

AN INVESTIGATION OF COLLEGE AND UNIVERSITY FOODSERVICE ADMINISTRATORS' LEVEL OF AGREEMENT ON POTENTIAL INFLUENCING FACTORS ON SUSTAINABLE FOOD WASTE MANAGEMENT

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ABSTRACT

A national survey to determine college and university foodservice administrators' level of agreement on statements regarding food waste management was developed based on focus group results. Sixty-three college/university foodservice administrators participated in either an online or mailed survey. Administrators mostly disagreed with statements describing barriers to food waste management. However, they agreed they had limited space to store food for donation. Respondents from contract-managed facilities and those serving a higher number of meals agreed more strongly on potential liability issues related to food donation. To increase facilities' donation of leftover food, storage space and liability issues must first be addressed.

Keywords: food waste management, college and university foodservice operations, liability, type of management, number of meals served

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INTRODUCTION

Although the Environmental Protection Agency (EPA) has made significant improvements in municipal solid waste management, food waste management remains a challenge. The total amount of solid waste peaked in 2007 (255 million tons [MT]) and decreased by 4.6 % (244 MT) in 2009. In 2010, a total of 250 MT of municipal solid waste was generated in the United States (EPA, 2011). The EPA (2006) reported that the total amount of food waste had increased by 6.5% in 2010 (34,760 kilotons [KT]) since 2007 (32,630 KT). More than one third of this solid waste (85 MT) was recycled, whereas 2.8% of food waste (970 KT) was recycled and/or composted in 2010.

Discarding edible food is considered a significant waste of money and energy. Anthropologist Timothy W. Jones (2005) reported that 14% of food was within expiration dates. This equates to wasting \$590 worth of food annually for a family of four and a total of \$90 billion per year nationally: \$30 billion from retail business, \$20 billion from the farming industry, and \$40 billion from households (Jones, 2005). Considering the fact that 28,510 KT of food was wasted in 2005 (EPA, 2006), and the Consumer Price Index for all food has increased by 22.5% since 2005 (United States [U.S.] Bureau of Labor, 2011), it has been estimated that 33,790 KT food waste in 2010 would be worth more than \$130 billion nationally. Recently, Hall, Guo, Dore, and Chow (2009) also reported that 40% of food available in the U.S. food supply was wasted in 2003 based on the researchers' formula, which was not adjusted for spoilage and wastage. When adjusted for

spoilage and wastage, the U.S. Department of Agriculture estimated about 25% of edible food was wasted (Hall et al., 2009). In addition, Cuéllar and Webber (2010) concluded that approximately 2% of energy consumption in the United States during 2007 was wasted in the form of food. This was based on calculations of total embedded energy in food from agriculture, transportation, processing, preparation, sales, and storage.

The EPA has developed a food waste recovery hierarchy, which suggests source reduction as the most preferred method to avoid food waste, followed by food donation to hungry people and/or hog farmers, composting, and landfill/incineration (EPA, 2010). A 2007 report for the city of Seattle showed that reducing the amount of food waste from foodservice operations would contribute significantly to food waste reduction because the amount of food waste generated from grocery stores and restaurants was estimated at 16% of the overall waste stream (URS Corporation, 2007). However, the current status for foodservice operations' implementation of food waste management programs or the amount of food donated or composted is unclear.

Food donation to the needy is the second recommended method for food waste management. The Bill Emerson Good Samaritan Food Donation Act was established in 1996 to protect food donors/providers from lawsuits (U.S. Government Printing Offices, 1996). Further, the Katrina Emergency Tax Relief Act (H.R. Rep. #3768, 2005) was passed by former President George W. Bush in 2005 to encourage organizations to donate food to evacuees from natural disasters and receive a tax deduction for donated food. This act has been extended several times under different names, such as the Pension Protection Act of 2006 and the Emergency Economic Stabilization Act of 2008. The Good Samaritan Hunger Relief Tax Incentive Extension Act was also introduced in 2009. A few national chain restaurants such as Yum! Brands Inc., Cheesecake Factory, and Darden Restaurants participate in a food donation program (Food Donation Connection, 2011a), but concerns about possible liability over foodborne illness outbreaks still remain when donated food is not properly handled. Several governmental agencies, including the EPA, provide requirements and guidelines for donors to safely prepare, store, and reheat donated food to reduce risk of foodborne illness (EPA, 2010). However, despite these efforts to ensure the safety of donated food, foodborne illness outbreaks could happen and damage the public image of restaurants or other foodservice operations that had served the donated food. Recently, a total of 60 people were hospitalized after eating turkey dinner at a homeless shelter in Denver, CO (Goetz, 2012, July 23). Although, it was not confirmed, it is speculated that this outbreak may have occurred due to the donated food which was received by Denver Rescue Mission, the homeless shelter, the day before serving the turkey dinner.

