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School Foodservice Employees' Perceptions of Practice: Differences by Generational Age and Hours Worked

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ABSTRACT

Purpose/Objectives

This study investigated the influences of school foodservice employees' age and average number of hours worked per week on perceived safe food handling practices, barriers, and motivators.

Methods

A bilingual survey (English and Spanish) was developed to assess reported food safety practices, barriers, and motivators to follow safe food handling behaviors. Perceptions of frequency of following listed food handling practices, importance of barriers to following safe food handling, and importance of motivating factors that encouraged safe food handling were rated using a 5 point Likert type scale. Demographic questions were also included on the survey.

Results

A total of 879 responses (response rate of 24.2%) was collected with 754 usable responses. The majority of participants were female (95%) and had received food safety training (98.2%). Overall, employees perceived most listed barriers and motivators as important or very important. However, depending on employees' age and average number of hours worked each week, significant differences in safe food handling practices and perceptions of the importance of barriers and motivators were found among groups.

Applications to Child Nutrition Professionals

Managers can ensure all employees perform safe food handling practices by customizing delivery of food safety messages to targeted generational groups.

Keywords: school foodservice workers; food safety practices; barriers; motivation; gender; work status

INTRODUCTION

More than 31 million children are provided with lunches each weekday through the National School Lunch Program (NSLP) administered by the U. S. Department of Agriculture (USDA) Food and Nutrition Service (USDA Food and Nutrition Service, 2013). School districts participating in the NSLP are required to have a food safety plan based on HACCP principles; yet there have been instances of outbreaks traced back to schools. One study found the level of implementation of school nutrition program food safety plans based on HACCP principles, required as of July 2006, varies (Stinson, Carr, Nettles, & Johnson, 2011). A U.S. General Accounting Office (GAO) (2003) study, conducted

prior to HACCP implementation, found 40 large outbreaks directly related to federal school meal programs with about half of these caused by improper food handling practices. As such, foodservice employees are one of the most important control points in ensuring food safety.

Researchers (Acikel, Ogur, Yaren, Gocgeldi, Ucar, & Kir, 2008; Finch & Daniel, 2005; Hislop & Shaw, 2009) have emphasized the importance of food safety training to enhance employees' safe food handling behavior. Some researchers have reported that increasing employees' food safety knowledge through training did not translate into changed practices (Almanza, Namkyung, Ismail, & Nelson, 2007; Byrd-Bredbenner, Maurer, Wheatley, Cottone, & Clancy, 2007; Dharod, Pérez-Escamilla, Bermúdez-Millán, Segura-Pérez, & Damio, 2004; Frash, Binkely, Nelson, & Almanza, 2005; Henroid & Sneed, 2004; Rowell, Binkley, Thompson, Burris, & Alvarado, 2013). Recent research suggests it is important to examine additional factors affecting employees' behavior changes, such as motivation and barriers to practicing safe food handling as well as demographic characteristics of the foodservice workforce. In particular, studies have examined generational differences and work status as important factors (Ellis, Arendt, Strohbahn, Meyer, & Paez, 2010; Lin & Sneed, 2005; Twenge, Campbell, Hoffman, & Lance, 2010).

Today four generations of employees: the Silent Generation (born in 1925-1945), the Baby Boomers (born 1946-1964), Generation X (1965-1981), and Generation Y (labeled "Generation Me" by Twenge et al., 2010) born between 1982 to 1999 are working in the foodservice industry. While there may be variations in years of birth and the names given to each of these age groupings, most researchers agree four generational groups exist, and that differences exist between the groups in terms of work values (Hansen & Leuty, 2012); work attitudes, such as centrality of work in life, perceived value of leisure, and work ethic (Twenge, 2010); psychological traits (Twenge & Campbell, 2008); and perceived person-organization fit (Cennamo & Gardner, 2008). This generational diversity has been identified as one of several trends influencing food safety in foodservice operations (Sneed & Strohbahn, 2008). A study by Ellis et al. (2010) found significant differences in motivational factors to follow safe food handling practices among different age groups of foodservice employees working in commercial and noncommercial operations. In particular, younger employees were more likely to consider extrinsic motivators, such as effective communications, reward, and resource availability, as more important than older employees in influencing them to practice safe food handling.

Employees' work status has been also identified as an important factor affecting food safety in foodservice organizations, particularly given the industry's significant employment of part-time employees. The effects of work status on a variety of aspects related to employment, such as job attitudes, management practices, and motivations, have been reported (Abidin, Arendt, & Strohbahn, 2013; Gakovic & Tetrick, 2003; Sobaih, Coleman, Ritchie, & Jones, 2011). Lin and Sneed (2005) found significant differences in reported safe food handling knowledge, attitudes, practices, and training between full time and student employees who worked less than 20 hours a week in university dining services. Their findings revealed full time employees had higher ratings on all safe food handling related factors. Thus, they concluded that managers should focus on student employees to ensure safe food handling practices are followed.

The purpose of this current study was to determine the influences of school foodservice employees' age and work status on reported practicing of safe food behaviors. Specific objectives were to 1) identify employees' reported safe food handling practices, motivators, and barriers, 2) examine how employees' ages impacted reported safe food handling practices, motivators, and barriers, and 3) investigate effects of number of hours worked on employees' reported safe food handling practices, motivators, and barriers.

