy, Gidron, & Olley, 2017), scientists have been seeking measures of psychological constructs without bias, and more indirect measurements have emerged (Fazio & Olson, 2003). According to Greenwald, McGhee, and Schwartz

(1998), indirect measurement will make participants resist masking themselves by self-presentation strategies, which means this measurement will reveal some attitudes that the participants did not want to express.

#### *2.6.2.1 Applications of Implicit Attitude Measure*

Indirect measurements as an approach to assess participants' attitudes have been applied in many settings, such as racial attitudes, self-esteem, and health behaviors (Fazio & Olson, 2003). There are many implicit measurement approaches; the most well-known is the Implicit Association Test (IAT) developed by Greenwald, McGhee and Schwartz (1998). This approach assesses an individual's implicit attitudes by evaluating the strength of a link between a target concept and an attribute dimension. In the study conducted by Greenwald, McGhee, and Schwartz (1998), the IAT was used to measure participants' attitude towards race. First, participants were asked to categorize some names as either typical names of black people or of white people, with their attitude towards race as the target concept. Later, participants were required to classify some clearly valenced words (e.g., flowers and insects) into pleasant or unpleasant, which constituted the attribution dimension. In the last step, participants carried out these categorization tasks twice: once with one response key signifying black/pleasant and the other white/unpleasant, and again with one meaning black/unpleasant and the other signifying white/pleasant. The results of this study showed that it was much easier for participants to match the target concept of black with unpleasant than with pleasant.

A priming measure is another main approach used to assess people's implicit attitude, and it is based on the statement that attitudes are automatically activated with the mere presentation of the attitude object (Fazio, Jackson, Dunton, & Williams, 1995). To

put it simply, an individual may have a negative evaluation towards one object (e.g., pest), and his negative evaluation will automatically be activated by the presence of that object. If the target object is also negative for the individual, he or she should indicate the connotation of the target adjective (e.g., disgusting) relatively quickly. Fazio, Jackson, Dunton and, Williams (1995) conducted a study to examine participants' racial attitudes based an automatic evaluation automatically activated from memory with the presentation of pictures of black and white people. In their study, participants were required to describe their feelings using an evaluative word, such as pleasant, as quickly as possible. In another study carried out by Dovidio, Kawakami, Johnson, Johnson, and Howard (1997), investigators assessed participants' implicit attitudes towards white and black people by observing their nonverbal behavior and a priming procedure. The results indicated that people with more negative attitudes toward black participants during the priming task more frequently blinked their eyes and had less eye contact when interacting with black interviewers than with white interviewers. Studies using implicit measures are shown in Table 3.

Table 3. *Studies Using Implicit Measures*

Author, year	Topic	The number of items	Approach	Study design
Fazio, Jackson, Dunton, & Williams, 1995	Race	NI	Priming measure	Assessing participants' automatic responses to seeing black and white people's pictures.
Levy, Gidron, & Olley, 2017	Condom use	20	I-CUTE	Participants were provided pictures with some scenarios and required to choose one of out of four answers to estimate the character's thoughts in the scenario (reflecting their attitudes).
Greenwald, McGhee, & Schwartz, 1998	Race	NI	IAT	Evaluating the strength of a link between a target concept (attitudes toward white and black people) and attribute dimension (attitudes towards flowers and insects).
Nunes & Baldwin, 2007	Child sexual abusers	NI	IAT	Applying the IAT to measure self and child for child molesters and nonsexual offenders.
Dovidio, Kawakami, Johnson, Johnson, & Howard, 1997	Race	NI	Priming measure	Observing the correspondence between attitude estimates based on a priming procedure and nonverbal behaviors while interacting with white and black interviewers.
Rosenzweig, 1978	Personality	24	RPFT	Participants were provided pictures of people in scenarios and were asked to project these characters' thoughts; the investigator later interpreted the participants' responses.

Apart from the IAT and priming measures, there are many other methods that can be to assess implicit attitudes, such as the Rosenzweig Picture Frustration Test (RPFT):

Rosenzweig, 1978). In the RPFT, participants are provided many pictures with characters in different scenarios, and they are asked to project the thoughts of those characters. Later, an investigator interprets the participants' responses to assess their implicit attitudes. In addition, Levy, Gidron, and Olley (2017) developed another implicit attitude measure approach—an indirect condom use test (I-CUTE)—to assess people's attitudes towards using condoms based on the RPFT (Rosenzweig, 1978). Similar to the RPFT (Rosenzweig, 1978), participants are provided many pictures with characters in different scenarios, and they are asked to project the thoughts of these characters. Instead of interpreting their responses, participants are asked to choose from four responses, and their answers can reveal their implicit attitudes.

#### *2.6.2.2 Applications of Implicit Attitude Measure in the Hospitality Field*

Apart from fields listed above, the implicit attitude measurement is utilized in the hospitality field as well. The implicit attitude measurements have been utilized extensively in the area of tourism research. For example, Lee and Kim (2017) used the single-target implicit association test to assess participants' implicit image cognitions toward three destinations: China, England and France. In their study, participants' implicit cognition was measured based on reaction times. In addition, in another study conducted by Yang, He and Gu (2011), the Implicit Association Test was used to assess Chinese tourists' perceived image of Japan and Hong Kong. The implicit measures were applied in the food and beverage management area as well. In the research conducted by Lee and Kim (2013), the implicit association test was utilized to assess people's attitudes toward fast food restaurants brands.

### **2.6.3 Behavioral Intention Measures**

Ajzen (1991) pointed out that intention is the main precursor to behaviors. In addition, many scholars (e.g., Engel, Kollat, & Blackwell, 1968; Howard & Sheth, 1969) have stated that behavioral intention intervenes between attitudes and behaviors. Due to the important role of predicting behaviors, determining how to measure participants' behavioral intentions appropriately has been an important topic for many scholars (Miniard, Obermiller, & Page, 1982).

#### *2.6.3.1 Implications of Behavioral Intention Measures*

A person's intention of conducting food safety practices has been measured in many studies (e.g., Chow & Mullan, 2010; Hinsz & Nickell, 2015; Mullan & Wong, 2009; Phillip & Anita, 2010; Pilling, Brannon, Shanklin, Roberts, & Howells, 2008) to better predict people's food safety behaviors in the future. A 7-point Likert scale is the most common measure scale used to assess participants' behavioral intention of conducting food safety practices. In the study conducted by Phillip and Anita (2010), a 7-point Likert scale ranging from very unlikely (-3) to very likely (3) was applied in the questionnaire to assess 249 food handlers' behavioral intention of conducting safe food handling practices. In addition, many investigators have utilized the 7-point Likert scale ranging from strongly disagree (1) to strongly agree (7) to assess participants' intention of conducting food safety behaviors (e.g., Hinz & Nickel, 2015; Pilling, Brannon, Shanklin, Roberts, & Howells, 2008). In another study conducted to predict food safety behaviors, Chow and Mullan (2009) developed a questionnaire using a 7-point Likert scale ranging from definitely do to definitely not to assess participants' behavioral intention of conducting food safety behaviors. In addition, the 5-point Likert scale is also

a popular measure used in questionnaires to assess behavioral intention. For example, Bai, Tang, Yang, and Gong (2014) used a single item, “I intend to prepare food hygienically at every meal in the next week” (ranging from strongly disagree to strongly agree) to measure participants’ behavioral intention of conducting safe food handling practices. In another study carried out by Shapiro, Porticella, and Gravani (2011), a 5-point Likert scale (ranging from strongly disagree to strongly agree) was also applied to assess home cooks’ intention to adopt safe home handling practices. Table 4 lists food safety studies using behavioral intention measure.

Table 4. *Food Safety Studies Using Behavioral Intention Measure*

Author, year	Number of items	Measure scale	Sample question
Pilling, Brannon, Shanklin, Howells, & Roberts, 2008	NI	7 Likert scale (1=strongly disagree, 7=strongly agree).	“I plan to properly handle food and work surfaces at work.”
Phillip & Anita, 2010	NI	7 Likert scale (-3=very unlikely, +3=very likely).	“In the next week, I intend to carry out safe food handling practices at every occasion.”
Hinsz & Nickell, 2015	5	7-point Likert scale (1=strongly disagree, 7=strongly agree).	“I intend to do all that is needed to produce clean and uncontaminated turkey products.”
Chow & Mullan, 2010	5	7-point Likert scale (1=definitely do not, 7=definitely do).	“I am confident that I am able to prepare food hygienically, even if I have to make a detailed plan.”
Bai, Tang, Yang, & Gong, 2014	1	5-point Likert scale (1=strongly disagree, 5=strongly agree)	“I intend to prepare food hygienically at every meal during the next week.”
Shapiro, Porticella, & Gravani, 2011	2	5-point Likert scale (1=strongly disagree, 5=strongly agree)	“Washing my hands for a full 20 seconds in warm water with soap the next time I handle raw meat or chicken would be very easy.”

NI = Not informed

## 2.7 Hypotheses of the Study

Accordingly, based on the aforementioned literature review, 36 hypotheses were developed. Below are the hypotheses developed from this study.



- *Hypothesis 1a:* Participants in the hypocrisy group have better directly measured attitudes toward handwashing practices (DAH) than control group.
- *Hypothesis 1b:* Participants in the hypocrisy group have better directly measured attitudes toward handwashing practices (DAH) than the only commitment group.
- *Hypothesis 1c:* Participants in the hypocrisy group have better directly measured attitudes toward handwashing practices (DAH) than the only mindfulness group.
- *Hypothesis 1d:* Participants in the only commitment group have better directly measured attitudes toward handwashing practices (DAH) than from the control group.
- *Hypothesis 1e:* Participants in the only commitment group have better directly measured attitudes toward handwashing practices (DAH) than the only mindfulness group.
- *Hypothesis 1f:* Participants in the only mindfulness group have better directly measured attitudes toward handwashing practices (DAH) than the control group.
- *Hypothesis 2a:* Participants in the hypocrisy group have better directly measured attitudes toward glove practices (DAG) than the control group.
- *Hypothesis 2b:* Participants in the hypocrisy group have better directly measured attitudes toward glove practices (DAH) than the only commitment group.
- *Hypothesis 2c:* Participants in the hypocrisy group have better directly measured attitudes toward glove practices (DAH) than the only mindfulness group.
- *Hypothesis 2d:* Participants in the only commitment group have better directly measured attitudes toward glove practices (DAG) than the control group.
- *Hypothesis 2e:* Participants in the only commitment group have better directly

measured attitudes toward glove practices (DAG) than the only mindfulness group.

- *Hypothesis 2f:* Participants in the only mindfulness group have better directly measured attitudes toward glove practices (DAG) than the control group.
- *Hypothesis 3a:* Participants in the hypocrisy group have better implicit measured attitudes toward handwashing practices (IAH) than control group.
- *Hypothesis 3b:* Participants in the hypocrisy group have better directly measured attitudes toward handwashing practices (IAH) than the only commitment group.
- *Hypothesis 3c:* Participants in the hypocrisy group have better implicit measured attitudes toward handwashing practices (IAH) than the only mindfulness group.
- *Hypothesis 3d:* Participants in the only commitment group have better implicit measured attitudes toward handwashing practices (IAH) than the control group.
- *Hypothesis 3e:* Participants in the only commitment group have better implicit measured attitudes toward handwashing practices (IAH) than the only mindfulness group.
- *Hypothesis 3f:* Participants in the only mindfulness group have better implicit measured attitudes toward handwashing practices (IAH) than the control group.
- *Hypothesis 4a:* Participants in the hypocrisy group have better implicit measured attitudes toward glove practices (IAG) than control group.
- *Hypothesis 4b:* Participants in the hypocrisy condition have better directly measured attitudes toward glove practices (IAG) than the only mindfulness group.
- *Hypothesis 4c:* Participants in the hypocrisy condition have better directly measured attitudes toward glove practices (IAG) than the only mindfulness group.
- *Hypothesis 4d:* Participants in the only commitment condition have better implicit

measured attitudes toward glove practices (IAG) than the control group.

- *Hypothesis 4e:* Participants in the only commitment condition have better implicit measured attitudes toward glove practices (IAG) than the only mindfulness condition.
- *Hypothesis 4f:* Participants in the only mindfulness condition have better implicit measured attitudes toward glove practices (IAG) than the control group.
- *Hypothesis 5a:* Participants in the hypocrisy group have a higher handwashing intention (INH) than the control group.
- *Hypothesis 5b:* Participants in the only commitment group have a higher handwashing intention (INH) than the control group.
- *Hypothesis 5c:* Participants in the only commitment group have a higher handwashing intention (INH) than the only mindfulness condition.
- *Hypothesis 5d:* Participants in the only mindfulness group have a higher handwashing intention (INH) than the control group.
- *Hypothesis 5e:* Participants in the only commitment group have a higher handwashing intention (INH) than the only mindfulness group.
- *Hypothesis 5f:* Participants in the only mindfulness group have a higher handwashing intention (INH) than the control group.
- *Hypothesis 6a:* Participants in the hypocrisy group have a higher intention of conducting glove practices (ING) than the control group.
- *Hypothesis 6b:* Participants in the hypocrisy group have a higher intention of conducting glove practices (ING) than the only commitment group.
- *Hypothesis 6c:* Participants in the hypocrisy group have a higher intention of

conducting glove practices (ING) than the only mindfulness group.