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Composting food waste has been well documented. A recent EPA report described three successful stories of foodservice facilities that composted food waste: Larry's Market grocery chain in Seattle, Washington; Middlebury College in Middlebury, Vermont; and the Frost Valley facility in Claryville, New York (EPA, 2010). Five Larry's Market grocery stores collected and composted a total of 90% compostable materials such as wilted produce, flowers, and cardboard boxes in addition to donating non-perishable food items. Middlebury College collected and composted about 75% of total food waste. As a result, the college saved \$137 per ton in landfill hauling and tipping fees, which equals a total net saving of \$27,000 per year. The Frost Valley facility was able to reduce its solid waste by 53%, saving \$5,200 per year by implementing a composting program.

The efforts to reduce or utilize food waste evolved in various ways. Deluxe Town Diner in Watertown, Massachusetts, invested \$20,000 for a boiler that used recycled vegetable oil and saved \$5,800 annually on heating and waste disposal expenses (Buchthal, 2006). Manufacturing companies such as Frito Lay and Kraft Foods Inc. also joined efforts to reduce food waste and became the 2010 award winners in the Waste Reduction Awards Program administered by the California Department of Resources Recycling and Recovery (CalRecycle, 2011). Aramark, a contract foodservice management company, has researched and implemented strategies to reduce food waste from their facilities. Aramark found that eliminating use of trays in cafeteria foodservice operations (trayless dining) reduced food waste by 20–30% (Aramark Higher Education, 2008). Aramark is also in the process of conducting a pilot study for a food donation program at Pacific University in Oregon (Lang, 2011).

Researchers and food waste management professionals have suggested factors and possible barriers to consider when implementing food waste management programs. Wie, Shanklin, and Lee (2003) recommended that foodservice facilities consider total amount of waste, availability of farms, compost sites, space, labor, cost for the labor, waste hauling and utility, and regulations for tax deductions when developing food waste management strategies. The Center for Ecological Technology (CET, 1999) in collaboration with Massachusetts Department of Environmental Protection suggested possible barriers to implementing food waste programs. These barriers include the lack of physical availability of the processing sites such as composting units; high demands for labor, space, and care; and inconsistent governmental and financial support or incentives. According to the Evans McDonough Co. (2002, 2004), the main barriers to implementing a food waste management program in residential areas were inconvenience, odor/smell, pests such as rodents and insects, and hygiene issues. Wie et al. focused on the cost effectiveness of implementing food waste management programs in four different types of non-commercial foodservice operations, and other studies have investigated residents' attitudes and barriers to food waste management programs in residential areas. No study has been published about the attitudes and perceived barriers that college and university foodservice operations may face in implementing food waste management programs. Therefore, this study was designed to investigate foodservice administrators' level of agreement on statements that could possibly represent attitudes and perceived barriers to sustainable food waste management in college and university foodservice operations.

METHODOLOGY

The Research procedures of this study were reviewed and approved by the Institutional Review Board of a University prior to contacting study participants.

Focus Group Discussion

A focus group was used to gather information from foodservice managers to identify variables for quantitative survey questionnaires. Contact information for colleges and university foodservice administrators and RecycleMania program participants in the Dallas, Fort Worth, and Houston areas in Texas were collected from public web sites. Individual participants were recruited by e-mail and telephone calls using the contact information. Foodservice administrators were asked questions about past and current practices and opinions regarding food waste management during a 60-minute focus group session. As a token of appreciation, a gift certificate (\$50.00) from a national retailer of their choice was given to each participant in the focus group. Seven college/university foodservice administrators participated in the focus group, which was recorded, transcribed verbatim, and then analyzed to identify variables and common terms used by the administrators for the following national survey. A few quotes that support the results of the survey are included in the discussion section.