METHODOLOGY

Instrument Development

A bilingual survey (English and Spanish) was developed to assess reported food safety practices, barriers, and motivators to follow safe food handling behaviors. The survey was based on literature reviews and previous studies with foodservice employees conducted by members of the research team, including surveys, observational and interview data (Ellis, et al., 2010; Arendt, Roberts, Strohbehn, Ellis, Paez, & Meyer, 2012). The first section of the survey asked respondents to assess how often they followed each of seven listed food handling practices using a 5-point Likert type scale (1 = never; 5 = always). Practices were those recommended in the *Food Code 2009* (U.S. Food and Drug Administration) such as "use of sanitizer after cleaning". The second section consisted of 17 barriers to handling food safely such as "the work place," or "lack of good habits". Respondents' rated their perceptions of the importance of each item using a 5-point Likert type scale (1 = not important; 5 = very important).

In the third section, respondents assessed the importance of 28 motivating factors that encouraged them to handle food safely, such as "being taught about food safety," and "feeling like I did a good job", using a 5-point Likert type scale (1 = not important; 5 = very important). Finally, 12 demographic questions were asked, such as age, gender, work status, and food safety training experiences using multiple choice response options. As part of a larger study, the developed instrument was pilot tested with 209 foodservice employees in the U. S. including 73 respondents from schools. Based on feedback from the pilot test, minor modifications to the instrument were made, such as specifying requested actions in the directions; segmenting response options for type of foodservice where currently employed; and correcting typographical errors.

Sample and Data Collection

The target population of this study was hourly foodservice employees working in school foodservice operations in the U. S. A random national sample of school foodservice directors was compiled from the School Nutrition Association's membership list and personal contacts. These school foodservice directors were contacted and asked to distribute the questionnaires to their hourly employees without supervisory responsibilities. The questionnaire was designed as a booklet. The back page was preprinted with return address and prepaid postage; respondents were able to tape the folded survey and return at their convenience. A total of 3,629 questionnaires were mailed to 26 districts with 879 responses collected, resulting in a response rate of 24.22%. After excluding 125 invalid questionnaires when supervisory responsibilities were noted, 754 responses were used for further analysis.

Data Analysis

Descriptive statistics were calculated and data analyzed using SPSS 19.0. Analysis of variance (ANOVA) was used to compare mean differences in respondents' reported safe food handling practices, perceived barriers and motivators to handle food safely among their age groups and by average number of hours worked a week.

RESULTS AND DISCUSSION

Sample Characteristics

Table 1 shows characteristics of the 754 hourly employee respondents. The age of more than half of respondents was between 41 to 60 years (55.80%) with 28.00% over the age of 60. The majority of respondents was female (95.00%) and completed the questionnaire in English (94.60%). More than 50% of respondents reported their work status as full time (54.00%).

Table 1. *Demographic Characteristics of School Foodservice Employees*

Characteristics	Frequency (n)	Percent (%)
Age range (n = 754)		
18 – 25 years	9	1.20
26 – 40 years	113	15.00
41 – 60 years	421	55.80
Over 60 years	211	28.00
Gender (n = 735)		
Female	698	95.00
Male	37	5.00
Average work hours (n = 726)		
Less than 10 hours each week	63	8.40
10-20 hours each week	122	16.20
21-30 hours each week	410	54.40
More than 30 hours each week	131	17.40
Work status (n = 732)		
Full-time	395	54.00
Part-time	336	45.90
Both	1	0.10
Years of foodservice experience (n = 735)		
< 1 year	27	3.70
1-3 years	82	11.20
4-7 years	170	23.10
8-12 years	177	24.10
13-20 years	156	21.20
> 20 years	123	16.70

Language at work (n = 781)		
English	718	91.90
Spanish	47	6.40
Other	16	2.10
Language at home (n=752)		
English	653	89.60
Spanish	69	9.50
Other	30	4.10

However, the percentage of respondents who reported an average of more than 30 work hours per week at the current operation was 17.40%, indicating part time and full time may be defined differently among districts, or respondents worked additional hours at another foodservice operation/location. Relatively few respondents had worked less than one year in foodservice (3.70%) while over half (62.00%) had worked 8 years or more. Almost 90% of all respondents reported using English both at work (91.90%) and home (89.60%); Spanish was noted as the language used most at work by 6.40% and at home by 9.50% of respondents.

Almost all respondents reported they had received food safety training (98.20%) (See Table 2). Five of seven topics listed on the questionnaire were selected by more than 90% of the participants: "cleaning and sanitizing" (95.40%), "handwashing" (94.40%), "temperature danger zone" (94.30%), "glove use" (92.50%), and "cross contamination" (92.00%). Not surprisingly, given increased prevalence of food allergies among school children, over 75% reported this as a training topic. The most common response to number of hours of food safety training received by nonsupervisory school foodservice staff each year was "3 to 5 hours" (25.10%), followed by "more than 10 hours" (20.80%) and 19.20 % reporting "only periodic training on-the-job". Results by respondents' age groups and reported average hours worked per week were analyzed.