- *Hypothesis 6d*: Participants in the only commitment group have a higher intention of conducting glove practices (ING) than the control group.
- *Hypothesis 6e*: Participants in the only commitment group have a higher intention of conducting glove practices (ING) than the only mindfulness group.
- *Hypothesis 6f*: Participants in the only mindfulness group have a higher intention of conducting glove practices (ING) than the control group.

## **CHAPTER 3 METHODOLOGY**

### **3.1 Introduction**

This chapter introduced the research process of this study, including the research design, the development of the instrument, the validation of the instrument, and the subject selection and sampling procedures. Lastly, statistical analysis methods were also explained.

### **3.2 Research Design**

This section discussed the design of the research for this study. The completely randomized design (CRD) was applied in this study, and the CRD was used to study the effect of one primary factor ( $K = 1$ ) on the outcome variables (Montgomery, 2009). This study aims to examine the effect of hypocrisy on changing participants' attitudes and behavioral intentions regarding food safety practices by comparing attitudes and behavioral intentions from four groups (only commitment group, only mindfulness group, hypocrisy group and control group) and the group is the primary factor in this study. Therefore, the CRD design is an appropriate approach utilized in this study.

To conduct the study, all participants were randomly and equally divided into four groups. Group 1 was assigned to the commitment-only condition. Group 2 was given the mindfulness-only condition. Group 3 experienced the hypocrisy condition (commitment plus mindfulness conditions), while Group 4 was used as the control group (no mindfulness/no commitment). All participants were asked to answer the attitude and intention survey at the end of the study.

The commitment and mindfulness conditions were treated as interventions, which manipulated the degree to which individuals recognize inefficient hand hygiene practices

and also the extent to which they participate in hand hygiene practices. Under the commitment condition, this project adopted and developed a method based on the study conducted by Dickerson, Thibodeau, Aronson, and Miller (1992). The participants in Group 1 were given flyers with statements promoting food safety (APPENDIX: B), like “*Please wash your hands as frequently as you should! If I can, so can you!*” before completing the attitude and intention survey. Group 1 participants were asked to sign their names below the statements on the flyers if they agreed with them. In addition, they were be notified that the flyers with their signatures of agreement would be made available to the public to promote food safety. This condition was aimed to influence the extent to which participants preached good hygiene practices. Under the mindfulness condition, participants in Group 2 were be asked to answer a set of self-check questions (APPENDIX: C) at the beginning of the attitude and intention survey, such as “*Do you **always** wash your hands before you put on gloves?*”. This self-check survey was designed to remind participants that they occasionally may fail to comply with standard hygiene practices. Group 3 was be given the flyers and asked to sign their names to the flyers if they agreed with their statements; they completed the self-check questions before starting the attitude and intention survey. Group 4 only filled out the attitude and intention survey. This online survey includes several sections, such as demographical information, explicit attitudes, implicit attitudes, and behavioral intention towards hand hygiene. The study design was outlined below (*Figure 1 Study Design*).

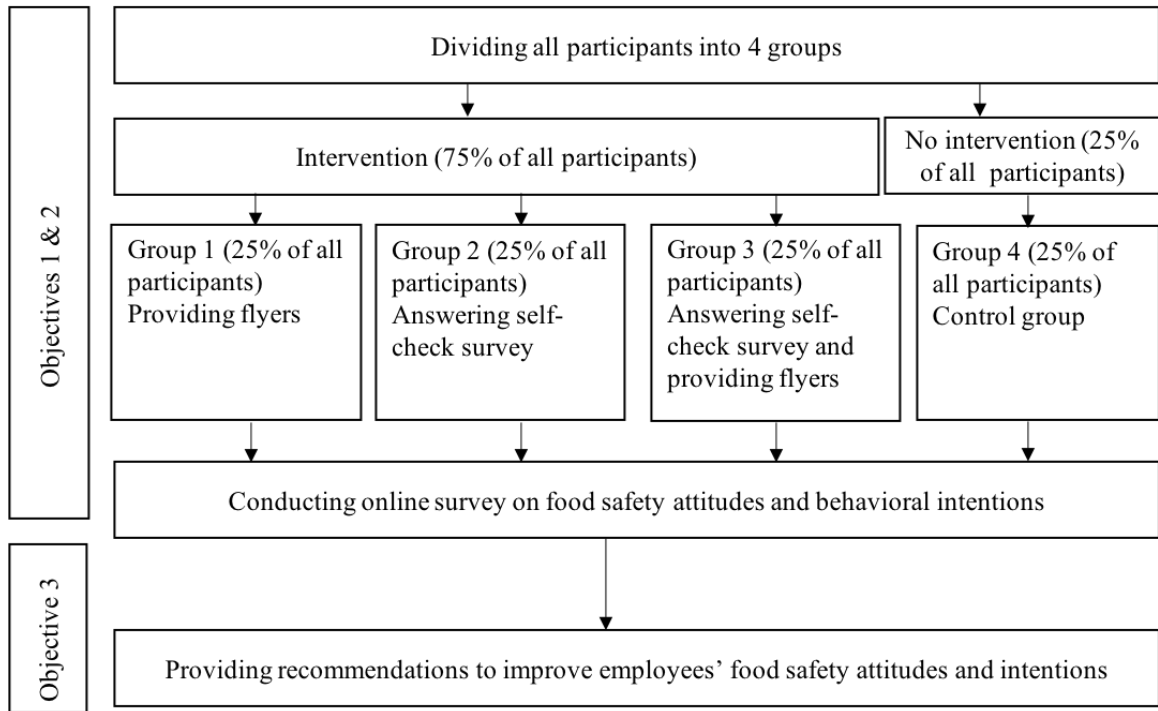


Figure 1. *Study Design*

### 3.3 Instrument Development

The research instruments were developed based on the literature review, including direct attitude measures, implicit attitude measures, and behavioral intention measures (APPENDIX D) The direct attitude measures comprises two sections: Section 1 included questions that measured participants' direct attitude towards handwashing practices, and section 2 contained questions to assess participants' direct attitudes towards glove practices. All questions will be presented using a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). For example, all participants were asked to choose the proper response that can best reflect their opinions for the following statements :

- *“Washing my hands properly at work is important to me.”*
- *“Washing hands before handling raw or cooked food reduces the risk of*

*food poisoning.”*

Two sections constituted the implicit attitude measures: In section 1(Figure 2), participants were shown four pictures with scenarios related to handwashing, and they were asked to estimate the thoughts of characters in those pictures. In section 2(Figure 3), the participants viewed four pictures with scenarios related to glove behaviors and were asked to estimate the thoughts of the characters in those pictures. For example, all participants were asked to choose the proper response that best reflects their estimations for the character’s next action in the picture.

*Scenario 1: When he is going to wash his hands, he found that there was no soap available near the handwashing sink. Customers were waiting for him to serve the food. Under this situation, he was going to \_\_\_\_*

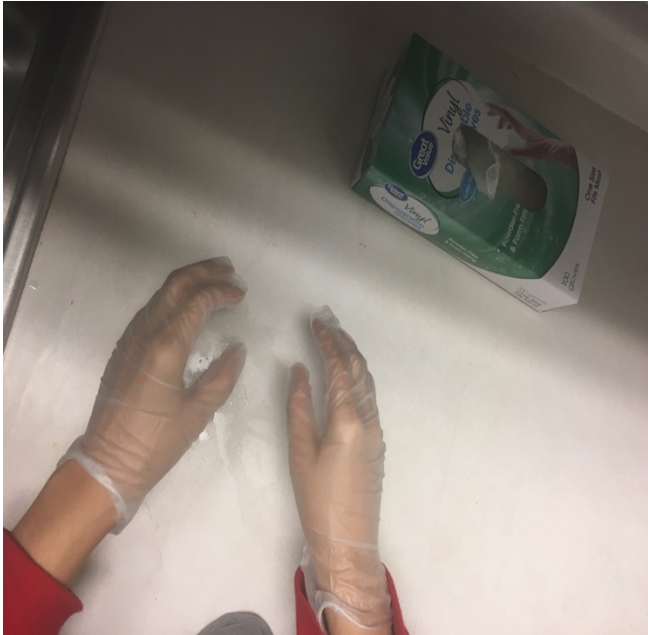


- Serve the food directly without washing his hands.
- Wash his hands without soap.
- Let customers wait for him and go to looking for the soap.

Figure 2. *Implicit Attitude Measure for Handwashing Behaviors*



*Scenario 2: During a busy shift, he had been working at the cafeteria for four hours straight without changing his gloves. A group of new customers just came in and were waiting for him to serve them food. He did not want these customers to have to wait, and he is going to \_\_\_\_*



- Take off his gloves and serve them with bare hands.
- Continue to use the same gloves and take their orders.
- Take off his gloves, wash his hands, put on a pair of new gloves, and serve them.

Figure 3. *Implicit Attitude Measure for Glove Behaviors*

The behavioral intention test included two sections as well. There were 4 questions to measure the participants' behavioral intention of washing their hands in the first section and another 4 questions to assess the participants' behavioral intention of using gloves in the second section. All questions were measured using a 7-point Likert scale ranging from 1 (strongly agree) to 7 (strongly disagree). For example, all participants were asked to choose the proper response that can best reflect their intentions for the following statements:

- *"I intend to wash my hands properly during future work."*

- *“I will make efforts to wash my hands before handling raw or cooked food to reduce the risk of food poisoning in the future.”*

### **3.4 Instrument Validation**

Validity of the instrument is defined as the accuracy of its measurement, which refers to how well an instrument measures the underlying outcome of interest (Sullivan, 2011). The validity of instruments employed in this study was evaluated by a panel of experts, including three faculty and two restaurant managers, using both face validity and content validity. Face validity was used to determine whether the instrument is valid for its intended purpose, while content validity is used to assess if the instrument is appropriate for measuring what it claims to measure (Ary, Jacobs, Razavieh, & Sorensen, 2006). Furthermore, the Cronbach’s Alpha coefficients were calculated to test for reliability. In addition, all members of the panel were asked for suggestions to improve the clarity of the instruments, and the instrument in this study was modified based on their suggestions.

### **3.5 Sampling and Data Collection**

#### **3.5.1 Pilot Study**

The pilot study was conducted with 40 students who were currently working in the foodservice facilities. Based on the results of the pilot study, including explicit attitude measures, implicit attitude measures and behavioral intention measures, Cronbach’s Alpha coefficients were calculated to check study reliability. Questions were removed to make sure the Cronbach’s Alpha reliability is  $> .70$ . Respondents were asked the clarity of the instruments, and study was modified based on their suggestions.

### **3.5.2 Targeted Population**

Since the nature of this study is to understand the food safety practices of employees working in the foodservice industry, all employees who are over 18 years old and are currently working in US foodservice operations were considered as the target population.

### **3.5.3 Sample and Data Collection Procedures**

To calculate the necessary sample size for this study, the G\* Power (Faul, Erdfelder, Lang, & Buchner, 2007) was employed. In this study, we chose the effect size as .25 and the Alpha level as .05, which were often set as (Zodpey, 2004), and the effective sample size of 279 was determined. Before the sampling procedures began, an approval was obtained from the University of Missouri-Columbia Campus Institutional Review Board. An online survey was developed using the Qualtrics platform, and a market survey company was used to recruit the online sample and survey distribution. Non-probabilistic sampling methods are defined as a sampling method of choosing easily accessible participants. Since a market survey company was used to recruit participants for convenience, a non-probabilistic sampling method was used in this study. A total 400 subjects were recruited in this study. All participants were randomly and evenly assigned into four groups, and each group contained 100 participants.

## **3.6 Data Analysis**

To analyze the data, the Statistical Package for the Social Sciences (SPSS Statistics) version 22.0 for Windows (IBM Corporation, Armonk, NY) was used. Tests of internal reliability were conducted to examine the internal reliability of the instrument and guarantee adequate internal reliability by improving the Cronbach's Alpha to  $> .70$ .

Descriptive analyses were used to summarize employees' demographic information. We assumed that the year of working in the restaurant and hours of food safety training would be covariates that would influence the outcomes, so the analysis of covariance (ANCOVA) was conducted to test the effect of year of working in the restaurant and hours of food safety training on the outcome variables. If it was proved that there was no covariant effect, the one-way analysis of variance (ANOVA) would be conducted to compare between four groups in term of all outcome variables (DAH, DAG, IDH, IDG, INH and ING) and the statistical analysis methods applied in this study are listed in the Table 5.