Survey

Based on results from the literature and the focus group, a questionnaire was developed. The questionnaire consisted of three main parts: (a) demographic information about foodservice administrators, (b) information about the facilities where the administrators work, and (c) statements reflecting attitudes and perceived barriers regarding food waste management. A Likert-type 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree) was used to measure level of agreement on statements reflecting attitudes and perceived barriers regarding food waste management. The questionnaire was validated by three foodservice educators and two university foodservice administrators for expert judgment of content validity (Jha, 2008), including vocabularies commonly used among foodservice administrators. The questionnaire was revised according to their suggestions. The questionnaire was converted to an online survey form using PsychData (PsychData™, LLC, 2008, State College, PA).

A convenience sample of 33 voting delegates of the National Association of College and University Food Services (NACUFS) was invited to participate in a pilot study using the online survey. Six administrators completed the pilot-study survey to assess the clarity of direction and internal consistency of the questions. Based on results of the inter-item reliability test using Cronbach's alpha, eight out of 23 statements on attitudes and perceived barriers were eliminated. The remaining statements were categorized into three sections: (a) operational management ($\alpha = 0.641$, $n = 8$), (b) financial resources and administrative support ($\alpha = 0.679$, $n = 4$), and (c) motivation ($\alpha = 0.600$, $n = 3$). Because of the small sample size of the pilot test due to a low response rate, no further revisions to improve α value were made.

Data Collection

A mailing list of 624 voting delegates of NACUFS was purchased from the organization as the study sample. A cover letter that included a web page link to the survey was e-mailed to 591 voting delegates of NACUFS who had provided e-mail addresses. The 33 voting delegates from Texas and Oklahoma who had participated in the pilot study were not resurveyed. Two weeks later, follow-up e-mails were sent. At the same time, a cover letter and printed questionnaire were also sent to voting delegates of NACUFS who had not yet responded. Three weeks after the postal mailing, a follow-up reminder postcard was sent to each non-respondent to encourage participation. Upon completion of the questionnaire, participants were offered a gift certificate of their choice (\$5.00) as a token of appreciation.

Data Analyses

The Statistical Package for the Social Sciences for Windows (SPSS, v. 15.0, Chicago, IL) was used for data analyses. Descriptive statistics were used to summarize the data. Student's t-test was used to test differences between self-operated and contract-managed foodservice operations. The number of meals served per week was grouped into four sections to determine the effect of size of foodservice operation on college and university foodservice administrators' attitudes and perceived barriers regarding food waste management. One-way analyses of variance (ANOVA) were performed to test for differences in variables among facilities with different sizes. A repeated measures ANOVA item analysis was applied to test differences in mean values of level of agreement on statements among the three sections: operational management (n = 8), financial resources and administrative support (n = 4), and motivation (n = 3).

RESULTS AND DISCUSSION

Seven college and university foodservice administrators participated in a focus group discussion. The focus group participants represented facilities serving between 4,000 and 35,000 meals per week. Three were working in contract-managed operations, and the rest were working in self-operated foodservice operations. Most foodservice administrators reported that they had already implemented recycling programs for cardboard and paper goods, but had not extensively

executed waste management programs for food. The participants shared information about several food waste management methods: composting, donating food scraps to farmers for animal feeding, collecting food scraps in trash bins, implementing trayless dining, and recycling vegetable oil to generate energy. Their attitudes toward food waste management programs were very positive. They agreed that there is no best method for all foodservice operations because each food waste disposal method has its advantages and disadvantages. They also agreed that food waste management programs should continue because the advantages outweigh the disadvantages.

Attitudes and Perceived Barriers in Food Waste Management

In the survey, respondents were asked to rate 15 statements related to attitudes and perceived barriers in food waste management on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). Average ratings for each statement and the three sections are shown in Table 1. Survey participants showed a significantly higher level of agreement on statements related to the operational management section than other sections ($p < .001$).