Table 2. Food Safety Training Information for School Foodservice Employees		
	Frequency (n)	Percent (%)
Received food safety job training (n = 732)		
Yes	719	98.20
No	13	1.80
Training Topic		

Cleaning and sanitizing	699	95.40
Handwashing	692	94.40
Temperature danger zone	691	94.30
Glove use	678	92.50
Cross contamination	674	92.00
Health	621	84.70
Allergens	549	74.90
Other	37	5.00
Not sure	17	2.30
Maximum food safety training hours each year		
Only periodic training on-the-job	135	19.20
Less than 1 hour, formal training	20	2.80
1-2 hours	108	15.40
3-5 hours	176	25.10
6-10 hours	117	16.70
More than 10 hours	146	20.80

Age Groups

Reported safe food handling practices.

Table 3 shows respondents' reported frequency of each of the listed safe food handling practices (1 = never; 5 = always) by age groups. Generally, all employees, regardless of age, reported following safe food handling practices with means ranging from 2.30 for "come to work if sick" to 4.97 for "wash hands" in response to the question of "How often do you ...". Although there were some variations seen between age groups, there were no significant differences in reported frequency of safe food handling practices between different generations. Mean ratings of five listed food safety practices were higher than 4.00 (ranging from 4.44 to 5.00), except for two items: "come to work if sick," and "have customers with allergies". A reverse coding of the mean rating of "come to work if sick" would result in a 3.70 rating, which when compared to other reported safe food handling practices, would be lower. The lower reported practice could be due to availability or lack of sick days as part time staff in many foodservice operations do not qualify for benefits such as sick days. If employees do not work, they are not paid; for those with lower incomes, working while ill may be a necessity. The lower mean rating for the statement pertaining to customers with allergies is interesting given the increases among school-age children; however, students in middle

and high schools may not identify themselves as having allergies, or employees' specific job responsibilities may not involve interaction with them. For example, employees working in the dish room may not know which children have allergies.

Barriers to following safe food handling practices.

Overall, respondents rated 11 of the 16 barriers to following safe food handling practices at a mean of 4.00 or higher. These perceptions may be due to lack of experience or a sense of not wishing to complain. Table 3 shows different mean ratings of importance of barriers to safe food handling for all respondents and by different age groups. The item rated highest in importance was "don't think need to follow" with a mean of 4.41, and the barrier "afraid of co-worker's reactions" received the lowest ratings from all age groups (with perceived importance ranging from 2.22 to 2.87).

Employees in the youngest age category (between 18 and 25) generally gave lower ratings of importance than older age groups on most barriers to following safe food handling practices with exception of two items, "forgetfulness" and "work pace". Two of the food safety barriers, "don't know what to do" and "handwashing hurts hands" were perceived as significantly less important ($p < .05$) by employees age 18 to 25 years ($M = 3.67$ and 2.56 respectively) than those over the age of 60 years ($M = 4.23$ and 3.48 respectively).

Motivators to following safe food handling practices.

Table 3 also shows mean ratings of importance for safe food handling motivators by all respondents and by different age groups. Regardless of age, 23 of 27 listed motivators to following food safety practices were considered important with mean ratings of 4.00 or higher by all respondents and by each age group. Mean ratings by all respondents of the importance of safe food handling motivators ranged from 3.52 for "unsupportive work group" to 4.95 for "keeping customer safe," "thermometer to take temperature," "skills to handle food safely," and "having gloves available". A similar pattern of responses was seen between perceived safe food handling motivators and barriers, in that lowest mean ratings were from employees in the 18 to 25 years age group. The exception was for four motivators: "time savers," "keeping customers satisfied," "equipment that works," and "rewards on teamwork". These four items were rated the lowest (M ranged from 4.27 to 4.86) by employees between 26 to 40 years of age. Employees over 41 years of age (age groups of 41–60 and over 60) perceived all motivators as more important than younger groups.

Table 3. *School Foodservice Employees' Mean ratings of Food Safety Practices, Barriers, and Motivators among Different Age Groups*

Note: 5-point Likert type scale used with 1=Never; 5=Always for food safety practices;
5-point Likert type scale used with 1=Not important; 5=Very important for food safety barriers and motivators

	All	18-25 yrs	26-40 yrs	41-60 yrs	> 60 yrs
	<i>M ± SD</i>	<i>M ± SD</i>	<i>M ± SD</i>	<i>M ± SD</i>	<i>M ± SD</i>
Practices (n=715-737)					

Wash hands	4.97 ± 0.26	5.00 ± 0.00	4.98 ± 1.13	4.97 ± 0.25	4.95 ± 0.33
Keep area clean	4.87 ± 0.36	4.89 ± 0.33	4.94 ± 0.23	4.88 ± 0.34	4.86 ± 0.44
Keep food in safe temperature	4.83 ± 0.63	4.44 ± 1.33	4.78 ± 0.68	4.87 ± 0.57	4.81 ± 0.67
Use sanitizer	4.79 ± 0.59	5.00 ± 0.00	4.86 ± 0.42	4.80 ± 0.59	4.72 ± 0.66
Take temperatures	4.72 ± 0.81	4.56 ± 1.33	4.61 ± 0.97	4.80 ± 0.65	4.63 ± 0.97
Have customers with allergies	3.69 ± 1.33	3.00 ± 1.22	3.54 ± 1.38	3.71 ± 1.34	3.74 ± 1.30
Come to work if sick	2.30 ± 1.40	2.11 ± 1.17	2.31 ± 1.36	2.38 ± 1.46	2.14 ± 1.31
Barriers (n=686-716)					
Work pace	4.42 ± 1.16	4.56 ± 0.88	4.33 ± 1.13	4.41 ± 1.17	4.48 ± 1.15
Don't think need to follow	4.41 ± 1.33	2.89 ± 2.03	4.37 ± 1.31	4.41 ± 1.33	4.50 ± 1.27
Not enough supplies	4.39 ± 1.26	3.67 ± 1.73	4.45 ± 1.10	4.38 ± 1.27	4.40 ± 1.27
No rules	4.30 ± 13.4	3.56 ± 1.81	4.22 ± 1.30	4.34 ± 1.32	4.31 ± 1.38
Lack time	4.25 ± 1.24	4.11 ± 1.36	4.13 ± 1.18	4.28 ± 1.23	4.26 ± 1.29
Don't want to waste supplies	4.25 ± 1.33	3.44 ± 1.94	4.11 ± 1.33	4.26 ± 1.34	4.36 ± 1.27
Lack habits	4.19 ± 1.23	3.89 ± 1.69	4.31 ± 1.18	4.42 ± 1.24	4.50 ± 1.19
Can't find supplies	4.16 ± 1.33	4.00 ± 1.41	4.07 ± 1.36	4.20 ± 1.30	4.12 ± 1.36