Table 5. *Statistical Analysis Methods*

	<b>Handwashing practices</b>	<b>Glove practices</b>	<b>Statistical Analysis Methods</b>
<b>Direct attitude</b>	<p><i>Hypothesis 1a:</i> Participants in the hypocrisy group have better DAH than the control group.</p> <p><i>Hypothesis 1b:</i> Participants in the hypocrisy group have better DAH than participants from the only commitment group.</p> <p><i>Hypothesis 1c:</i> Participants in the hypocrisy group have better DAH than the only mindfulness group.</p> <p><i>Hypothesis 1d:</i> Participants in the only commitment group have better DAH than the control group.</p> <p><i>Hypothesis 1e:</i> Participants in the only commitment group</p>	<p><i>Hypothesis 2a:</i> Participants in the hypocrisy group have better DAG than the control group.</p> <p><i>Hypothesis 2b:</i> Participants in the hypocrisy group have better DAH than participants from the only commitment group.</p> <p><i>Hypothesis 2c:</i> Participants in the hypocrisy group have better DAH than the only mindfulness group.</p> <p><i>Hypothesis 2d:</i> Participants in the only commitment group have better DAG than the control group.</p> <p><i>Hypothesis 2e:</i> Participants in the only commitment</p>	<p>Analysis of covariance (ANCOVA) and one-way analysis of variance (ANOVA) were used to test the covariate effect of two variables (years of working and hours of training per years) and to compare participants' DAH and DAG among the four groups.</p>

	<p>have better DAH than participants in the only mindfulness group.</p> <p><i>Hypothesis 1f:</i> Participants in the only mindfulness group have better DAH than the control group.</p>	<p>group have better DAG than participants in the only mindfulness group.</p> <p><i>Hypothesis 2f:</i> Participants in the only mindfulness group have better DAG than the control group.</p>	
<b>Implicit attitude</b>	<p>Hypothesis 3a: Participants in the hypocrisy group have better IAH than control group.</p> <p>Hypothesis 3b: Participants in the hypocrisy group have better IAH than the only commitment group.</p> <p>Hypothesis 3c: Participants in the hypocrisy group have better IAH than the only mindfulness group.</p> <p>Hypothesis 3d: Participants in the only commitment group have better IAH than the control group.</p> <p>Hypothesis 3e: Participants in the only commitment group have better IAH than the only mindfulness group.</p> <p>Hypothesis 3f: Participants in the only mindfulness group have better IAH than the control group.</p>	<p>Hypothesis 4a: Participants in the hypocrisy group have better IAG than control group.</p> <p>Hypothesis 4b: Participants in the hypocrisy group have better IAG than the only commitment group.</p> <p>Hypothesis 4c: Participants in the hypocrisy group have better IAG than the only mindfulness group.</p> <p>Hypothesis 4d: Participants in the only commitment group have better IAG than the control group.</p> <p>Hypothesis 4e: Participants in the only commitment group have better IAG than the only mindfulness group.</p> <p>Hypothesis 4f: Participants in the only mindfulness group have better IAG than the control group.</p>	<p>Analysis of covariance (ANCOVA) and one-way analysis of variance (ANOVA) were used to test the covariate effect of two variables (years of working and hours of training per years) and to compare participants' IAH and IAG among four groups.</p>
<b>Behavioral intention</b>	<p><i>Hypothesis 5a:</i> Participants in the hypocrisy group have a higher INH than the control group.</p> <p><i>Hypothesis 5b:</i> Participants in the only commitment group have a higher INH than the only commitment group.</p>	<p><i>Hypothesis 6a:</i> Participants in the hypocrisy group have a higher ING than the control group.</p> <p><i>Hypothesis 6b:</i> Participants in the hypocrisy group have a higher ING than the only commitment group.</p>	<p>Analysis of covariance (ANCOVA) and one-way analysis of variance (ANOVA) were used to test the covariate effect of two variables</p>

	<p><i>Hypothesis 5c:</i> Participants in the only commitment group have a higher INH than the only mindfulness group.</p> <p><i>Hypothesis 5d:</i> Participants in the only mindfulness group have a higher INH than the control group.</p> <p><i>Hypothesis 5e:</i> Participants in the only commitment group have a higher INH than the only mindfulness group.</p> <p><i>Hypothesis 5f:</i> Participants in the only mindfulness group have a higher handwashing intention (INH) than the control group.</p>	<p><i>Hypothesis 6c:</i> Participants in the hypocrisy group have a higher ING than the only mindfulness group.</p> <p><i>Hypothesis 6d:</i> Participants in the only commitment group have a higher ING than the control group.</p> <p><i>Hypothesis 6e:</i> Participants in the only commitment condition have a higher ING than the only mindfulness group.</p> <p><i>Hypothesis 6f:</i> Participants in the only mindfulness group have a higher intention of conducting glove practices (ING) than the control group.</p>	<p>(years of working and hours of training per years) and to compare participants' INH and ING among four groups.</p>
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# CHAPTER 4 RESULTS

## 4.1 Introduction

This chapter addressed findings of this research systematically and thoroughly. The process of cleaning the original data was discussed in the section on preliminary analyses. In addition, participants' profiles were illustrated based on the results of descriptive analyses. The results of 36 hypotheses were displayed in section 4 (Hypothesis Testing). Other variables that may influence the results of this research were discussed in the last section.

## 4.2 Preliminary Analyses

### 4.2.1 Data Cleaning

The total available sample is 371, which consists of 96 participants from only commitment group, 82 participants from only mindfulness group, 93 participants from control group, and 100 participants from the hypocrisy group. Initially, 689 participants (78, 175, 171 and 165 participants from those groups respectively) filled in the questionnaire. However, only 374 participants' responses were kept, and the other 315 questionnaires were deleted from our preliminary analyses due to missing values. Later, the scatter plot was used to detect the outlier, and another three responses were removed from the sample pool due to their extremely high training hours.

### 4.2.2 Measures of Internal Consistency.

Cronbach's alpha coefficients were calculated to test for reliability among multiple items of outcome variables as shown in Table 6. Reliabilities for direct attitude of handwashing ( $\alpha = .88$ ), direct attitude of glove use ( $\alpha = .86$ ), indirect attitude of glove

use ( $\alpha = .86$ ), intention of handwashing ( $\alpha = .86$ ), and intention of glove use ( $\alpha = .89$ ) were far beyond  $\alpha = .70$ , which was excellent, and reliability for indirect attitude of handwashing ( $\alpha = .70$ ) was acceptable.

Table 6. *Cronbach's Alpha for Outcome Variables*

Variables	n	Cronbach's Alpha
DAH	9	.88
DAG	8	.86
IAH	4	.86
IAG	4	.86
INH	9	.89
ING	8	.70

### 4.3 Participants' Profiles

Results of the descriptive analyses (Table 7) showed that almost half of the participants ( $n = 184, 49.6\%$ ) were between 21 and 30 years old, followed by those 31 to 40 years old ( $n = 126, 34.0\%$ );  $11.3\%$  ( $n = 42$ ) of participants were between 41 and 50 years old; only  $3.2\%$  ( $n = 12$ ) of participants were 50 years old or more, and  $1.9\%$  ( $n = 7$ ) of participants were between 18 and 20 years old. In addition, the gender disbursement of participants indicated two thirds of them were male ( $n = 246, 66.3\%$ ) and one third were female ( $n = 125, 33.7\%$ ). In terms of ethnicity, almost half of them were Caucasian ( $n = 182, 49.1\%$ ), followed by Asian/Pacific Islander ( $n = 128, 34.5\%$ ), Black American ( $n = 26, 7.0\%$ ), American Indian ( $n = 15, 4.0\%$ ) and Hispanic/Spanish American ( $n = 11, 3.0\%$ ). Only nine participants belonged to other ethnic groups ( $n = 9, 2.4\%$ ). For



education level, over half of participants had a bachelor's degree (n = 202, 54.5%), and 20.2% (n = 75) had a high school diploma or less, while only 15.9% (n = 59) had an associate degree and 8.9% (n = 33) had a postgraduate degree.

Table 7. *Demographic Characteristics of Participants*

Characteristics	n	%
<b>Age (n = 371)</b>		
18–20	7	1.9
21–30	184	49.6
31–40	126	34.0
41–50	42	11.3
> 50	12	3.2
<b>Gender (n = 371)</b>		
Male	246	66.3
Female	125	33.7
<b>Ethnicity (n = 371)</b>		
Caucasian	182	49.1
American Indian/Native American	15	4.0
Black/African American	26	7.0
Hispanic/Spanish American	11	3.0
Asian/Pacific Islander	128	34.5
Other	9	2.4
<b>Education Level (n = 371)</b>		
High school diploma or less	75	20.2
Two-year college degree (Associate)	59	15.9
Four-year college degree (Bachelor)	202	54.5
Postgraduate studies	33	8.9
Other	2	.5
<b>Type of restaurants in which participants worked (n = 371)</b>		
Fast-food restaurants (e.g., McDonald's)	115	31.0
Campus/university dining (e.g., food service department on campus)	34	9.2
Casual dining restaurants (e.g., Applebee's, Olive Garden)	158	42.6
Fine dining restaurants (e.g., Ruth's Chris Steak House)	49	13.2
Other	15	4.0
<b>Title of position (n = 371)</b>		
Food service employee	183	49.3

Supervisory position	86	23.2
Managerial position	85	22.9
General manager/Director	8	2.2
Other	9	2.4
Position required to handle foods (n = 371)		
Yes	344	92.7
No	27	7.3
Attended food safety trainings (n = 371)		
Yes	336	90.6
No	35	9.4
Who provided the food safety trainings (n = 336)		
Manager/supervisor	194	57.7
ServSafe instructor	99	29.5
Professor (course requirement)	33	9.8
Other	10	3.0
Topic of food safety trainings (n = 336)		
Handwashing	36	10.7
Glove use	11	3.3
Both handwashing and glove use	272	81.0
Other	17	5.0
Size of work facility (n = 371)		
Small (0–100 seats)	189	50.9
Middle (101–200 seats)	160	43.1
Large (Over 200 seats)	22	5.9
Number of employees working in the facility (n = 371)		
Fewer than 10 employees	46	12.4
10 - 50 employees	237	63.9
51 -100 employees	73	19.7
>100 employees	15	4.0

Most participants either worked in fast-food restaurants (n = 115, 31.0%) or casual dining restaurants (n = 158, 42.6%). Some of them worked in the campus dining department (n = 34, 9.2%) and fine dining restaurants (n = 15, 4.0%). However, 15 participants did not work in the types of facilities listed in the survey, which accounted for 4.0% of the total sample. The distribution of positions showed that most participants

were either food service employees (n = 183, 49.3%) or supervisors (n = 86, 23.2%). Also, some of them (n = 85, 22.9%) were in managerial positions. However, only a few were general managers or directors (n = 9, 2.4%). In addition, most participants were working in small-size restaurants (n = 189, 50.9%), followed by middle-size restaurants (n = 160, 43.1%). Only 5.9% (n = 22) of participants were employed in large-size restaurants. Results showed most of the participants (n = 237, 63.9%) were working in restaurants with 10 to 50 employees, and 19.7% (n = 73) were working in restaurants with 51 to 100 employees. Also, 12.4% (n = 46) of the participants worked in places with fewer than 10 employees, and 4% (n = 15) of participants were working in facilities with more than 100 employees.

Most participants (n = 344, 92.7%) were required to handle food. In addition, a majority of them (n = 336, 90.6%) had attended food safety trainings, but 35 participants (9.4%) did not attend any trainings. According to the results of follow-up questions answered by the participants who had attended trainings, more than half of the participants (n = 194, 57.7%) received food safety trainings from their manager/supervisor. Also, around 30% of the participants (n = 99, 29.5%) stated that the trainings were provided by a ServSafe instructor. In addition, some indicated that these trainings were provided by professors (n = 33, 9.8%) or from other people not listed in the options (n = 10, 3.0%). Training topics varied with the majority of trainings (n = 272, 81.0%), covering both handwashing and glove use. More specifically, 10.7% of the trainings only covered handwashing (n = 36), and another 3.3% only covered glove use (n = 11).