Operational management: There was a significantly higher level of agreement on limited space in facilities to store food items for donation and dislikes to separate food waste from soiled dishes than

Table 1. College and University Foodservice Administrators' Mean Ratings of Statements Reflecting Attitudes and Perceived Barriers Regarding Food Waste Management (N=63)

Statements	M	±	SD
Operational management			
We have very limited space to store food items for donation.	3.68		1.16 ^{af}
Employees/customers do not like to separate food waste from soiled dishes and packaging.	3.29		1.07 ^b
Our operation does not donate foods to nonprofit organizations because of potential liability issues.	2.95		1.28 ^{bc}
We were overwhelmed with the complicated government requirements for food waste programs.	2.75		.88 ^{cd}
Lack of resources about food waste management discouraged us.	2.71		1.01 ^{cd}
We are satisfied with our current food waste program.	2.57		1.00 ^{cde}
Food waste management is not a current priority issue in our operation.	2.25		1.05 ^e
The amount of food waste from our operation is not enough to implement a specific food waste management plan.	2.13		.89 ^e
Average operational management ⁱ	2.80	±	.55 ^{ay}
Financial resources and administrative support			
We do not have the financial resources to initiate a food waste program in our operation.	2.94		1.08 ^a
We do not have enough staff to initiate a food waste management program.	2.51		1.01 ^b
My administrators (or headquarters) are not willing to support a food waste management program.	2.44		.93 ^b
We do not see the cost benefits of a food waste program.	2.37		.96 ^b
Average financial resources and administrative support ⁱⁱ	2.56	±	.83 ^b
Motivation			
Government regulations do not require us to have a specific food waste management program.	3.49		.86 ^a
We tried several methods to reduce food waste in the past, but none of them were successful.	2.32		.69 ^b
The impact of food waste disposal on the environment is not our concern	1.60		.64 ^c
Average motivation ⁱⁱⁱ	2.45	±	.52 ^b

Note. M = Mean; SD = Standard Deviation. Likert scales: 1, strongly disagree; 2, disagree; 3, neutral; 4, agree; 5, strongly agree. ^v Statistical significance was analyzed by a repeated-measures ANOVA ($F(2, 58) = 9.78, p < .001$) among 3 sections of attitudes and perceived barriers. Values with different superscripts (bolded alphabets) are significantly different ($p < .05$) from each other analyzed by pairwise comparisons among three sections. ^{iv} Statistical significance was analyzed by a repeated-measure ANOVA: ⁱ $F(7, 53) = 16.3, p < .001$ among 8 statements under operational management; ⁱⁱ $F(3, 60) = 9.72, p < .001$ among 4 statements under financial resources and administrative support; ⁱⁱⁱ $F(2, 61) = 109.3, p < .001$ among 3 statements under motivation. ^v Values with different superscripts are significantly different ($p < .05$) from each other analyzed by pairwise comparisons under each section.

the rest of operational statements (Table 1). A national survey showed that inadequate refrigerator space (17%), and inadequate freezer space (15.2%) were perceived as challenges for cooling leftover food properly (Krishnamurthy & Sneed, 2011). The nature of foodservice industry is also very labor-intensive and service-oriented (Ottenbacher, 2009) and has a high turnover rate (Hinkin & Tracey, 2000). The lack of space was mentioned during the focus group discussion of this study, "If you happen to get just one delivery over a week, you will have some waste or spoilage." Limited refrigerator and/or freezer space can make it difficult for foodservice facilities to follow proper food-cooling procedures and thus to donate prepared food. Therefore, frequent, possibly daily pick-up schedules for leftover prepared food should be implemented if foodservice facilities plan to set up programs to donate prepared food to the needy population. Foodservice administrators will also need to put additional effort, time, and money into educating employees and customers about food waste management and implementing any food waste programs.

Foodservice administrators working in contract-managed foodservice operations agreed more strongly on the statement regarding potential liability issues when implementing food donation program as a method of food waste management than those working in self-operated foodservice operations ($p < .05$; Table 2). Contract-managed foodservice operations tend to monitor productivity and liabilities more tightly due to their large volume of business (Choi, Park, Shin, & Kwak, 2007) and their success in contract agreements with colleges and universities. Even with the Federal Bill Emerson Good Samaritan Food Donation Act (U.S. Government Printing Offices, 1996), the concerns of lawsuits or negative media attention for foodborne illness outbreaks still exist. One of the focus group participants from a contract company was extremely concerned about negative public opinions of the company's reputation if a foodborne illnesses outbreak were to happen after donating prepared food to the needy population.