Forgetfulness	4.15 ± 1.37	4.22 ± 1.39	4.02 ± 1.36	4.17 ± 1.35	4.16 ± 1.41
No supplies	4.03 ± 1.46	3.00 ± 1.80	4.02 ± 1.35	4.00 ± 1.50	4.16 ± 1.41
Don't know what to do*	4.01 ± 1.49	3.67a ± 1.80	3.70 ± 1.58	4.05 ± 1.49	4.23b ± 1.42
Too much work	3.74 ± 1.51	2.89 ± 1.62	3.47 ± 1.55	3.77 ± 1.51	3.86 ± 1.47
Too busy	3.60 ± 1.62	3.22 ± 1.48	3.31 ± 1.68	3.62 ± 1.61	3.76 ± 1.60
Losing my utensils/equipment	3.57 ± 1.63	2.56 ± 1.74	3.40 ± 1.63	3.56 ± 1.64	3.75 ± 1.57
Handwashing hurts hands*	3.23 ± 1.82	2.56a ± 1.74	2.83 ± 1.82	3.24 ± 1.81	3.48b ± 1.80
Afraid of co-worker's reactions	2.85 ± 1.70	2.22 ± 1.39	2.64 ± 1.69	2.90 ± 1.69	2.87 ± 1.72
Motivators (n=663- 748)					
Skills to handle food safely	4.95 ± 0.28	4.89 ± 0.33	4.90 ± 0.35	4.95 ± 0.29	4.96 ± 0.19
Having gloves available	4.95 ± 0.29	4.67 ± 1.00	4.90 ± 0.35	4.96 ± 0.29	4.98 ± 0.14
Thermometer to take temperature	4.95 ± 0.33	4.67 ± 1.00	4.93 ± 0.32	4.96 ± 0.29	4.95 ± 0.34
Keeping customers safe	4.95 ± 0.33	4.89 ± 0.33	4.87 ± 0.53	4.95 ± 0.33	4.98 ± 0.14
Enough towels and hand soap	4.94 ± 0.31	4.78 ± 0.67	4.90 ± 0.42	4.95 ± 0.30	4.97 ± 0.19
Being taught about food safety	4.93 ± 0.34	4.56 ± 1.01	4.89 ± 0.41	4.94 ± 0.36	4.97 ± 0.17
Food safety policies/procedures	4.93 ± 0.35	4.67 ± 1.00	4.88 ± 0.41	4.95 ± 0.25	4.94 ± 0.41

Satisfied customers	4.92 ± 0.34	4.67 ± 1.00	4.86 ± 0.44	4.93 ± 0.33	4.94 ± 0.24
Food safety information	4.92 ± 0.36	4.56 ± 1.33	4.89 ± 0.35	4.92 ± 0.37	4.95 ± 0.21
Keeping customers satisfied	4.91 ± 0.37	5.00 ± 0.00	4.86 ± 0.44	4.93 ± 0.36	4.90 ± 0.36
Equipment that works	4.91 ± 0.39	5.00 ± 0.00	4.86 ± 0.10	4.92 ± 0.40	4.91 ± 0.35
Serving good foods	4.90 ± 0.45	4.78 ± 0.67	4.86 ± 0.48	4.92 ± 0.40	4.88 ± 0.53
Training on safe food handling	4.89 ± 0.44	4.75 ± 0.46	4.82 ± 0.49	4.90 ± 0.43	4.89 ± 0.42
Feeling like I did a good job	4.87 ± 0.53	4.67 ± 0.71	4.73 ± 0.71	4.89 ± 0.51	4.91 ± 0.42
Not harming the customer	4.87 ± 0.55	4.22 ± 1.56	4.84 ± 0.48	4.87 ± 0.57	4.90 ± 0.45
Workplace does not tolerate unsafe handling	4.86 ± 0.55	4.44 ± 1.33	4.81 ± 0.60	4.86 ± 0.54	4.89 ± 0.46
Supervisor to explain what is expected	4.83 ± 0.55	4.56 ± 1.01	4.69 ± 0.81	4.85 ± 0.51	4.89 ± 0.41
Putting myself in the customers' shoes	4.77 ± 0.67	4.67 ± 1.00	4.71 ± 0.64	4.79 ± 0.69	4.78 ± 0.65
Nice looking menu item	4.66 ± 0.80	3.86 ± 1.68	4.55 ± 0.91	4.67 ± 0.77	4.72 ± 0.75
I'll eat the food too	4.66 ± 0.92	4.13 ± 1.13	4.64 ± 0.94	4.63 ± 0.96	4.73 ± 0.80
Rewards on teamwork	4.56 ± 0.92	4.63 ± 0.74	4.48 ± 0.92	4.62 ± 0.85	4.49 ± 1.03
Time savers	4.55 ± 0.93	4.50 ± 1.41	4.27 ± 1.14	4.60 ± 0.87	4.60 ± 0.89