#### 4.4 Hypothesis Testing

A series of ANCOVA and one-way ANOVA were conducted to test the hypotheses. The ANCOVA was utilized to test the covariate effects of two variables: working years and training hours on all outcome variables (DAH, DAG, IAH, IAG, INH, and ING). To conduct the ANCOVA, several assumptions, including the independence of the covariate variables and independent variables, linearity, and homogeneity of regression slopes, were tested in the study. The one-way ANOVA was used to check the independence of the covariate variables (working years and training hours) and independent variables (four groups). Results revealed no significant differences in terms of working years across these four groups [ $F(3, 367) = .05, p > .05$ ], which may indicate that the covariate variable (working years) was not influenced by the independent variables (groups) in this study, supporting the assumption for independence between the covariate variables and independent variable. However, results showed that there were significant differences existed in terms of training hours [ $F(3, 367) = 3.18, p < .05$ ]. Therefore, the ANCOVA could be carried out to test the effect of independent variable (groups) on all outcome variables with adding the working years as the covariate variable but there was no need to add the training hours as the covariate variable into the model .

The ANCOVA was carried out to compare differences in DAH, DAG, IAH, IAG, INH, and ING among four groups with the working years as the covariate variable. Results (Table 8) showed that the covariate variable (working years) was significant [ $F(1, 366) = 36.98, p < .001$ ] and DAH was also not significantly different with regard to groups [ $F(3, 366) = 1.32, p > .05$ ]; therefore, hypotheses 1a to 1f were not supported. In addition, results indicated that the covariate variable (working years) was significant [ $F$

(1, 366) = 24.33,  $p < .001$ ] and DAG was also not significantly different with regard to groups [ $F(3, 366) = 1.13, p > .05$ ], which means hypotheses 2a to 2e were not supported.

Table 8. Results of ANCOVA on All Outcome Variables by Groups

Variable	Groups				<i>F</i> (3,366)
	Only commitment	Only mindfulness	Hypocrisy	Control	
DAH	5.62 ± 1.33	5.44 ± 1.43	5.41 ± 1.55	5.73 ± 1.33	1.32
DAG	5.99 ± 1.10	5.85 ± 1.01	5.78 ± 1.06	6.02 ± 1.05	1.13
IAH	2.62 ± .42	2.60 ± .44	2.74 ± .31	2.56 ± .52	3.26*
IAG	2.45 ± .68	2.50 ± .60	2.66 ± .46	2.41 ± .67	3.07*
INH	6.01 ± 1.09	5.99 ± 1.00	5.81 ± 1.16	5.68 ± 1.29	1.90
ING	6.00 ± 1.13	5.99 ± .99	5.86 ± 1.10	5.43 ± 1.57	5.01**

Note. \* =  $p < .05$ , \*\* =  $p < .01$ .

However, for results of ANCOVA on IAH, the covariate variable (working years) was significant [ $F(1, 366) = 10.70, p < .001$ ] and IAH was significantly different with regard to groups [ $F(3, 366) = 3.26, p < .05$ ]. By comparing the four groups in terms of IAH using the Tukey test, there was only significance differences between the hypocrisy group ( $M = 2.74, SD = .31$ ) and the control group ( $M = 2.56, SD = .52$ ) at  $p < .05$ , which may indicate that participants from the hypocrisy group had more positive IAH than the control group, supporting hypothesis 3a. For results of ANCOVA test of IAG, the covariate variable (working years) was significant [ $F(1, 366) = 9.87, p < .01$ ] and IAG was significantly different with regard to groups [ $F(3, 366) = 3.07, p < .05$ ] and there was a significant difference only between the hypocrisy group ( $M = 2.66, SD = .46$ ) and the control group ( $M = 2.41, SD = .67$ ) at  $p < .05$ , which may indicate that participants from the hypocrisy group had more positive IAG than the control group, supporting hypothesis 4a.

However, the ANCOVA indicated the covariate variable (working years) was

significant [ $F(1, 366) = 23.30, p < .001$ ] and there was no significant difference in terms of INH [ $F(3, 366) = 1.90, p > .05$ ]. In addition, results from the ANCOVA test showed the covariate variable (working years) was significant [ $F(1, 366) = 14.63, p < .001$ ] and ING was significantly different with regard to groups [ $F(3, 366) = 5.01, p < .01$ ]. Based on the results of the Tukey test, there were significant differences between the only commitment group ( $M = 6.00, SD = 1.13$ ) and the control group ( $M = 5.43, SD = 1.57$ ) at  $p < .01$ ; the only mindfulness group ( $M = 5.99, SD = .99$ ) and the control group ( $M = 5.43, SD = 1.57$ ) at  $p < .05$ ; and the hypocrisy group ( $M = 5.86, SD = 1.10$ ) and the control group ( $M = 5.43, SD = 1.57$ ) at  $p < .01$ . This may indicate that all groups had higher ING than the control group, which supports hypotheses 6a, 6d, and 6f.

To sum up, the results of analysis indicated that only hypotheses 3a, 4a, 6a, 6d, and 6f were supported, and other hypotheses were not supported (Table 9).

Table 9. *Summary of Results of All Hypothesis*

	<b>Handwashing practices</b>	<b>Hypotheses</b>	<b>Glove practices</b>	<b>Hypotheses</b>
<b>Direct attitude</b>	<i>Hypothesis 1a:</i> Participants in the hypocrisy group have better DAH than control group.	<b>(Not supported)</b>	<i>Hypothesis 2a:</i> Participants in the hypocrisy group have better DAG than control group.	<b>(Not supported)</b>
	<i>Hypothesis 1b:</i> Participants in the hypocrisy group have better DAH than only commitment group.	<b>(Not supported)</b>	<i>Hypothesis 2b:</i> Participants in the hypocrisy group have better DAG than only commitment group.	<b>(Not supported)</b>
	<i>Hypothesis 1c:</i> Participants in	<b>(Not supported)</b>	<i>Hypothesis 2c:</i> Participants in	<b>(Not supported)</b>

	the hypocrisy group have better DAH than only mindfulness group.		the hypocrisy group have better DAG than only mindfulness group.	
	<i>Hypothesis 1d:</i> Participants in the only commitment group have better DAH than control group	<b>(Not supported)</b>	<i>Hypothesis 2d:</i> Participants in the only commitment group have better DAG than control group	<b>(Not supported)</b>
	<i>Hypothesis 1e:</i> Participants in the only commitment group have better DAH than only mindfulness group.	<b>(Not supported)</b>	<i>Hypothesis 2e:</i> Participants in the only commitment group have better DAG than only mindfulness group.	<b>(Not supported)</b>
	<i>Hypothesis 1f:</i> Participants in the only mindfulness group have better DAH) than control group.	<b>(Not supported)</b>	<i>Hypothesis 2f:</i> Participants in the only mindfulness group have better DAG than control group.	<b>(Not supported)</b>
<b>Implicit attitude</b>	Hypothesis 3a: Participants in the hypocrisy group have better IAH than control group.	<b>Supported</b>	Hypothesis 4a: Participants in the hypocrisy group have better IAG than control group.	<b>Supported</b>
	Hypothesis 3b: Participants in the hypocrisy group have better IAH than only commitment group.	<b>(Not supported)</b>	Hypothesis 4b: Participants in the hypocrisy group have better IAG than only commitment group.	<b>(Not supported)</b>
	Hypothesis 3c:	<b>(Not</b>	Hypothesis 4c:	<b>(Not</b>

	Participants in the hypocrisy group have better IAH than only mindfulness group.	<b>supported)</b>	Participants in the hypocrisy group have better IAG than only mindfulness group.	<b>supported)</b>
	Hypothesis 3d: Participants in the only commitment group have better IAH than control group	<b>(Not supported)</b>	Hypothesis 4d: Participants in the only commitment group have better IAG than control group.	<b>(Not supported)</b>
	Hypothesis 3e: Participants in the only commitment group have better IAH than only mindfulness group.	<b>(Not supported)</b>	Hypothesis 4e: Participants in the only commitment group have better IAG than only mindfulness group.	<b>(Not supported)</b>
	Hypothesis 3f: Participants in the only mindfulness group have better IAH than control group.	<b>(Not supported)</b>	Hypothesis 4f: Participants in the only mindfulness group have better IAG than control group.	<b>(Not supported)</b>
<b>Behavioral intention</b>	<i>Hypothesis 5a:</i> Participants in the hypocrisy group have a higher INH than control group.	<b>Not supported</b>	<i>Hypothesis 6a:</i> Participants in the hypocrisy group have a higher ING than control group.	<b>Supported</b>
	<i>Hypothesis 5b:</i> Participants in the hypocrisy group have a higher INH than only commitment group	<b>(Not supported)</b>	<i>Hypothesis 6b:</i> Participants in the hypocrisy group have a higher ING than only commitment group.	<b>(Not supported)</b>
	<i>Hypothesis 5c:</i>	<b>(Not</b>	<i>Hypothesis 6c:</i>	<b>(Not</b>



	Participants in the hypocrisy group have a higher INH than only mindfulness group.	<b>supported)</b>	Participants in the hypocrisy group have a higher ING than only mindfulness group.	<b>supported)</b>
	<i>Hypothesis 5d:</i> Participants in the only mindfulness group have a higher INH than control group.	<b>(Not supported)</b>	<i>Hypothesis 6d:</i> Participants in the only mindfulness group have a higher ING than control group.	<b>Supported</b>
	<i>Hypothesis 5e:</i> Participants in the only commitment group have a higher INH than only mindfulness group.	<b>(Not supported)</b>	<i>Hypothesis 6e:</i> Participants in the only commitment group have a higher INH than only mindfulness group.	<b>(Not supported)</b>
	<i>Hypothesis 5f:</i> Participants in the only mindfulness group have a higher INH than control group.	<b>Not Supported</b>	<i>Hypothesis 6f:</i> Participants in the only mindfulness group have a higher INH than control group.	<b>Supported</b>

## 4.5 Other Findings

This section introduced other findings, excepting hypotheses testing from this study, which may impact the outcome variables such as restaurant type, working position, and education levels.

### 4.5.1 One-Way ANOVA of Previous Trainings on Intentions.

As can be seen from the results (Table 10), the intention of participants from all

groups to use gloves was significantly higher than that of the control group, but there was no significant difference between any groups in terms of the intention of handwashing. The study assumed that the effects of handwashing training and glove use training may impact the intention. To test the assumption, all participants were categorized into two groups: one group with previous handwashing trainings and another group without previous handwashing trainings. Then, the one-way ANOVA analysis was conducted to test whether the intention of handwashing (INH) varied between these two groups. Results indicated that there were no significant differences between the group with previous handwashing trainings and the group without previous handwashing trainings [ $F(1, 369) = .73, p > .05$ ].

Table 10. *One-Way ANOVA of INH and ING by Previous Trainings*

Variables	Groups		$F(1,369)$
	With previous trainings	Without previous trainings	
INH	5.89 ± 1.16 (n = 308)	5.75 ± 1.08 (n = 63)	.73
ING	5.93 ± 1.21 (n = 283)	5.42 ± 1.29 (n = 88)	11.38***

Note. \* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$

In addition, we also clustered all participants into two groups: one group with previous glove use trainings and another group without previous glove use trainings. Another one-way ANOVA analysis was conducted to test whether ING was significantly different between these two groups. Results showed that the group without previous glove use trainings ( $M = 5.42, SD = 1.29$ ) had significantly lower ING than the group with previous glove use trainings ( $M = 5.93, SD = 1.21$ ) [ $F(1, 369) = 11.38, p < .001$ ].

#### **4.5.2 One-Way ANOVA of Educational Levels on All Outcome Variables.**

The one-way ANOVA was also carried out to test the effect of educational level on all outcome variables (DAH, DAG, IAH, IAG, INH, and ING). All participants were

categorized based on their educational levels (high school diploma or less, associate degree, bachelor's degree, and postgraduate studies). Results (Table 11) showed significant difference in terms of DAH [ $F(3, 365) = 15.52, p < .001$ ]. The Tukey test showed significant differences between those with a high school diploma or less ( $M = 6.23, SD = .81$ ) and those with a bachelor's degree ( $M = 5.17, SD = 1.55, p < .001$ ), those with a high school diploma or less ( $M = 6.23, SD = .81$ ) and those with postgraduate studies ( $M = 5.35, SD = 1.34, p < .001$ ), and those with an associate degree ( $M = 6.10, SD = 1.05$ ) and those with a bachelor's degree ( $M = 5.17, SD = 1.55, p < .001$ ).

Table 11. *One-Way ANOVA of All Outcome Variables by Educational Levels*

Variable	Groups				$F(3,365)$
	High school diploma or less (n = 77)	Associate degree (n = 59)	Bachelor's degree (n = 202)	Postgraduate studies (n = 33)	
DAH	6.23 ± .81	6.10 ± 1.05	5.17 ± 1.55	5.35 ± 1.34	15.52***
DAG	6.25 ± .93	6.07 ± 1.06	5.77 ± 1.08	5.75 ± 1.06	4.51**
IAH	2.65 ± .44	2.67 ± .44	2.64 ± .41	2.44 ± .50	2.43
IAG	2.62 ± .58	2.49 ± .61	2.46 ± .61	2.50 ± .67	1.20
INH	6.29 ± .99	6.09 ± 1.13	5.67 ± 1.15	5.60 ± 1.23	7.00***
ING	6.14 ± 1.11	5.94 ± 1.29	5.67 ± 1.26	5.60 ± 1.29	3.19*

Note. \* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$ .

