Staff Food-Related Behaviors and Children’s Tastes of Food Groups during Lunch at Child Care in Oklahoma

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ABSTRACT
Background
Young children should consume a variety of nutrient-dense foods to support growth, while limiting added fat and sugar. A majority of children between the ages of 3 and 5 years attend child care in the United States, which makes this environment and the child-care staff influential at meals.

Objective
The aim was to determine the association between best-practice food-related behaviors and young children’s tastes of fruit, vegetable, low-fat dairy, and high-fat/high-sugar foods at child care.

Design
This was a cross-sectional study.

Participants
A community-based study with 201 children ages 3 to 5 years from 25 early care and education centers, including 11 tribally affiliated centers and two Head Start programs across Oklahoma. Data collection occurred from fall 2011 to spring 2014.

Main outcome measures
Classroom observations used the Environmental Policy Assessment Observation tool to measure the staff behaviors and environment. Staff behavior was compared at three different levels: the composite score of staff nutrition behavior, each constituent staff behavior, and staff behaviors grouped into broader feeding behaviors. Tasted food was measured through the Dietary Observation in Child Care method. The children’s meals were categorized into the following food groups: fruit, vegetable, low-fat dairy, fried vegetable, fried meat, high-fat meat, and high-fat/high-sugar food.

Statistical analysis performed
Descriptive statistics were calculated for relevant variables. Relationships between the constituent staff behaviors and food groups that children tasted were compared using multilevel mixed-model analysis.

Results
The mean number of tasted fruit or vegetable items was higher and the mean number of tasted high-fat/high-sugar food items was lower when staff: 1) determined fullness before plate removal when less than half of food was eaten, 2) ate with the children, and 3) talked about healthy food.

Conclusions
The utilization of the three staff behaviors and their association with higher mean tastes of nutrient-dense items and lower mean tastes of high-fat/high-sugar food items among exposed children demonstrated support for the use of the best practices in early care and education centers.


Children between the ages of 3 and 5 years should consistently consume a variety of nutrient-dense foods to support their growth and daily activity.1 Young children eat fewer calories per day than adults; with their relatively higher nutrient requirements for caloric intake, children should limit foods with added fat and sugar to ensure adequate nutrient intake that supports development.1 Butte and colleagues2 and Fox and colleagues3 reported that American children over-consume sodium, saturated fat, and energy-dense, nutrient-poor foods that promote total caloric overconsumption. Analysis by Kim and colleagues4 found that young children consume less than half of the daily recommended vegetables; potatoes, including fried forms, were the most commonly consumed vegetable. However, young children do consume adequate amounts of fruit.4

Because 62% of 3- to 5-year-old children in the United States attend early care and education (ECE) centers,5 it is critical to understand the primary factors in this eating environment that impact children’s food intake and behavior development.6 Young children’s food preferences and responsiveness to calories within a meal are malleable and influenced by the home environment and child-care arrangements.7,8 Feeding practices are composed of individual food-related behaviors (eg, modeling) and have been associated with children’s food acceptance.9 The most recent nutrition-related best-practice behaviors for child-care environments include: work with children to listen to satiety
RESEARCH

Staff Behaviors

Staff behaviors can be measured with a variety of metrics. Staff behaviors of conceptual interest included use of internal or external satiety cues with meals, modeling healthy eating behavior, encouraging children to try food not initially eaten, and conversation about healthy food and meal service. These staff behaviors were measured with the Environmental and Policy Assessment and Observation Instrument (EPAO), which is an observation tool designed to measure obesogenic environmental and behavioral factors within an ECE classroom.\(^{23}\)

The constituent responses from the EPAO staff behavior subscale were classified into the following broader feeding behaviors: internal satiety cues,\(^{24}\) modeling,\(^{7}\) and external satiety cues.\(^{24}\) Staff “determine fullness before plate removal” and “determine hunger before serving seconds” were responses related to internal satiety cues.\(^{24}\) Staff “sit with children during the meal,” “eat the same food as the children,” and “eat less healthy food in front of children” were responses related to modeling.\(^{7}\) Finally, staff “use of food to reward behavior” and staff “use of food to control behavior” were responses related to external satiety cues.\(^{24}\) The responses “talk with children about healthy food,” family-style meal service, and “encourage picky eaters” differ from other