Rewards on following rules	4.36 ± 1.17	4.25 ± 0.89	4.32 ± 1.15	4.38 ± 1.14	4.35 ± 1.24
No reward on safe food handling behaviors	3.75 ± 1.58	3.44 ± 1.24	3.69 ± 1.60	3.73 ± 1.56	3.83 ± 1.61
Health inspector who doesn't make me handle food safely	3.75 ± 1.68	3.38 ± 1.69	3.50 ± 1.69	3.77 ± 1.69	3.88 ± 1.67
No food safety rules	3.75 ± 1.68	2.63 ± 1.85	3.49 ± 1.70	3.79 ± 1.66	3.88 ± 1.69
Unsupportive work group	3.52 ± 1.64	2.88 ± 1.64	3.23 ± 1.63	3.52 ± 1.64	3.73 ± 1.64

* Statistically significant difference between groups ($p < .05$)

a Mean rating different from that of > 60 years group

b Mean rating different from that of 18-25-year-olds

However, none of these differences was statistically significant. The high mean rating of importance of the motivator "keeping customer safe" suggests school foodservice staff are deeply connected to the students they serve and view safe handling as important in keeping their customers safe. Motivators related to rewards, health inspectors, unsupportive work group, and food safety rules, which were considered extrinsic motivators in the Ellis et al. (2010) study, were considered relatively less important in this study. No significant generational differences were found. All participants in this study perceived extrinsic motivators related to "resources" (e.g., availability of thermometers, towels, gloves, and equipment, food safety information) as highly important to practicing safe food handling whereas Ellis et al. (2010) findings' were that intrinsic motivators such as "keeping customers safe" and "satisfied customers" had higher ratings among all employees' age groups. The high rating by the 18-26 age group in this study (albeit the category with the fewest number of respondents) could be due to a sense of protectiveness, particularly if school foodservice workers also were young parents.

Hours Worked

Differences between respondents grouped by reported average number of hours worked at the school foodservice each week were also analyzed. Significant differences were found between hours worked and employees' self reported food handling practices, as well as perceptions of the importance of barriers and motivators (Table 4). This finding is consistent with previous research that has found those with part time work status may feel less engaged and less accountable toward food safety (Ellis et al., 2010). However, interpretation of findings from this study should consider that only approximately 25% of respondents worked 20 or fewer hours per week while the remaining three-fourths worked 21 hours or more at the school foodservice.

Table 4. School Foodservice Employees' Mean Ratings for Food Safety Practices, Barriers, and Motivators Based on Average Number of Hours Worked per Week

Note: 5-point Likert type scale used with 1=Never; 5=Always for food safety practices;

5-point Likert type scale used with 1=Not important; 5=Very important for food safety barriers and motivators

	All	<10 hrs	10-20 hrs	21-30 hrs	> 30 hrs
	<i>M ± SD</i>	<i>M ± SD</i>	<i>M ± SD</i>	<i>M ± SD</i>	<i>M ± SD</i>
Practices (n=715-737)					
Wash hands	4.97 ± 0.26	5.00 ± 0.00	4.93 ± 0.43	4.97 ± 0.24	4.98 ± 0.15
Keep area clean	4.87 ± 0.36	4.94 ± 0.25	4.87 ± 0.48	4.89 ± 0.34	4.89 ± 0.31
Keep food in safe temperature	4.83 ± 0.63	4.86 ± 0.66	4.66 ± 0.98	4.89 ± 0.41	4.83 ± 0.73
Use sanitizer*	4.79 ± 0.59	4.94 ^{ac} ± 0.25	4.76 ± 0.83	4.81 ^d ± 0.51	4.76 ^d ± 0.60
Take temperatures*	4.72 ± 0.81	4.82 ± 0.77	4.46 ^a ± 1.22	4.78 ^b ± 0.65	4.72 ± 0.81
Have customers with allergies*	3.69 ± 1.33	3.67 ± 1.43	3.26 ± 1.41 ^a	3.82 ± 1.27 ^b	3.66 ± 1.34
Come to work if sick	2.30 ± 1.40	2.50 ± 1.59	2.24 ± 1.36	2.26 ± 1.38	2.41 ± 1.43
Barriers (n=686-716)					
Work pace*	4.42 ± 1.16	4.76 ^{ab} ± 0.76	4.15 ^d ± 1.43	4.43 ^d ± 1.13	4.43 ± 1.10
Don't think need to follow*	4.41 ± 1.33	4.61 ^b ± 1.12	4.06 ^d ± 1.63	4.43 ± 1.31	4.51 ± 1.16
Not enough supplies	4.39 ± 1.26	4.61 ± 1.07	4.12 ± 1.52	4.39 ± 1.24	4.50 ± 1.08