In addition, results showed significant difference in terms of DAG [ $F(3, 367) = 4.51, p < .01$ ]. The Tukey test showed only significant difference between those with a high school diploma or less ( $M = 6.25, SD = .93$ ) and those with a bachelor's degree ( $M = 5.77, SD = 1.08, p < .01$ ). However, results indicated no significant difference in terms of IAH and IAG between different educational levels ( $p > .05$ ). In terms of intention, results showed significant difference in regard to INH between different educational levels [ $F(3, 367) = 7.00, p < .001$ ]. The Tukey test showed significant differences concerning INH

between those with a high school diploma or less ( $M = 6.29, SD = .99$ ) and those with a bachelor's degree ( $M = 5.67, SD = 1.15, p < .001$ ), and those with a high school diploma or less ( $M = 6.29, SD = .99$ ) and those with postgraduate studies ( $M = 5.60, SD = 1.23, p < .001$ ). In addition, results showed significant difference in terms of ING among participants with different educational levels [ $F(3, 367) = 3.19, p < .05$ ]. The Tukey test showed significant difference only between those with a high school diploma or less ( $M = 6.14, SD = 1.11$ ) and those with a bachelor's degree ( $M = 5.67, SD = 1.26, p < .05$ ). To sum up, all results of the ANOVA and the Tukey about the effects of the educational levels on all outcome variables are listed in Table 12.

Table 12. *Summary of Results about Effects of Educational Levels*

	<b>ANOVA Results</b>	<b>Tukey Test</b>
<b>DAH</b>	Significant	high school diploma or less ( $6.23 \pm .81$ ) > bachelor's degree ( $5.17 \pm 1.55$ ), $p < .001$ high school diploma or less ( $6.23 \pm .81$ ) > postgraduate studies ( $5.35 \pm 1.34$ ), $p < .001$ associate degree ( $6.10 \pm 1.05$ ) > bachelor's degree ( $5.17 \pm 1.55$ ), $p < .001$
<b>DAG</b>	Significant	high school diploma or less ( $6.25 \pm .93$ ) > bachelor's degree ( $5.77 \pm .108$ ), $p < .01$
<b>IAH</b>	Not significant	
<b>IAG</b>	Not significant	
<b>INH</b>	Significant	high school diploma or less ( $6.29 \pm .99$ ) > bachelor's degree ( $5.67 \pm 1.15$ ), $p < .001$ high school diploma or less ( $6.29 \pm .99$ ) > postgraduate studies ( $5.60 \pm 1.23$ ), $p < .001$
<b>ING</b>	Significant	high school diploma or less ( $6.14 \pm 1.11$ ) > bachelor's degree ( $5.67 \pm 1.26$ ), $p < .05$

#### 4.5.3 One-Way ANOVA of Restaurant Types on All Outcome Variables.

The one-way ANOVA was also carried out to test the effect of the restaurant type

on all outcome variables (DAH, DAG, IAH, IAG, INH, and ING). All participants' workplaces were categorized based on restaurant type (fast-food restaurants, campus dining, casual dining restaurants, and fine dining restaurants). Results (Table 13) showed significant difference in terms of DAH with different restaurant types [ $F(3, 367) = 10.21, p < .001$ ]. The Tukey test showed significant difference between fast-food restaurants ( $M = 5.12, SD = 1.46$ ) and casual dining restaurants ( $M = 5.77, SD = 1.44, p < .001$ ), fast-food restaurants ( $M = 5.12, SD = 1.46$ ) and fine dining restaurants ( $M = 6.09, SD = .99, p < .001$ ), campus dining ( $M = 4.89, SD = 1.18$ ) and casual dining restaurants ( $M = 5.77, SD = 1.44, p < .01$ ), and campus dining ( $M = 4.89, SD = 1.18$ ) and fine dining restaurants ( $M = 6.09, SD = .99, p < .001$ ).

Table 13. *One-Way ANOVA of All Outcome Variables by Restaurant Types*

Variable	Groups				$F(3,367)$
	fast food (n = 127)	campus dining (n = 34)	casual dining (n = 160)	fine dining (n = 50)	
DAH	5.12 ± 1.46	4.89 ± 1.18	5.77 ± 1.44	6.09 ± .99	10.21***
DAG	5.61 ± 1.18	5.19 ± .91	6.16 ± .92	6.21 ± .95	13.81***
IAH	2.56 ± .46	2.62 ± .43	2.65 ± .44	2.72 ± .37	1.60
IAG	2.31 ± .68	2.48 ± .57	2.52 ± .61	2.79 ± .36	7.34***
INH	5.56 ± 1.20	5.22 ± .94	6.05 ± 1.13	6.19 ± .99	9.37***
ING	5.48 ± 1.30	5.15 ± 1.00	6.04 ± 1.22	6.09 ± 1.20	8.77*

Note. \* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$ .

Results showed significant difference in terms of DAG among participants with different restaurant types [ $F(3, 367) = 13.81, p < .001$ ]. The Tukey test showed significant difference concerning DAH between participants who worked at fast-food restaurants ( $M = 5.61, SD = 1.18$ ) and casual dining restaurants ( $M = 6.16, SD = .92, p < .001$ ), fast-food restaurants ( $M = 5.61, SD = 1.18$ ) and fine dining restaurants ( $M = 6.21, SD = .95, p < .01$ ), campus dining ( $M = 5.19, SD = .91$ ) and casual dining

restaurants ( $M = .16, SD = .92, p < .01$ ), and campus dining ( $M = 5.19, SD = .91$ ) and fine dining restaurants ( $M = 6.21, SD = .95, p < .001$ ). However, results (Table 13) indicated no significant difference in terms of IAH between participants who worked at different restaurant types ( $p > .05$ ).

Results (Table 13) also showed significant difference in terms of IAG between participants who worked at different restaurant types [ $F(3, 367) = 7.34, p < .001$ ]. The Tukey test showed significant difference concerning IAG between fast-food restaurants ( $M = 2.31, SD = .68$ ) and casual dining restaurants ( $M = 2.52, SD = .61, p < .01$ ), fast-food restaurants ( $M = 2.31, SD = .68$ ) and fine dining restaurants ( $M = 2.79, SD = .36, p < .01$ ), campus dining ( $M = 2.52, SD = .61$ ) and casual dining restaurants ( $M = 2.52, SD = .61, p < .001$ ), and campus dining ( $M = 2.52, SD = .61$ ) and fine dining restaurants ( $M = 2.79, SD = .36, p < .001$ ).

In terms of intention, results showed significant difference in regard to INH between participants who worked at different restaurant types [ $F(3, 367) = 9.73, p < .001$ ]. The Tukey test showed significant differences between fast-food restaurants ( $M = 5.56, SD = 1.20$ ) and casual dining restaurants ( $M = 5.22, SD = .94, p < .05$ ), and fast-food restaurants ( $M = 5.56, SD = 1.20$ ) and fine dining restaurants ( $M = 6.19, SD = 1.20, p < .001$ ).

In addition, results also indicated significant differences concerning ING between different restaurant types [ $F(3, 367) = 8.77, p < .001$ ]. The Tukey test showed significant differences concerning INH between fast-food restaurants ( $M = 5.48, SD = 1.30$ ) and casual dining restaurants ( $M = 6.04, SD = 1.22, p < .001$ ), fast-food restaurants ( $M = 5.48, SD = 1.30$ ) and fine dining restaurants ( $M = 6.09, SD = 1.19, p < .05$ ), campus dining ( $M$

= 5.15,  $SD = 1.00$ ) and casual dining restaurants ( $M = 6.04$ ,  $SD = 1.22$ ,  $p < .001$ ), and campus dining ( $M = 5.15$ ,  $SD = 1.00$ ) and fine dining restaurants ( $M = 6.09$ ,  $SD = 1.20$ ,  $p < .01$ ). To sum up, all results of the ANOVA and the Tukey about the effects of the restaurant type on all outcome variables are listed in Table 14.

Table 14. *Summary of Results about Effects of Restaurant Types*

	<b>ANOVA Results</b>	<b>Tukey Test</b>
<b>DAH</b>	Significant	Fast-food restaurants ( $5.12 \pm 1.46$ ) < casual dining restaurants ( $5.77 \pm 1.44$ ), $p < .001$ Fast-food restaurants ( $5.12 \pm 1.46$ ) < fine dining restaurants ( $6.09 \pm .99$ ), $p < .001$ campus dining ( $4.88 \pm 1.18$ ) < casual dining restaurants ( $5.77 \pm 1.44$ ), $p < .01$ campus dining ( $4.88 \pm 1.18$ ) < fine dining restaurants ( $6.09 \pm .99$ ), $p < .001$
<b>DAG</b>	Significant	fast-food restaurants ( $5.61 \pm 1.18$ ) < casual dining restaurants ( $6.16 \pm .92$ ), $p < .001$ fast-food restaurants ( $5.61 \pm 1.18$ ) < fine dining restaurants ( $6.21 \pm .95$ ), $p < .01$ campus dining ( $5.19 \pm .91$ ) < casual dining restaurants ( $6.16 \pm .92$ ), $p < .01$ campus dining ( $5.19 \pm .91$ ) < fine dining restaurants ( $6.21 \pm .95$ ), $p < .001$
<b>IAH</b>	Not significant	
<b>IAG</b>	Significant	fast-food restaurants ( $2.31 \pm .68$ ) < casual dining restaurants ( $2.52 \pm .61$ ), $p < .05$ fast-food restaurants ( $2.31 \pm .68$ ) < fine dining restaurants ( $2.79 \pm .36$ ), $p < .001$ casual dining restaurants ( $2.52 \pm .61$ ) < fine dining restaurants ( $2.79 \pm .36$ ), $p < .05$
<b>INH</b>	Significant	fast-food restaurants ( $5.56 \pm 1.20$ ) < casual dining restaurants ( $6.05 \pm 1.13$ ), $p < .01$ fast-food restaurants ( $5.56 \pm 1.20$ ) < fine dining restaurants ( $6.19 \pm .99$ ), $p < .01$ campus dining ( $5.22 \pm .94$ ) < casual dining restaurants ( $6.05 \pm 1.13$ ), $p < .001$ campus dining ( $5.22 \pm .94$ ) < fine dining restaurants ( $6.19 \pm .99$ ), $p < .001$
<b>ING</b>	Significant	fast-food restaurants ( $5.48 \pm 1.30$ ) < casual dining restaurants ( $6.04 \pm 1.22$ ), $p < .001$ fast-food restaurants ( $5.48 \pm 1.30$ ) < fine dining restaurants ( $6.09 \pm 1.19$ ), $p < .05$ campus dining ( $5.15 \pm 1.00$ ) < casual dining restaurants ( $6.04 \pm 1.22$ ), $p < .001$ campus dining ( $5.15 \pm 1.00$ ) < fine dining restaurants ( $6.09 \pm 1.19$ ), $p < .01$



#### 4.5.4 One-Way ANOVA of Work Positions on All Outcome Variables.

The one-way ANOVA was also utilized to test the effect of work position on all outcome variables (DAH, DAG, IAH, IAG, INH, and ING). Participants were categorized based on their work positions (food service employee, supervisory position, managerial position, and general manager). Results (Table 15) indicated significant difference in terms of DAH among participants with different work positions [ $F(3, 367) = 7.79, p < .001$ ]. The Tukey test showed significant differences between food service employees ( $M = 5.70, SD = 1.21$ ) and supervisory positions ( $M = 4.97, SD = 1.70, p < .001$ ). However, results also showed no significant difference concerning DAG with different work positions.

Table 15. *One-Way ANOVA of All Outcome Variables by Work Positions*

Variable	Groups				$F(3,367)$
	food service employee (n = 192)	supervisory position (n= 8)	managerial position (n = 85)	general manager (n = 8)	
DAH	5.70 ± 1.21	4.97 ± 1.70	5.87 ± 1.34	4.92 ± 1.73	7.79***
DAG	5.92 ± 1.09	5.78 ± 1.10	6.03 ± 1.00	6.31 ± .72	1.17
IAH	2.57 ± .46	2.65 ± .38	2.71 ± .45	2.84 ± .13	2.87
IAG	2.48 ± .64	2.35 ± .61	2.65 ± .57	2.56 ± .37	3.46*
INH	5.88 ± 1.15	5.71 ± 1.13	6.03 ± 1.10	4.92 ± 1.73	2.87*
ING	5.79 ± 1.30	5.71 ± 1.15	5.92 ± 1.23	5.78 ± 1.79	.43

Note. \* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$ .