Donating prepared food to the needy population is also closely related to the marketing strategy trend of hospitality and food industry [National Restaurant Association (NRA), 2011]. Companies

can promote their public images of pursuing sustainability and social responsibility, and receive tax deduction for donated food to the needy population (Food Donation Connection, 2011b). Recently, a contract management company implemented a food donation pilot program at Pacific University in Oregon and was able to donate 600 pounds of prepared food to the local needy people (Lang, 2011). Many restaurants such as Pizza Hut, Olive Garden, and Chipotle have participated in a food donation program and received a tax reduction for years (Food Donation Connection, 2011a).

Financial resources and administrative support: Respondents tended to disagree with the four statements related to financial resources and administrative support (Table 1). Their responses indicate that a food waste management program was considered cost-effective and that higher level administrators would be supportive of such a program. However, lack of financial resources to initiate a food waste management program was agreed upon more among items in this section.

Foodservice administrators serving a relatively small number of meals agreed more strongly on the lack of financial resources to initiate a food waste management program than those serving a large number of meals ($p < .05$; Table 3). They also agreed more strongly with the statement regarding potential liability issues when implementing a food donation program as a method of food waste management than those serving a large number of meals per week ($p < .05$; Table 3). Small-scale foodservice operations commonly encounter difficulties in human resource management (Alonso, 2009). They may not be able to hire employees who can be in charge of new food donation programs or who support financial and/or legal matters related to the programs. Smaller foodservice operations will hardly receive full support from human resources, financial, and legal departments to deal with liability issues possibly related to food donation programs.

Motivation: Three statements were asked regarding attitudes and perceived barriers related to motivation (Table 1). The foodservice administrators concerned about the impact of food waste disposal on the environment ($p < .05$). Conserving the environment and natural resources has become an important aspect in foodservice operations,

Table 2. Difference in College and University Foodservice Administrators' Level of Agreement on a Statement Regarding Potential Liability Issues for Donated Foods between Contract-Managed and Self-Operated Foodservice Operations (N=63)

Statements	Type of Management				t	p
	Contract-Managed (n=20)		Self-Operated (n=41)			
	M	SD	M	SD		
Operational Management						
We have very limited space to store food items for donation.	3.84	1.02	3.56	1.23	.852	.367
Employees/customers do not like to separate food waste from soiled dishes and packaging.	3.50	1.15	3.17	1.00	1.152	.254
Our operation does not donate foods to nonprofit organizations because of potential liability issues.	3.47	1.31	2.67	1.22	2.309	.025*
We were overwhelmed with the complicated government requirements for food waste programs.	2.95	0.78	2.56	.82	1.696	.095
Lack of resources about food waste management discouraged us.	2.60	1.00	2.76	1.02	-.566	.574
We are satisfied with our current food waste program.	2.65	0.99	2.46	.98	.698	.488
Food waste management is not a current priority issue in our operation.	2.25	1.07	2.29	1.06	-.148	.883
The amount of food waste from our operation is not enough to implement a specific food waste management plan.	2.25	1.07	2.29	1.06	-.594	.555

Note. M = Mean; SD = Standard Deviation. Likert scales: 1, strongly disagree; 2, disagree; 3, neutral; 4, agree; 5, strongly agree.
* $p < .05$, statistical significance was analyzed by student's t-test between contract-managed and self-operated foodservice operations.

and many professional groups suggested how to practice sustainability in the operations. The Academy of Nutrition and Dietetics recommended various techniques to reduce, recycle, and compost food waste from the operations (Harmon & Gerald, 2007). The NRA also created the NRA Conserve Initiative that encouraged restaurants to participate in waste management programs and provided them tips to take social responsibility (NRA, 2008). The more attention is paid to sustainability and corporate social responsibility in community, the more businesses will implement many creative ways to conserve energy and resources and use them as a marketing tool.

Participants had the highest level of agreement with the statement, "Government regulations do not require us to have a specific food waste management program" ($p < .05$; Table 1). Although government does not require any specific food waste management program, foodservice operations have voluntarily implemented food recovery programs and received a significant amount of monetary incentives in the form of a tax deduction. According to the guidelines for charitable contribution from Internal Revenue Services (2012), facilities donating food inventory to a qualified organization such as food bank can deduct some of the food cost. The current rules specify that the sum of half of the gross margin (i.e., market value minus cost) in addition to the taxpayer's cost, but not in excess of twice the cost of the donated food or 10% of total income for the year, can be deducted from taxable income (Charitable contribution, 2012).