No rules*	4.30 ± 13.4	4.64b ± 1.03	4.04d ± 1.59	4.30 ± 1.34	4.35 ± 1.22
Lack time	4.25 ± 1.24	4.39 ± 1.07	3.93 ± 1.50	4.33 ± 1.17	4.25 ± 1.22
Don't want to waste supplies	4.25 ± 1.33	4.39 ± 1.26	4.04 ± 1.56	4.27 ± 1.30	4.35 ± 1.19
Lack habits	4.19 ± 1.23	4.56 ± 1.15	4.07 ± 1.52	4.46 ± 1.17	4.53 ± 1.06
Can't find supplies	4.16 ± 1.33	4.23 ± 1.38	3.98 ± 1.51	4.17 ± 1.30	4.24 ± 1.20
Forgetfulness	4.15 ± 1.37	4.36 ± 1.28	4.09 ± 1.51	4.10 ± 1.38	4.28 ± 1.21
No supplies	4.03 ± 1.46	3.97 ± 1.57	3.77 ± 1.67	4.08 ± 1.42	4.17 ± 1.29
Don't know what to do	4.01 ± 1.49	4.31 ± 1.49	3.89 ± 1.59	3.97 ± 1.52	4.27 ± 1.26
Too much work	3.74 ± 1.51	3.48 ± 1.66	3.57 ± 1.63	3.77 ± 1.48	3.95 ± 1.37
Too busy	3.60 ± 1.62	3.76 ± 1.59	3.55 ± 1.67	3.53 ± 1.65	3.81 ± 1.46
Losing my utensils/equipment*	3.57 ± 1.63	4.00 ± 1.48	3.40 ± 1.70	3.50 ± 1.65	3.76 ± 1.51
Handwashing hurts hands	3.23 ± 1.82	3.59 ± 1.80	3.32 ± 1.78	3.09 ± 1.84	3.32 ± 1.75
Afraid of co- worker's reactions*	2.85 ± 1.70	3.14 ± 1.79	2.76 ± 1.76	2.66c ± 1.66	3.25a ± 1.63
Motivators (n=663- 748)					
Having gloves available	4.95 ± 0.29	4.97 ±0.18	4.91 ± 0.47	4.95 ± 0.26	4.96 ± 0.23
Skills to handle food safely	4.95 ± 0.28	5.00 ±0.00	4.93 ± 0.43	4.94 ± 0.25	4.94 ± 0.24

Keeping customers safe	4.95 ± 0.33	5.00 ±0.00	4.88 ± 0.51	4.95 ± 0.33	4.96 ± 0.19
Thermometer to take temperature	4.95 ± 0.33	5.00 ±0.00	4.89 ± 0.51	4.96 ± 0.30	4.93 ± 0.28
Enough towels and hand soap	4.94 ± 0.31	5.00 ±0.00	4.90 ± 0.47	4.94 ± 0.30	4.95 ± 0.23
Being taught about food safety	4.93 ± 0.34	4.97 ±0.26	4.91 ± 0.45	4.93 ± 0.36	4.95 ± 0.23
Food safety policies/procedures	4.93 ± 0.35	4.94 ± 0.31	4.96 ± 0.24	4.93 ± 0.36	4.94 ± 0.27
Satisfied customers*	4.92 ± 0.34	4.98a ±0.13	4.91 ± 0.49	4.90d ± 0.35	4.96 ± 0.20
Food safety information	4.92 ± 0.36	4.95 ±0.28	4.92 ± 0.46	4.92 ± 0.37	4.92 ± 0.28
Keeping customers satisfied	4.91 ± 0.37	5.00 ±0.00	4.86 ± 0.55	4.92 ± 0.32	4.87 ± 0.42
Equipment that works*	4.91 ± 0.39	5.00b ±0.00	4.85d ± 0.61	4.94 ± 0.27	4.90 ± 0.30
Serving good foods	4.90 ± 0.45	4.83 ±0.62	4.87 ± 0.53	4.90 ± 0.44	4.94 ± 0.24
Training on safe food handling	4.89 ± 0.44	4.92 ±0.33	4.87 ± 0.52	4.90 ± 0.40	4.87 ± 1.40
Feeling like I did a good job	4.87 ± 0.53	4.92 ±0.33	4.83 ± 0.69	4.87 ± 0.51	4.88 ± 0.41
Not harming the customer	4.87 ± 0.55	4.90 ±0.54	4.86 ± 0.67	4.87 ± 0.52	4.87 ± 0.40
Workplace does not tolerate unsafe handling	4.86 ± 0.55	4.83 ± 0.75	4.87 ± 0.50	4.85 ± 0.56	4.89 ± 0.34
Supervisor to explain what is expected*	4.83 ± 0.55	4.95ac ±0.22	4.84 ± 0.56	4.81d ± 0.60	4.82d ± 0.48