For the effects of work position on participants' implicit attitudes, results showed no significant difference in terms of IAH [ $F(3, 367) = 2.87, p = .06$ ]. However, results also indicated significant differences in terms of IAG among work positions [ $F(3, 367) = 3.46, p < .05$ ]. The Tukey test showed significant differences only between supervisory position ( $M = 2.48, SD = .64$ ) and managerial position ( $M = 2.65, SD = .57, p < .05$ ), and supervisory position ( $M = 2.35, SD = .61$ ) and general manager ( $M = 2.56, SD = .37, p$

< .001). For the effects of the work positions on participants' intention, results showed significant difference in terms of INH between different work positions [ $F(3, 367) = 2.87, p < .05$ ], and the Tukey test showed significant difference only between managerial position ( $M = 6.03, SD = 1.00$ ) and general manager ( $M = 4.92, SD = 1.73, p < .05$ ). However, results (Table 15) showed no significant difference concerning ING among work positions [ $F(3, 367) = .43, p = .73$ ]. To sum up, all results of the ANOVA and the Tukey about the effects of the restaurant type on all outcome variables are listed in Table 16.

Table 16. *Summary of Results about Effects of Work Positions*

	<b>ANOVA Results</b>	<b>Tukey Test</b>
<b>DAH</b>	Significant	Food service employee ( $5.70 \pm 1.21$ ) > supervisory position ( $4.97 \pm 1.70$ ), $p < .001$
<b>DAG</b>	Not Significant	
<b>IAH</b>	Not significant	
<b>IAG</b>	Significant	supervisory position ( $2.48 \pm .57$ ) < managerial position ( $2.52 \pm .61$ ), $p < .05$ supervisory position ( $2.48 \pm .57$ ) < general manager ( $2.79 \pm .36$ ), $p < .001$
<b>INH</b>	Significant	managerial position ( $5.92 \pm 1.22$ ) > general manager ( $5.78 \pm 1.79$ ), $p < .05$
<b>ING</b>	Not Significant	

# **CHAPTER 5 DISCUSSION**

## **5.1 Introduction**

This chapter discussed the findings of this study. Firstly, the results of testing hypotheses and objectives were summarized and discussed based on comparisons between the results of this study and those of previous studies. For the results of hypothesis testing in this study, the reasons why some hypotheses were not supported were explained, and implications were provided as well. In addition, other findings such as the impact of educational levels or work positions on outcome variables were discussed. Finally, the significances of the study were illustrated as well.

## **5.2 Results Discussion and Implications**

All hypotheses and some variables that may impact outcome variables have been tested in this study. Significant differences concerning only implicit attitude toward handwashing practices, implicit attitude toward glove use and intention of washing hands between groups and the educational level, restaurant type, and work position can impact outcome variables as well.

### **5.2.1 Discussion and Implications of Hypotheses Testing**

A total of 36 hypotheses were proposed in this study, and only 5 hypotheses (H3a, H4a, H6a, H6d, and H6f) were supported. To be more specific, there were no significant differences between the four groups in terms of direct attitude towards handwashing or glove use, but there was significant difference about implicit attitudes of handwashing and glove use between the hypocrisy group and the control group. In addition, the intention of glove use in all groups was significantly different than that of the control group. Based on the findings from this study, some implications were provided

accordingly.

#### ***5.2.1.1 Discussion and Implications of Results regarding DAH and DAG.***

For the results of testing, all hypotheses related to DAH and DAG (H1a–f & H2a–f) were not supported, which means there was no significant difference towards DAH and DAG between groups. Not finding any significant differences in this study may be due to the data collection method utilized (self-report), and similar results were found in previous hypocrisy studies assessing participants' direct attitudes by self-reports (e.g., Goldonowicz, 2014). In the study carried out by Goldonowicz (2014), researchers intended to use the “hypocrisy” strategy to impact participants' attitudes towards honesty and to decrease their cheating behaviors. All participants were clustered into four groups (only mindfulness, only commitment, hypocrisy group, and control group), and self-reporting was used to assess their attitudes towards engaging in cheating behaviors after utilizing the hypocrisy strategy. Results of this study showed no significant difference in attitudes towards cheating behaviors among the four groups. The study confirmed a limitation of self-reporting to assess participants' attitudes (Goldonowicz, 2014), similar to our study.

However, not finding any significant difference concerning DAH and DAG does not necessarily imply that the “hypocrisy” could not change participants' attitudes and intention towards handwashing or glove use. The reason of not causing any differences among the four groups in the results can be contributed to the method of assessment: self-report. The use of self-report data to evaluate food safety trainings has been doubted by some scholars due to the impact of social desirability bias (de Jong, Pieters, & Fox, 2010). In addition, Levy, Gidron, and Olley (2017) also revealed that participants may become dishonest when their direct attitudes are assessed by self-reports. Many studies

investigating food safety practices have shown that participants always overestimated their food practices significantly (e.g., Abbot et al., 2009; Jenner et al., 2006). Therefore, it is possible for some participants to over-rate their attitudes about handwashing and glove use in the questionnaire, causing no significant differences concerning DAH and DAG among the groups.

Based on this finding and discussion, the direct attitude is not recommended to be measured to assess the effectiveness of food safety intervention. In addition, this also confirmed the disadvantage of the self-report method to assess participants' attitudes and indicated the benefit of implicit attitude measurement to truly estimate participants' attitudes by comparing results between direct attitudes and implicit attitudes. Therefore, implicit attitude measurements such as IAT and RPFT should be highly promoted and extensively utilized in future studies.

#### ***5.2.1.2 Discussion and Implications of Results regarding IAH.***

For the results of all hypotheses about IAH, hypothesis 3a was supported, meaning there were significant differences between the hypocrisy group and the control group concerning implicit attitude towards handwashing. Since attitude represents the degree of an individual's evaluation towards certain behaviors (Ajzen, 1991), which is the significant predictor of behaviors, the significant differences in terms of attitude towards handwashing may reveal that the hypocrisy strategy can successfully change restaurant employees' attitudes towards handwashing, thereby improving restaurant food safety practices eventually. Therefore, this supported hypothesis uncovered the potentiality of adopting hypocrisy induction to change food workers' attitudes towards handwashing. In addition, the results showed that even the mean of implicit attitudes

towards handwashing from all groups was higher than the control group, but there was a statistically significant difference only between the hypocrisy group and the control group, which was consistent with results from previous hypocrisy studies (Dickson, 1992). In the study conducted by Dickson (1992), the “hypocrisy” strategy was utilized to encourage participants to conserve water. Shower time was measured in this study as the dependent variable, and results indicated significant difference only between the hypocrisy group and the control group.

The finding of our study may indicate that all three groups (only commitment, only mindfulness, and hypocrisy group) were motivated to have better attitudes towards handwashing to some extent by the strategy of hypocrisy, but the hypocrisy may have the strongest impact on individuals’ behaviors when both the mindfulness condition and commitment condition exist. Therefore, this finding also confirms two necessary conditions of hypocrisy: commitment and mindfulness. With a better understanding of the role of these two conditions, researchers can better design hypocrisy interventions. It is essential to develop both commitment and mindfulness interventions when using the hypocrisy strategy to improve food safety practices.

In addition, using the “hypocrisy” strategy can improve food workers’ attitudes towards handwashing practices. Some interventions under the “hypocrisy” principle could be carried out. For example, restaurants can encourage employees join various types of activities to promote handwashing, such as signing their names on flyers to promote handwashing and then discussing their failures in a focus group.

### ***5.2.1.3 Discussion and Implications of Results regarding IAG.***

For results of all hypotheses about IAG, similar to IAH, only hypothesis 4a was

supported. The results showed only significant difference concerning IAG between the hypocrisy group and the control group, which means the implicit attitude towards glove use in the hypocrisy condition was significantly better than that in the control condition. Similar to what has been stated above about the role of attitude in predicting behaviors, the significant difference towards glove use here also shows the possibility of using the “hypocrisy” strategy to change food workers’ glove use behaviors. Similar to the results of IAH, the significant difference towards IAG did not exist between other groups, which is consistent with results of the study conducted by Dickson (1992) again, confirming the necessity of both commitment and mindfulness conditions for causing the effect of hypocrisy.

Based on findings and the discussion above, the “hypocrisy” strategy could be used to improve restaurant employees’ attitudes towards glove use as well. Some interventions guided by the “hypocrisy” strategy could be developed and implemented by restaurant operators and professionals. For example, restaurant employees could be asked to give lectures about glove use to their colleagues and then fill in a self-check sheet about glove use. Results about IAG also highlighted the role of attitudes to influence food workers’ food safety practices. According to this, it is still essential to strengthen employees’ attitudes towards food safety practices via various methods such as workshops and lectures.

#### ***5.2.1.4 Discussion and Implications of Results regarding INH.***

Results showed no significant differences between four groups regarding INH, which implies that the “hypocrisy” strategy may not impact participants’ intention of handwashing. There has been some debate about the impact of the “hypocrisy” strategy

on people's intentions. Some studies contradicted our study, showing that people's intention was influenced by the "hypocrisy" strategy (e.g., Lee, 2016). For example, in one study by Lee (2016), the hypocrisy intervention was used to encourage participants to exercise, and the results of this study showed that the intention of doing exercise was significantly higher in the hypocrisy group than in the control group. However, results of some studies showed no impact of the "hypocrisy" strategy on changing people's intentions (e.g., Southard, 2016), which was consistent with our study. In Southard's (2016) study, the "hypocrisy" strategy was used to improve participants' intention of exercising, and the results showed no significant difference towards intention of exercising between the hypocrisy group and the control group.

The ceiling effect may explain why there is no difference in handwashing intention in our study, and this effect should be taken into consideration when interpreting outcomes to evaluate the effectiveness of the "hypocrisy" strategy. The ceiling effect occurs when the dependent variables reach their maximum value, which may prevent showing the effect of the independent variables on the dependent variables in the study (Cramer & Howitt, 2004). In this study, the mean of all participants' intention towards handwashing reached almost 6 ( $M = 5.9$ ;  $SD = 1.1$ ) out of a scale of 7, and the ceiling effect was very likely to happen on this outcome. According to Cramer and Howitt (2004), failing to recognize the possibility of a ceiling effect in a study may lead to the mistaken conclusion that the independent variable has no effect, so it is possible that the "hypocrisy" strategy did impact participants' intentions towards handwashing but the effects were not shown due to the ceiling effect. The ceiling effect happened in one previous hypocrisy study carried out by Aronson (1991). In that study,



hypocrisy was used to impact the intention of using condoms, but no differences of future intentions were noticed, and researchers blamed the ceiling effect (Aronson, 1991).

#### ***5.2.1.5 Discussion and Implications of Results regarding ING.***

Different from the hypotheses testing results of INH, significant differences of IHG were found between all groups and the control group, which suggests all participants in three conditions (only commitment condition, only mindfulness condition, and hypocrisy condition) may be motivated to use gloves. Testing results of hypotheses about INH were very similar to that of the study conducted by Stone (1994), which adopted the “hypocrisy” strategy to improve the intention of condom use.

Compared with the high mean of INH, the mean of ING was only 5.8 out of 7 for all participants, and it is less likely to have the ceiling effect. In addition, the different effects of training on handwashing intention and glove use intention can explain this finding. It may also suggest that the hypocrisy strategy is more useful to improve restaurant workers’ glove use practices than handwashing practices since it did improve their intention of using gloves. Based on the findings and discussion above, other interventions of food safety practices, such as workshop and food safety trainings, can be combined with the “hypocrisy” strategy to strengthen individuals’ intentions.

#### ***5.2.2 Discussion and Implications of Other Findings.***

Apart from testing all hypotheses, there are other findings from the study as well. The impact of educational level, restaurant type, and work position were tested and results showed that all these factors can influence certain outcome variables.

##### ***5.2.2.1 Discussion and Implications of the Educational Level.***

First of all, the educational level of participants did impact most outcome

variables (DAH, DAG, INH, and ING) but not IAH or IAG. Out of the expectation, participants with a higher educational level did not show a more positive attitude or higher intention towards handwashing and glove use. Interestingly, participants with a high school diploma or less showed better attitudes and intentions than participants with a bachelor's degree. There has been some debate about the impact of educational level on participants' food safety attitudes and intentions. Some studies (e.g., Cakirogu & Ucar, 2008; Sharif et al., 2013) showed that higher educational level could lead to more positive attitudes and higher intentions towards food safety practices, which was opposite from our study. For example, the food safety attitudes and practices of food handlers from military hospitals were evaluated by the self-report questionnaire in the study conducted by Sharif et al. (2013), and results indicated that the participants' attitudes and practice scores in the questionnaire varied significantly from their educational level, which means the scores increased with higher educational level. In addition, a study carried out in Turkey to determine employees' attitude towards hygiene showed participants' attitudes improved with higher educational level (Cakirogu & Ucar, 2008). However, this pattern of results, which is different from our study, can be explained. Since the size (75, 59, 22, and 202) of these groups with different educational levels was not equal, a Type I error is very likely, which is defined as the possibility of assuming difference between two groups when there is no difference (Cramer & Howitt, 2004).