Government regulations may indirectly reduce the quantity of waste disposal from households and businesses. According to a report from the city of Milwaukee, more than 7,000 cities and counties in the United States encourage residential and commercial units to reduce the quantity of trash by charging more for larger quantities of waste, described as a pay-as-you-throw (PAYT) program (Hall, Krumenauer, Luecke, & Nowak, 2009). The average weight of waste disposal was approximately 20% less in PAYT communities than non-PAYT communities in Sweden (Dahlén & Lagerkvist, 2010).

Sending food scraps to feed animals, especially swine, has been an option for waste management, but the changes in rules and regulations may have resulted in difficulties for farmers and food donors to keep up with the changes. One focus group participant who had donated food scraps for animal feeding in the past stated the impact of changes in governmental regulations making it difficult to do so. The participant had to stop sending leftover food to small hog farms when the FDA and USDA required food scraps to be boiled

thoroughly to kill the pathogens because small farms did not have such equipment to follow the rules. Animal feeding is regulated under the U.S. Department of Agriculture 9 CFR Part 166: Swine Health Protection. According to the Federal Register (Animal and Plant, 2002), the general restrictions (part 166.2) and storage of food waste (part 166.4) have been amended many times between 1982 and 2001. Also, not all states allow food scrap feeding to swine; only 28 states allow animal feeding in the United States (USDA, 2010). The latest published Federal Register allowed commercial food waste to be treated at 167°F for at least 30 minutes in licensed facilities and transported in separate vehicles from those hauling the animals (Swine health protection, 2009).

CONCLUSION AND MANAGERIAL IMPLICATION

Through a focus group and a national survey, this study was able to determine attitudes and perceived barriers regarding sustainable food waste management in a small group of college and university foodservice administrators. Most foodservice administrators appeared to have positive attitudes toward sustainable food waste management programs in their operations. However, attitudes regarding food waste management varied depending on the type of management system (e.g., self-operated vs. contract-managed) and the number of meals served weekly. Results from this study cannot be generalized but may provide a glimpse into food waste management practices in college and university foodservice operations although the low response rate for this study, with only 63 respondents, was a major limitation.

Foodservice administrators may need to evaluate resources and support to find the most suitable food waste management method for their facilities. Government agencies should also develop food waste management programs that focus on the needs of foodservice operators to minimize barriers to implementing sustainable food waste programs. This could result in more foodservice administrators choosing to implement ecologically desirable methods of food waste management.

Further studies with a larger number of colleges and universities should be conducted to verify and identify the accuracy and reliability of the results in this study. Food waste management research can also be expanded to K-12 schools and healthcare foodservice operations, where few studies were conducted. Factors affecting food waste management and available resources may be different for schools or healthcare foodservice facilities as compared to college and university foodservice operations.

Table 3. Difference in College and University Foodservice Administrators' Level of Agreement on Statements Regarding Potential Liability Issues for Donated Foods and Lack of Financial Resources according to the Number of Meals Served a Week (N=63)

Statements	Number of Meals							
	~ 5,999 (n=14)		6,000~14,999 (n=16)		15,000~39,999 (n=17)		≥ 40,000 (n=15)	
	M	SD	M	SD	M	SD	M	SD
Operational Management								
Our operation does not donate foods to nonprofit organizations because of potential liability issues.*	3.64	1.15 ^a	3.00	1.46 ^{ab}	3.07	1.28 ^{ab}	2.27	0.80 ^b
Financial Resources and/or Administrative Support								
We do not have the financial resources to initiate a food waste program in our operation.**	3.21	.98 ^{ab}	3.44	1.09 ^a	2.65	1.12 ^{ac}	2.47	0.92 ^b

Note. M = Mean; SD = Standard Deviation. Likert scales: 1, strongly disagree; 2, disagree; 3, neutral; 4, agree; 5, strongly agree.

* Statistical significance was analyzed by one-way ANOVA ($F[3, 55] = 3.223, p < .05$). Values with different superscripts are significantly different ($p < .05$) from each other analyzed by Bonferroni multiple comparisons.

** Statistical significance was analyzed by one-way ANOVA ($F[3, 58] = 3.070, p < .05$). Values with different superscripts are significantly different ($p < .05$) from each other analyzed by Bonferroni multiple comparisons.

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