Putting myself in the customers' shoes	4.77 ± 0.67	4.84 ±0.66	4.74 ± 0.82	4.78 ± 0.65	4.79 ± 0.54
Nice looking menu item	4.66 ± 0.80	4.85 ±0.52	4.64 ± 0.91	4.66 ± 0.81	4.61 ± 0.73
I'll eat the food too	4.66 ± 0.92	4.80 ±0.62	4.67 ± 0.89	4.67 ± 0.89	4.51 ± 1.13
Rewards on teamwork	4.56 ± 0.92	4.67 ±0.87	4.74 ± 0.66	4.53 ± 0.95	4.59 ± 0.84
Time savers	4.55 ± 0.93	4.72 ± 0.74	4.44 ± 1.12	4.53 ± 0.96	4.63 ± 0.71
Rewards on following rules	4.36 ± 1.17	4.48 ±1.07	4.52 ± 1.05	4.30 ± 1.21	4.34 ± 1.17
No reward on safe food handling behaviors	3.75 ± 1.58	3.90 ±1.63	3.76 ± 1.59	3.74 ± 1.59	3.70 ± 1.59
No food safety rules	3.75 ± 1.68	4.22 ±1.48	3.56 ± 1.75	3.75 ± 1.70	3.63 ± 1.66
Health inspector who doesn't make me handle food safely	3.75 ± 1.68	4.14 ±1.56	3.51 ± 1.78	3.75 ± 1.68	3.74 ± 1.66
Unsupportive work group	3.52 ± 1.64	3.83 ±1.65	3.71 ± 1.65	3.38 ± 1.64	3.59 ± 1.62

* Statistically significant difference between groups ($p < .05$)

a Mean rating different from that of 21-30 hours worked

b Mean rating different from that of 10-20 hours worked

c Mean rating different from that of > 30 hours worked

d Mean rating different from that of < 10 hours worked

Reported safe food handling practices.

In general, all employees reported that they follow listed safe food handling practices frequently with mean ratings for five of seven food safety practices ranging from 4.46 to 5.00 (5 =Always). In particular, the group working less than 10 hours a week reported higher frequency in following five safe food handling practices than those working 10 to 20 hours per week, 21–30 hours per week, or those working more than 30 hours per week. The practice reported as done most frequently by all work hour categories was "wash hands" with means ranging from 4.93 to

5.00. A significant difference was found between groups for reported frequency of having customers with allergies. Those who worked more than 20 hours per week (21 – 30 hours or more than 30 hours) indicated they more frequently had customers with allergies than those working less than 20 hours per week (10–20 or less than 10). This difference could be attributed to work responsibilities; those with fewer hours may have less student contact or work as a district "floater", therefore not realizing whether there are children with allergies in the units.

Barriers to following safe food handling practices.

Generally, the group working less than 10 hours a week gave higher ratings of importance to most of the listed safe food handling barriers compared to those in other work hour groups. In particular, there were significant differences between mean ratings of importance for five barriers to following safe food handling practices; "afraid of co-worker's reactions," "losing my utensils/equipment," "work pace," "no rules," and "don't think need to follow". Except for the item, "afraid of co-worker's reactions," respondents working less than 10 hours a week had significantly higher ratings of importance (*M* ranging from 4.00 to 4.76), whereas those working 10 to 20 hours had the lowest ratings (*M* ranging from 3.40 to 4.15). This result suggests that those working fewer hours may have less awareness of day to day operational infrastructure or availability or location of supplies, thus a sense these items were more important. Or those working fewer hours may give greater attentiveness to "missing pieces" or tools needed to practice food safety compared to those who spend more time in the facility and may become inured to these barriers.

Those working less than 10 hours per week rated the barrier, "afraid of co-worker's reactions", as significantly more important than respondents working 10–20 hours or 21-30 hours, but less important than those who worked more than 30 hours. These findings suggest the influence of a work culture on perceptions related to safe food handling. Those present a greater amount of time may have a greater sense of control or may be workers with more seniority. Seniority is often linked to greater influence; thus, these ratings of importance of the social dynamic on practicing safe food handling make sense.

Motivators to following safe food handling practices.

Significant differences existed between mean ratings based on hours worked per week and the importance of three motivator items: "supervisor to explain what is expected," "equipment that works," and "satisfied customers". Those working less than 10 hours a week perceived these three items as very important (*M* ranging from 4.95 to 5.00). This group also rated "importance of supervisors explaining expectations" as significantly higher than others (See Table 4). These differences may be due to tenure with the work organization or due to familiarity with the operation; those working more hours may have an understanding of expectations due to past communications, corrections or coaching.

CONCLUSIONS AND APPLICATION

This research examined hourly school foodservice employees' reported frequency of safe food handling practices and their perceptions of barriers and motivators to following those practices. In particular, this research focused on whether employees' perceptions of food safety practices, barriers and motivators differed by age and average hours worked per week and whether those differences were significant.

Overall, most respondents (98.2%) reported that they had received food safety job training. Training topics related to three risk factors identified by the U.S. FDA (2009) (improper holding temperature/time, poor personal hygiene, and cross contamination) appeared to be well covered through the training. Allergen training was reported as

having been covered in their training by almost 75% of respondents, which is not surprising considering increases in reported numbers of children with food allergies.

In terms of frequency of following safe food handling practices, respondents reported they always or almost always abided by food safety practices (e.g., wash hands, keep area clean, keep food at a safe temperature), suggesting they are knowledgeable about best practices and appropriate procedures. However, one limitation of this study or any survey findings is the self-reported data; observational studies can correct for bias.

Regardless of age and average number hours worked, most of the listed barriers were perceived as important (4.00 or higher on a 5.00 scale) in preventing safe food handling. The barrier "afraid of co-worker's reaction" was the only variable with a mean rating of less than 3.00 out of 5.00. However, there was a significant difference in this item relative to average number of hours worked per week; employees working more than 30 hours a week considered co-worker's reactions as important. This finding suggests employees working more hours seemed to care more about relationships with co-workers and the community at work than those working fewer hours. Organizational citizenship studies have supported this contention that increased work time leads to greater sense of affiliation and cooperation.