Unlike the studies discussed above, some studies (e.g., Soares et al., 2011) indicated that participants with higher educational level did not show more positive food safety attitudes or higher intentions, which supports the results of our study. In the study carried out by Soares et al. (2011), researchers evaluated the level of knowledge,

attitudes, and practices of food safety by food handlers in a school in Brazil. Results suggested that improper food handling practices do not always result from a low level of education (Soares et al., 2011).

Based on the discussion above, we can conclude that the debate on the impact of educational level on employees' attitudes and intentions towards food safety practices is worthy of our attention, and this impact needs to be explored more deeply. In addition, controlling the relatively equal number of participants from groups with different educational levels should be taken into consideration in future studies.

#### ***5.2.2.2 Discussion and Implications of Restaurant Type.***

Restaurant type was found to be another factor that could impact some outcome variables. To be more specific, there were significant differences in terms of all outcome variables except INH. In general, participants working in fine dining restaurants had the best attitude and intention toward food safety practices, followed by those in casual dining restaurants, fast-food restaurants, and campus dining restaurants. The differences may lie in the fact that the standard of recruiting employees from fine dining restaurants may be much higher than other restaurants, and the fine dining restaurants may offer more food safety trainings as well, which can lead to more positive attitudes and higher intention of the employees working there. Some previous studies supported this assumption as well. For example, in the study conducted by McIntyre (2013) to examine food safety knowledge in British Columbia, results showed that participants from fine dining restaurants scored the highest in the survey, followed by those from fast-food restaurants. In addition, it was not surprising that the participants working in the campus dining had the worst attitudes towards food safety practices including handwashing and

glove use. Food in some establishments such as campus dining facilities was handled by many individuals who might not be qualified to handle the food (Osaili et al., 2017). Hiring many students without any previous food service experience may explain this pattern as well. In order to provide flexibility in staffing, campus dining facilities usually employ a large number of part-time student employees (Neumann, Stevens, & Graham, 2001). Also, many student employees work in campus dining facilities for only one or two semesters and leave for employment in other fields (Fiihr, 2001). Therefore, student employees may not have positive attitudes or intention towards food safety practices (Lin, 2003).

Based on the findings and discussion above, we can clearly see that food safety practices vary with the type of restaurant. Therefore, one type of food safety training cannot be utilized in general, and more interventions targeting food safety should be developed for participants working in different types of institutions. In addition, since campus dining employees' attitudes and intentions towards both handwashing and glove use behaviors were the most negative compared with other types, it is necessary for food safety professionals to put more effort into improving campus dining employees' attitudes and intentions towards food safety practices and creating interventions for them to improve their practices. More food safety trainings should be provided to student employees before they start work, which can raise their attitudes and intentions towards food safety practices. In addition, campus dining should more closely collaborate with the hospitality department and recruit more students with food service background and experience, which may improve the food safety practices of campus dining. Also, campus

dining could invite professors from the university to give lectures about food safety practices to employees.

### ***5.2.2.3 Discussion and Implications of Work Positions.***

In addition, work positions were found to impact some outcome variables including DAH, IAG, and INH. Exceeding our expectation, participants with higher positions did not show more positive attitudes or higher intentions towards food safety practices, but food service employees had more positive attitudes than supervisors, and managerial positions had higher intention than the director positions. This finding contradicts results of some previous studies investigating food safety practices (e.g., Glayton, Griffith, & Price, 2002; Green et al., 2005). In one study, Green et al. (2005) wanted to evaluate food workers' food preparation practices, and the results of this study indicated that managers washed their hands significantly more often than non-managers. In another study conducted by Glayton, Griffith, and Price (2002), both food handlers' beliefs and self-reported practices were investigated, and the results showed significant differences between managers and operative staffs about their self-reported practices, which means that managers reported they have more often conducted food safety practices including handwashing and glove use behaviors than employees without management responsibilities. However, researchers from the previous studies listed above simply categorized participants into a management group and a non-management group; they did not specify management employees into future levels such as manager level or director level.

Based on the results and discussion above, it concluded that researchers should not simply categorize participants into two levels (management and non-management)

but more levels (such as food service employee, supervisor, manager, and director) to compare their attitudes and intentions. In addition, different food safety trainings or interventions should be designed and implemented for employees with different work positions, targeting each group.

### **5.3 Significance of Study**

This is the first study that utilized the “hypocrisy” paradigm to improve restaurant employees’ food safety practices in the hospitality field, an innovation in the strategy of food safety. It was hypothesized that the hypocrisy group would have more significant differences in terms of all outcome variables than all other groups. Although results showed significant differences only between the hypocrisy group and the control group in terms of implicit attitudes towards handwashing and glove use, the “hypocrisy” strategy can influence employees’ attitudes and may impact their behaviors eventually. Therefore, after successfully testing the “hypocrisy” strategy in the experimental design, this strategy can be utilized to improve food workers’ attitudes and intentions towards food safety practices in the future. Since the effect of the “hypocrisy” strategy on changing people’s behaviors has been proven relatively long and stable (Stone & Fernandez, 2008), the new option “hypocrisy” strategy may improve restaurant employees’ behaviors better than previous strategies, thereby decreasing the chance of spreading foodborne illnesses by improper food safety practices. In addition, the result that the only significant difference was between the hypocrisy group and the control group was consistent with some previous research (Dickerson, 1992), indicating that the effect of “hypocrisy” may only work when both commitment and mindfulness exist. This finding also contributes to the better understanding and the literature pool of “hypocrisy.”

In addition, the “hypocrisy” strategy was found to impact participants’ glove use intention but not their handwashing intention. Results showed that the participants from all other groups had a significantly higher intention than the control group. According to the ANOVA test, reasons for these differences may be due to different effects of handwashing trainings and glove use trainings on behaviors. This may indicate that combining both glove use trainings and the “hypocrisy” strategy may boost food workers’ intention of using gloves.

Other than testing hypotheses, some factors that may impact participants’ food safety practices were found, such as educational levels, restaurant types, and work positions. However, the impact of educational levels and work positions did not meet our expectations: participants with higher educational levels and higher positions did not show more positive attitudes or higher intentions but more negative attitudes or lower intentions. In addition, participants working in fine dining restaurants and casual dining restaurants showed better attitudes and higher intention towards food safety practices than those in fast-food restaurants or campus dining facilities.

The measurement utilized to assess participants’ implicit attitudes is worthy of attention. Compared with previous food safety studies that investigated participants’ indirect attitudes towards food safety by asking indirect questions about food safety practices, a new measurement based on the “RPFT” and “I-CUTE” was used to assess participants’ implicit attitudes by letting them project the characters’ incoming actions in the picture. There are many advantages of this method. First of all, results would be more accurate compared with using the direct attitude measurement to assess participants’ attitudes. The results of four groups to assess participants’ direct attitudes did not show

any significant differences, but there were significant differences between the four groups when using the implicit measurement, which indicates that there may be some social bias of using direct attitude measurement, causing participants to hide their real opinions. Next, some implicit attitude measurements, such as IAT, demand accessibility to technology, which may need the help of computers or other expensive equipment to conduct tests (Levy et al., 2017), but the new measurement used in our study required no technology. The benefit of this new measurement could enable researchers and restaurant operators to easily assess attitudes of large populations.



# CHAPTER 6 CONCLUSION

## 6.1 Introduction

The last chapter wrapped up this study by talking about its limitations as well as making suggestions for the development of similar studies in the future.

## 6.2 Limitations and Suggestions for Future Studies

Like other studies, this study has several limitations. First of all, the method of data collection (online data collection) limited the representativeness and diversity of the sample in this study. The target population of this study was all food workers in the U.S. over 18 years old, but subjects who filled in this survey were only restaurant employees who had the access to the internet. To address this limitation, different data collection methods could be utilized including both online and on-site collection to gather a more representative sample. For example, researchers in future studies can recruit restaurant employees to fill in the questionnaire on site. Also, a larger sample size could be generated from different sites, which could increase the diversity of the sample.

Next, the effect of mindfulness and commitment may be impacted by the intervention utilized in the study. In most previous hypocrisy research, the intervention of mindfulness was either organizing a workshop to let participants talk about their past failures in public (e.g., Stone et al., 1994) or answering questions about past failures of conducting certain behaviors (e.g., Dickerson, 1992). For most commitment conditions, participants were required to make a commitment video (Stone et al., 1994) or to sign their names on a flyer in the scene. Because of some applicable issues, a similar intervention could not be used in this study. Therefore, signing an online flyer and completing a checklist were used for the intervention in the commitment and mindfulness

in this study, which may weaken the power of these conditions to cause the hypocrisy effect on participants. To eliminate this limitation, some new interventions based on previous hypocrisy studies are suggested to be used to a high extent for the commitment and mindfulness conditions about food safety in future studies. Since some researchers have proven that the effect will be stronger if the commitment happens in public (Stone, 2008), giving a lecture about food safety to peers or signing names on a real flyer are both good methods. For the mindfulness condition, a face-to-face interview about past failures of food safety practices or workshops about sharing experiences about failure with other participants would be beneficial approaches.

In addition, the change of participants' handwashing and glove use behaviors was not investigated directly via the observation; only participants' attitudes and intentions were assessed in this study. Therefore, observing the change of participants' behaviors to evaluate the effect of the "hypocrisy" strategy is highly recommended for future studies.

The method of self-reporting to measure participants' attitudes to evaluate the effectiveness of the "hypocrisy" strategy is one of the limitations in this study. Results of self-report in this study showed no significant difference between groups towards DAH and DAG, but significant differences of attitudes towards handwashing and glove use between groups did exist via another measurement. Self-reporting may impact the quality of assessing the effectiveness of food safety trainings such as the "hypocrisy" strategy in this study. To avoid this limitation, the implicit attitudes could be measured by some implicit attitude measurement to assess the real impact of food safety interventions in the future.

Lastly, participants' attitudes and intentions were assessed right after the

hypocrisy intervention in this study, which can only evaluate the short-term effect of this strategy. Combining the instant observations after the study and the follow-up observations would be strongly recommended for researchers to better test longevity of the “hypocrisy” strategy.

### **6.3 Conclusion**

Foodborne illness is still a significant issue in the United States, and the handlers’ improper food safety practices are still a large contributor of this problem. There is a long way to go to find an effective method to improve food workers’ food safety practices and prevent the spread of foodborne illnesses. This study revealed that the “hypocrisy” strategy can be used to improve food workers’ implicit attitudes towards both handwashing and glove use practices as well as glove use intention, which indicates that it can be applied extensively in food safety practices. Since this study is a pilot study that uses the “hypocrisy” strategy in the hospitality field, it has some limitations. This study can be applied as the foundation for other similar studies applying the “hypocrisy” strategy in the hospitality field, bringing more insights for future studies.

# APPENDIX A: Campus Institutional Review Board Exempt Approval Letter



**Institutional Review Board**  
University of Missouri-Columbia  
FWA Number: 0002876  
IRB Registration Numbers: 00000731, 00009014

482 McReynolds Hall  
Columbia, MO 65211  
573-882-3181  
irb@missouri.edu

January 24, 2019

Principal Investigator: Yidan Huang  
Department: Applied Soc Sci

Your IRB Application to project entitled Using a "hypocrisy" strategy to improve food safety practices in restaurant was reviewed and approved by the MU Institutional Review Board according to the terms and conditions described below:

IRB Project Number	2013623
IRB Review Number	244402
Initial Application Approval Date	January 24, 2019
IRB Expiration Date	January 24, 2020
Level of Review	Exempt
Project Status	Active - Exempt
Exempt Categories (Revised Common Rule)	45 CFR 46.104d(2)
Risk Level	Minimal Risk

The principal investigator (PI) is responsible for all aspects and conduct of this study. The PI must comply with the following conditions of the approval:

1. No subjects may be involved in any study procedure prior to the IRB approval date or after the expiration date.
2. All changes must be IRB approved prior to implementation utilizing the Exempt Amendment Form.
3. The Annual Exempt Form must be submitted to the IRB for review and approval at least 30 days prior to the project expiration date to keep the study active or to close it.
4. Maintain all research records for a period of seven years from the project completion date.

If you are offering subject payments and would like more information about research participant payments, please click here to view the MU Business Policy and Procedure:  
[http://bppm.missouri.edu/chapter2/2\\_250.html](http://bppm.missouri.edu/chapter2/2_250.html)

If you have any questions, please contact the IRB at 573-882-3181 or irb@missouri.edu.