METHODS

Study Design

This was a cross-sectional study with data collection from fall 2011 to spring 2014. Licensed ECE centers that provided full-time child care to 3- to 5-year-old children were contacted via telephone in a convenience sampling for the opportunity to participate. Twenty-five of the 56 centers that were contacted participated in the study. ECE centers were located in urban and rural settings across all regions in the state of Oklahoma. The study represents 3.3% of all ECE centers in the state. Child-care staff members were involved in feeding children during the meal. For example, a floating teacher who relieved the lead teacher or a center director who came into a classroom for a short period of time was included in the observations of staff behaviors. Observation of the children’s lunch meal occurred at least once on the same day as the classroom observation. Parents were notified of the study and were informed that children’s lunch-time classrooms would be observed regardless of

Research Question: The hypothesis was that child-care staff nutrition behavior best practices would be associated with more tasted fruit, vegetable, and low-fat dairy items, and fewer tasted fried-vegetable, fried-meat, high-fat meat, and high-fat/high-sugar food items during lunch at Early Care and Education centers.

Key Findings: Three staff best practice behaviors were associated with higher adjusted mean tastes of nutrient-dense items and lower adjusted mean tastes of high-fat/high-sugar food items among children exposed to the behaviors: 1) staff determined fullness before plate removal; 2) staff ate with children; and 3) staff talked about healthy food.
behaviors and were not added to a broader category. For the purpose of this paper, these responses were placed in a “general” category and were not compared with other constituent responses.

Inter-rater observations of the EPAO from previous literature have been reported to be sufficient, with high agreement among observers when using the tool (87.3%). Graduate students attended several hours of classroom training, with the initial training led by a researcher from the EPAO development team who flew in to conduct the training. The session was taped and training was repeated annually. At least 2 days of field training were also included with opportunities to discuss treatment of nuanced staff feeding behaviors as a group at the end of each meal. Each classroom and child-care staff member was observed by one researcher in the classroom for the entire day. Before researchers could observe independently, agreement was reached between classroom comparisons done by trainees and by a master observer. Some degree of subjectivity was inherent in the instrument, as some behaviors could be subtle or nuanced. For example, child satiety observation determines whether staff encouraged children to try food in a gentle and positive manner, or whether pressure was exerted on the child to finish his food.

The present study did not utilize a specific percent agreement to determine whether the training was understood by the researchers. Rather, an overall agreement on how to conduct the EPAO was used. As questions appeared, the observers discussed situations and reached a consistency in interpretation of observations and the subsequent scoring in the EPAO. While this instrument contains several sections about nutrition and the physical activity environment, only the overall nutrition staff behavior subscale and its constituents were included here.

Independent variables included the overall staff nutrition behavior score and constituent observations of staff behavior; 10 of the 11 subscale responses were included: “determine fullness,” where staff ask about fullness before plate removal with less than half of the food eaten; “determine hunger before serving second helpings,” where staff ask the child whether he or she is still hungry after the child requests seconds before giving more food; “sit with children during meal times”; “eat the same food as the children”; “eat unhealthy foods in front of children”; “use food to reward behavior,” where staff reward behavior with a treat; “use food to control behavior,” where staff threaten to take away food for misbehavior or food otherwise used to control behavior; “encourage picky eaters,” where staff gently encourage a child to ‘try a bite’ that is not initially eaten; family-style meal service, where children are seated around a table and encouraged to portion out food on their own plates with help; and “talk about healthy foods.” Researchers could mark “yes,” “no,” or “not observed” for occasions when the behavior would be irrelevant to the situation in the classroom. The responses were converted into a numerical value, averaged within the subscale, and multiplied by 10 for a possible score between 0 and 22. The negative actions of staff “use of food to reward behavior,” “staff use of food to control,” and “staff eat unhealthy food in front of children” were reverse-scored when determining the overall staff behavior score. For the purpose of the present study, the constituent responses of “no” and “not observed” represent the absence of the behavior under investigation and differ only in how the observer preferred to report that absence. Therefore, combining these two responses was warranted, given that in each case there was potential to observe the behavior of interest.

**Taste of Food Variables**

Exposing children to multiple fruits and vegetables enhances children’s intake and eventual acceptance of fruits and vegetables. Preschool children’s preference for less-palatable items, such as fruit and vegetables, has been shown to be influenced more by the feeding practices surrounding the present meal than by the actual volume consumed. The construct of interest here is that of tasting or trying foods, not volume.