Significant differences in employees' perceived importance of some barrier items were found based on employee age. Results showed significant differences in the barrier items "don't know what to do" and "handwashing hurts hands" between the youngest employee group (18-25 years) and the oldest employee group (over 60 years). The mean ratings of importance of these two barriers increased with employee age, suggesting older employees better recognize the need for clear instructions. The higher ratings of importance of the barrier "handwashing hurts hands" by older workers may be a result of drying skin due to natural aging processes. Although perceived importance of this item as a barrier ranged from 2.56 to 3.48 across the age groups, it is worth noting that employees may fail to wash hands when needed because of the pain, despite the fact that handwashing is one of the most important practices in preventing foodborne illness. Managers can assist in reducing handwashing needs by reconfiguring job responsibilities within the organization. For example, two employees might be assigned to the dish room area with one given the responsibility for loading the dish machine and the other unloading clean dishware, thus removing the need to wash hands between handling of soiled and clean dishes.

Significant differences in mean ratings of some barrier items to handling food safely ("work pace," "no rules," and "don't think need to follow") were also found based on average number of hours worked, although mean ratings were high across all groups (4.00 or higher on 5.00 scale of importance). In particular, employees working less than 10 hours gave the highest mean ratings to all three items. These findings emphasize the importance of improving work efficiencies as a way of addressing time pressures. Managers can assist workers in improving productivity by reorganizing work areas or storage of items frequently used by one group of staff. Or in-service trainings can help employees develop planning and organizational skills to dovetail tasks and work more efficiently. Also, by monitoring employees' performance and communicating openly with them, managers could provide constructive feedback to correct inefficient procedures and increase productivity. The fact that the highest ratings on the barrier items "no rules" and "don't think need to follow" came from employees working fewer hours indicates those employees would benefit from food safety training and a better sense of the work environment. A work culture, which can be defined as "the way we do things here", that supports food safety is emerging as an important factor affecting employees' safe food handling practices (Abidin, Arendt, & Strohbehn, 2013; Larson, Early, Cloonan, Surgue, & Parides, 2000). Given that all employees viewed barriers of "no rules" and "don't think need to follow" as important, those in charge of school foodservices should be attentive to this issue. Development of clear expectations and procedures to recognize those who do follow work rules and discipline of those who do not can

contribute to a safe food culture. Written procedures and policies serve as a way to communicate to staff expectations regarding their performance.

Overall, respondents rated 23 of 27 items motivating them to follow safe food handling practices as important ($M = 4.00$ or higher); twelve of the motivations had mean ratings of 4.90 or greater. These 12 items fall into three categories: 1) Customer-oriented attitudes (e.g., "keeping customers safe," "satisfied customers," "keeping customers satisfied"), 2) food safety knowledge (e.g., "skills to handle food safely," "being taught about food safety," "food safety information"), and 3) food safety tools and equipment (e.g., "thermometer to take temperature," "having gloves available," "enough towels and hand soap"). Customer-oriented attitudes indicate that employees feel a perceived responsibility to satisfy customers or ensure their safety, which encourages them to engage in food safety behaviors. Considering the importance of customer-oriented attitudes, managers should attempt to strengthen and support such attitudes by creating a customer-oriented work culture that emphasizes the purpose and importance of child nutrition program. With food insecurity a national concern, the contribution employees make to the health and learning readiness of school age children should be communicated to them.

The second group of highly rated items concerns the importance of increasing employees' food safety knowledge. To achieve this, managers could identify specific food safety practices of concern in their operation or district and in-service training to address these needs. Standard operating procedures (SOPs) for efficient and safe food handling help managers communicate to employees why they should handle food safely and how to do so; these SOPs frame the workplace culture. SOPs should be a "building block" of a district's HACCP based food safety plan. Templates of SOPs are readily available at www.iowahaccp.iastate.edu or <http://healthymeals.nal.usda.gov/resource-library/food-safety/hazard-analysis-critical-control-points-haccp>. Finally, sufficient and appropriate tools and equipment should be available to support employees' safe food handling practices. Managers should monitor what tools and equipment are required or lacking and ensure they are ready for employee use. They should also continually inform employees of the availability of these tools and equipment to encourage their use through SOPs and coaching.

While no significant differences were found in employees' perceived importance of motivators based on age, there were significant differences found in some motivators depending on average number of hours worked per week. Results show that employees working less than 10 hours gave higher ratings than other groups to three items: "supervisor to explain what is expected," "equipment that works," and "satisfied customers." To address the importance of these motivators for this group, managers could clearly explain what they expect of employees, emphasizing the importance of handling food safely. Also, as mentioned earlier, building a customer-oriented culture and providing adequate equipment for food safety performance improvement would be beneficial.

Results from this study emphasize the importance of 1) offering clear directions or instructions to help employees follow safe food handling practices through communication and food safety training, 2) providing sufficient and appropriate resources necessary to practice food safety behaviors, and 3) building a food safety-oriented culture. Findings from this study show that employees of various ages and work status do share some similar views regarding barriers or motivators to practicing safe food handling; yet there are clear differences for certain items and relative perceived importance. Therefore, managers working with a diverse workforce should tailor messages to ensure all employees practice safe food handling.

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