Thank you,  
MU Institutional Review Board

## APPENDIX B: Food Safety Flyer

*Please use gloves as frequently as you should! If I can, so can you!*

*Please wash hands as frequently as you should! If I can, so can you!*

Please provide your initial if you agree with these statements!

Participant Initial: \_\_\_\_\_

## APPENDIX C: Self-check Survey

**Directions:** Please circle the option that best represents your honest opinion. This is not a test, there are no wrong answers.

Statement	Yes	No
1. Do you <b>always</b> wash your hands before working?	1	2
2. Do you <b>always</b> wash your hands with soap during working?	1	2
3. Do you <b>always</b> wash your hands with soap for over 10 seconds during working?	1	2
4. Do you <b>always</b> wash your hands before wearing gloves?	1	2
5. Do you <b>always</b> change your gloves frequently during working?	1	2
6. Do you <b>always</b> change gloves after touching the raw meat?	1	2
7. Do you <b>always</b> change gloves when the gloves were worn out?	1	2
8. Do you <b>always</b> change gloves when you touched something maybe contaminated (such as hair or equipment)?	1	2

## APPENDIX D: Survey Instrument

### *Screening questions*

1. Are you above 18 years old?
  - A. Yes (Please continue to answer the next question)
  - B. No (You are already screened out from this survey)
  
2. Are you currently working in the restaurant industry?
  - A. Yes (Please continue to answer the next question)
  - B. No (You are already screened out from this survey)

**This is a survey about your opinions towards food safety practices**

### Direct Attitude Measures

**Directions:** Please read each question and check the scale item best describes your response.

Statement	Strongly Disagree (1)	(2)	(3)	Neutral (4)	(5)	(6)	Strongly Agree (7)
<b>Section 1</b>							
1. Washing my hands properly at work is important to me.							
2. Washing hands before handling raw or cooked food reduces risk of food poisoning.							
3. It is necessary for me to wash my hands prior wearing gloves.							
4. It is important for me to wash hands after going to the restaurant room and back to work.							
5. It is necessary for me to wash my hands with soap for 10 to 15 seconds.							
6. Clean hand towels should be used to wipe hands							

after washing.							
7. Frequent hand washing helps to prevent foodborne diseases.							
8. Washing hands properly reduces risk of contamination.							
<b>Section 2</b>							
1. Changing gloves frequently at work is important to me.							
2. Using protective gloves can reduce the risk of food poisoning.							
3. It is necessary to change gloves regularly as work for me.							
4. It is important for me to change gloves after touching things have been contaminated. (e.g. equipment)							



## Implicit Attitude Measures

**Directions:** Please read each question and picture and check the response that can best describes your estimation.

### Section 1

1. When he is going to wash his hands, he found that there was no soap available near the handwashing sink. Customers are waiting for him to serve the food.

Under this situation, he is going to \_\_\_\_



- Serve the food directly without washing his hands.
- Wash his hands without soap.
- Let customers wait for him and go to get the soap. Then he will wash hands appropriately before serving customers.

2. She is working at the foodservice department in a daycare center. Today she came in late and noticed that many kids are waiting for her to make chicken salad. Under this situation, she is going to \_\_\_\_



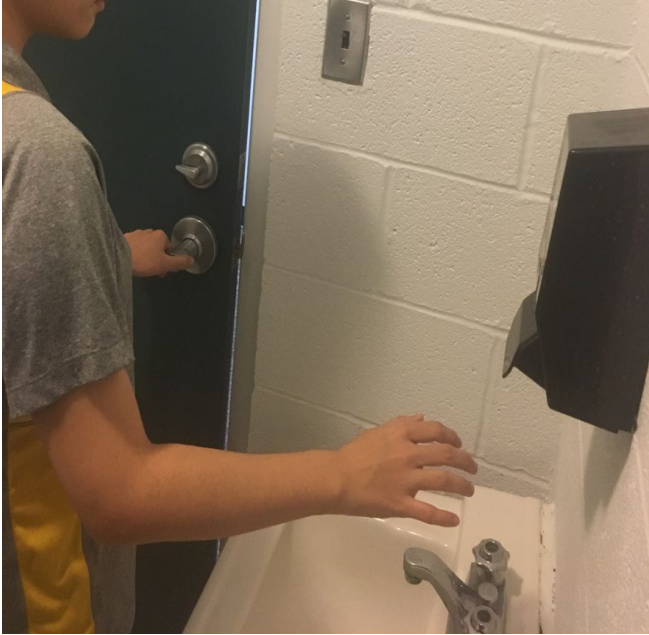
- Make the chicken salad directly with bare hands.
- Make the chicken salad with gloves.
- Wash her hands with soap and sanitize her hands before wearing gloves to make the chicken salad.

3. In the busy shift, he is about to wash his hands and a group of new customers just came in. He did not want customers to wait for him too long. Under this situation, he is going to \_\_\_\_



- Wash his hands without soap and take their orders right away.
- Wash his hands with soap for just few seconds and take their orders.
- Let customers wait for him and wash his hands with soap from 10 to 15 seconds using warm water and then dry his hands with paper towel.

4. She just came back from the restroom and is ready to handle food, and she is going to \_\_\_\_



- Back to work directly.
- Wash her hands using water.
- Wash her hands with soap for 10 to 15 seconds using warm water and then dry her hands with paper towel.

## Section 2

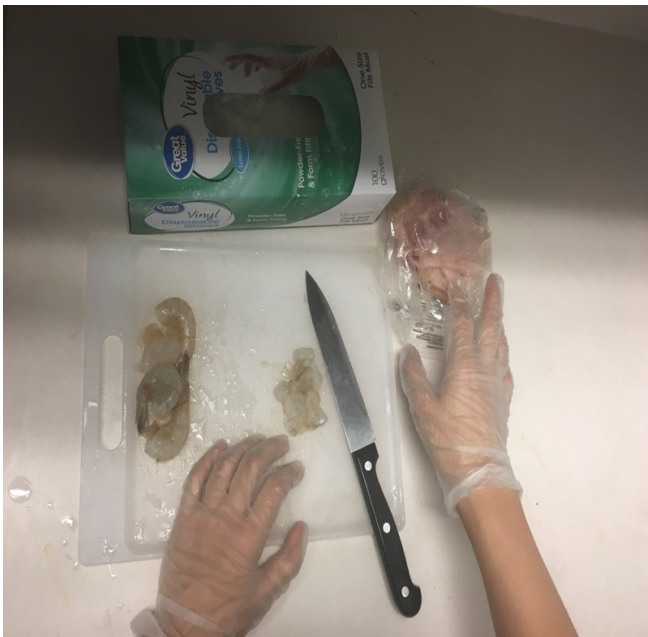
1. In the busy shift, he has been handling raw food at a cafeteria for four hours without changing gloves. Now, a group of new customers just came in, waiting for him to serve the sandwich. He did not want customers to wait for him and he is going to \_\_\_\_



- Take off his gloves and serve food with bare hands.
- Continue to use the same gloves and take their orders.
- Take off his gloves, wash and sanitize his hands, wear a pair of new gloves and serve them.

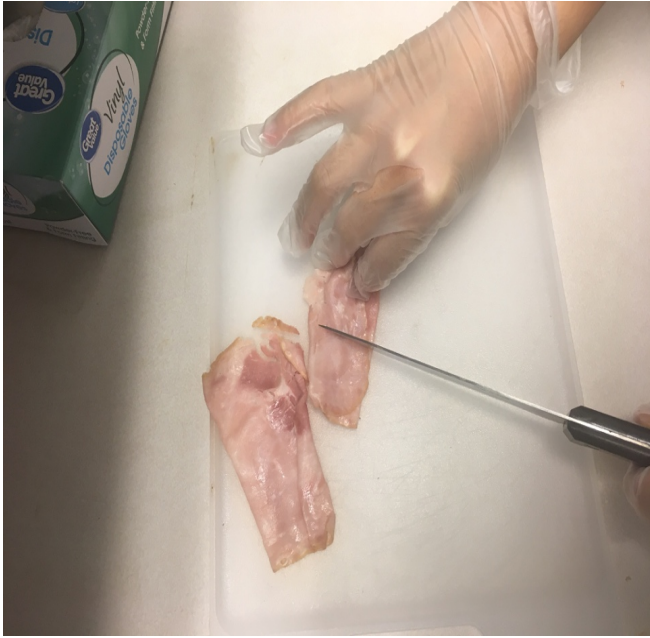
2. She just cut the raw shrimp and then will need to prepare the sandwich now.

She is going to \_\_\_\_



- Take off her gloves and prepare with bare hands.
- Continue to use the same gloves to prepare the sandwich.
- Take off her gloves, wash and sanitize hands, wear a pair of new gloves to prepare the sandwich.

3. He is making the sandwich for elementary schools and found a small hole in the gloves and he is going to \_\_\_\_



- Take off his gloves and prepare the sandwich with bare hands.
- Continue to use the same gloves to prepare the sandwich.
- Take off his gloves, wash and sanitize his hands, wear a pair of new gloves to prepare the sandwich.

4. She was preparing the sandwich with gloves and she noticed that she needs more chicken salad from the refrigerator. Now she is going to \_\_\_\_



- Continue use the same gloves to open the refrigerator and make the sandwich, no need to change.
- Take off her gloves to open the refrigerator and get more chicken salad and then put them back on to make sandwiches.
- Take off her gloves, clean her hands with soap and sanitizer, and then wear a pair of new gloves to make sandwiches.

### Behavioral Intention Measures

**Directions:** Please read each question and check the scale item best describes your response.

Statement	Strongly Disagree (1)	(2)	(3)	Neutral (4)	(5)	(6)	Strongly Agree (7)
<b>Section 1</b>							
1. I intend to wash my hands properly when preparing food in the future.							
2. I will make efforts to wash my hands before handling raw or cooked food to reduce risk of food poisoning in the future.							
3. I aim to wash my hands every time back from toilet to handle food in the future.							
4. I intend to wash my hands properly at work in the future.							
<b>Section 2</b>							
1. I intend to change my gloves appropriately at work in the future.							
2. I will make efforts to use protective gloves to reduce the risk of food poisoning risk at work in the future.							
3. I plan to change my gloves appropriately at work in the future.							

4.I aim to change my gloves after touching things have been contaminated at work in the future.							
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### Demographical information

**Directions:** Please read each question and check the answer best describes your response.

1. What is your gender?

- A. Male
- B. Female

2. What is your age?

- A. 18-20
- B. 21-30
- C. 31-40
- D. 41-50
- E. 50 and more

3. What is your ethnicity?

- A. Caucasian
- B. American Indian/Native American
- C. Black/African American
- D. Hispanic/Spanish American
- E. Asian/Pacific Islander
- F. Other: \_\_\_\_\_

4. What is the highest level of your education?

- A. High school diploma or less
  - B. Two-year college degree (Associate)
  - C. Four-year college degree (Bachelor)
  - D. Postgraduate studies
  - E. Other (please specify) \_\_\_\_\_
- 

6. What type of restaurant are you working at?

- A. Fast food restaurants (e.g. McDonald's)
- B. Campus/University dining (e.g. foodservice department on campus)
- C. Casual dining restaurants (e.g. Applebee's Olive garden)
- D. Fine dining restaurants (e.g. Ruth's Chris Steak house)

E. Other: \_\_\_\_\_

5. What is the total year of your experiences in foodservice industry?

- A. Less than 1 year
- B. More than 1 year
- C. 2-4 years
- D. 5 years and more
- E. 10 years and more

6. What is the title of your position?

- A. Foodservice employee
- B. Supervisory position
- C. Managerial position
- D. General manager/ Director
- E. Other: \_\_\_\_\_

7. Is your position required to handling foods?

- A. Yes
- B. No

8. Have you attended food safety trainings before?

a. If yes, who provided this training?

- A. Manager/supervisor
- B. ServSafe instructor
- C. Professor (It's a course requirement.)
- D. Others, please specify \_\_\_\_\_
- E. I have not attended before.

b. If yes, how frequent was it provided?

- A. Upon employment.
- B. Only when a complaint was received.
- C. Once a month.
- D. Once a year.
- E. I have not attended before.

c. If yes, what the topic of the training?

- A. Handwashing.
- B. Glove use.
- C. Both handwashing and glove use.
- D. Others, specify \_\_\_\_\_
- E. I have not attended before.

9. What is the size of the facility you are currently working in? (measured by the number of seats in the restaurant)

- A. Small size (0-100 seats).
- B. Middle size (101-200 seats).



C. Large size (Over 200 seats).

10. How many employees working in the facility you are currently working in?

A. Less than 10 employees.

B. 10 to 50 employees.

C. 51 to 100 employees.

D. More than 100 employees

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