As quantities for serving sizes vary dramatically between different fruits, vegetables, low-fat dairy, fried vegetable, fried meat, high-fat meat, and high-fat/high-sugar foods, each food item was counted as long as the child tasted the food item at the lunch meal, rather than using actual serving sizes. This decision was based on maintenance of consistency in reporting and appreciation that young children may not consume full servings of foods due to their bodies’ needs. By counting each type of vegetable served rather than the volume of servings, centers that serve mixed vegetables are favored because they are exposing children to multiple vegetables in one meal that collectively add up to the volume of one serving. The food groups assessed were derived to align with DGA recommendations and included fruit, vegetable, low-fat dairy, fried vegetable, fried meat, high-fat meat, and high-fat/high-sugar foods. Fruit and vegetable variables included all fresh, frozen, or canned items, and excluded juice or those prepared with sugar or fat. Low-fat dairy included all dairy items with 1% or lower milk fat content, and included chocolate skim milk. Fried vegetables, fried meat, high-fat meat, and high-fat/high-sugar foods were classified consistent with the EPAO guidelines for food groups.

The Dietary Observation for Child Care training system was used to train researchers to assess visual plate waste for children in the ECE center during lunch and was used to determine children’s tastes of the foods served to them during the lunch meal. This observed plate waste method was developed specifically in the child-care environment and has been reported to be an accurate method when compared with measured plate waste for determining children’s intake (Pearson’s $r=0.90$ to 0.95) with a high intraclass correlation among observers (intraclass correlation $=0.95$ to 0.98). In the present study, trained field observers achieved plate waste proficiency through common foods in the training, as inter-rater reliability was deemed sufficient (intraclass correlation $=0.968$). During the 4 years of the project, there were 16 observers. The number of sites observed by each observer ranged between 1 and 15, with an average of 6.5 centers per observer. While there may have been multiple observers per center, those were not necessarily on the same day. Observers were trained graduate students and were scheduled for observations based on availability. Each field observer was assigned to three children during the meal and passed a plate waste practical exam after training in the laboratory and field. Laboratory training included practice and visual estimation with standard measuring cups and spoons and the subsequent evaluation of 20 different foods.
common to ECE center lunches. Observers were required to be within 2 Tbsp for each food and 1 oz for each beverage for at least 85% of the foods tested. High agreement among observers was noted across the 20 foods on the plate and the food remaining at the end of the meal, while taking into account any amount of food that may have been spilled, traded, or stolen, and any second helpings. Training was repeated annually to train new observers and maintain rigor in measurement of serving sizes and calculation of food waste among the experienced observers.

Statistical Analysis
Descriptive statistics, including mean±standard deviations and percent of frequencies, were calculated for all relevant variables. Continuous variables were assessed for normality using the Shapiro–Wilk test. Spearman rank correlation tests were used to inform the variables included in the multilevel mixed models. The intraclass correlations for children within classrooms were assessed before model development and indicated the need to account for this correlation using multilevel mixed models. These models were used to assess the association of children’s tasting of different food items (continuous outcomes) with each of the staff practice behaviors (children exposed/not exposed). Fixed effects for these models were the classroom-level covariates and include number of teachers (continuous) and dichotomous staff behaviors. Random effects for the model include a random intercept for classroom and student-level covariates, including age, sex, and race. An additional level for ECE center was not included in the hierarchy, due to few classrooms from each ECE center being included in the study. Collinearity among model covariates was assessed using variance inflation factors computed for the fixed effects of the models. Parameter estimates for these models for the dichotomous staff behavior covariates provide mean differences and standard errors of tasted food items between children exposed and not exposed to these behaviors. The Akaike Information Criterion was used to compare models with differing covariates. Statistical significance was determined if the outcome P value was ≤0.05. Data were analyzed using SAS, version 9.3.26

RESULTS
Fifty-one percent of the 201 participating children were male. The sample was 39% American Indian, 36% white, 18.6% African American, 3.5% Hispanic, 2.0% Asian, and 0.5% Native Hawaiian or Pacific Islander. The mean number of children in each classroom was 12.6, and most (86%) classes were supervised by a single staff member. Meal service style was 1) delivered in bulk and served on prepared trays (40%), 2) delivered in bulk and portioned by staff (35%), and 3) family-style meal service (21%). The mean staff nutrition behavior score was 14.4±4.1, with a maximum possible score of 22. The percentage of children exposed to the constituent staff behaviors is presented in the Table. The most frequent staff behavior was encouraging a picky eater to try at least one bite of the food (92%); the least common staff behavior was using food to reward children (22%). The unadjusted mean number of foods served and tasted by children during lunch is shown in the Figure. Children were served a greater mean number of fruits and vegetables than any other food group. They were served a mean of 1.2 fruits and 1.8 vegetables and tasted a mean of approximately 1 fruit and 1.2 vegetables.

The adjusted mean differences of staff behaviors and children’s tastings of food items are reported in the Table. Compared to children who were not asked about fullness before plate removal of a half-eaten meal, children who were asked had a higher adjusted mean for tasting fruits (mean difference =1.31; P<0.001) and lower adjusted means for tasting fried meats (mean difference =−0.76; P<0.05), high-fat/high-sugar food items (mean difference =−0.69; P<0.0001), and high-fat meat (mean difference =−0.34; P=0.07). Children exposed to staff who determined hunger before serving seconds had lower adjusted means for tasting fruits (mean difference =−1.05; P<0.0001) and high-fat meat items (mean difference =−0.31; P<0.05) compared to children who were not asked about hunger before seconds were served.

Compared to children not exposed to modeling staff behaviors, children who sat with staff members did not have an improved meal profile; however, children who ate the same food with staff members had more desirable outcomes. When staff sat during lunch, children had higher adjusted means for tasting high-fat meat (mean difference =−0.61; P<0.05) and fried meat (mean difference =−0.65; P<0.052), but lower adjusted means for tasting fruit (mean difference =−1.24; P<0.05) and fried vegetables (mean difference =−0.30; P=0.09) compared to children in classrooms where staff did not sit during the meal. When children ate the same food with staff members they had higher adjusted mean tastings of vegetables (mean difference =−1.02; P<0.05) and high-fat meat (mean difference =−0.13; P=0.08) and lower adjusted mean tasting of high-sugar/high-fat (mean difference =−0.27; P<0.051) than when children were not exposed to the behavior. Compared to children who were not exposed to staff eating less healthy food in the room, children in rooms with staff who ate less-healthy food during the day had a higher adjusted mean tasting of fried meat items (mean difference =−0.11; P=0.052).

When children were in a class where staff used food for rewards, the adjusted mean tastings were higher for fried vegetable (mean difference =−0.28; P=0.09) and fried meat (mean difference =−0.44; P=0.06), while the lower adjusted mean tastings included fruit (mean difference =−2.40; P<0.0001), high-fat meat (mean difference =−0.50; P<0.05), and high-fat/high-sugar foods (mean difference =−0.74; P<0.0001) compared to children in classrooms where food was not used to reward behavior. Children in rooms where staff used food to control behavior had higher adjusted means for tasting fruits (mean difference =−0.92; P<0.05), low-fat dairy (mean difference =−0.17; P<0.05), and fried meat items (mean difference =−0.08; P=0.052) compared to children not exposed to staff that used food for behavior control.

Several associations were also detected with the general constituent staff behaviors. Compared to children not exposed to staff who encouraged picky eaters to try a bite, children in classes where staff exhibited the behavior had higher adjusted mean tastings of high-fat meat (mean difference =0.65; P<0.001), but lower adjusted mean tastings of fruits (mean difference =−2.18; P<0.0001), fried vegetables (mean difference =−0.70; P<0.05), and fried meats (mean difference =−1.11; P<0.05). Family-style meal service was not associated with any adjusted mean outcomes with P values >0.10. Children exposed to staff who talked about healthy
Table 1. The adjusted mean difference ± standard error of staff food-related behaviors and 3- to 5-year-old children’s (n=201) tasted food items at lunch in 35 classrooms at 25 early care and education centers in Oklahoma

<table>
<thead>
<tr>
<th>Nutrition-related behaviors</th>
<th>Food Item Tasted</th>
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<tbody>
<tr>
<td></td>
<td>Fruit</td>
<td>Vegetable</td>
<td>Low-fat dairy</td>
<td>Fried vegetable</td>
<td>Fried meat</td>
<td>High-fat meat</td>
<td>High-fat/sugar</td>
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<td>Internal satiety cues</td>
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<tr>
<td>Fullness before plate removal</td>
<td>1.31±0.34***</td>
<td>0.06±0.51</td>
<td>-0.04±0.15</td>
<td>-0.13±0.02</td>
<td>-0.76±0.02d</td>
<td>-0.34±0.16d</td>
<td>-0.69±0.15***</td>
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<td>Hunger before seconds</td>
<td>-1.05±0.43***</td>
<td>-0.12±0.42</td>
<td>-0.12±0.13</td>
<td>0.21±0.06</td>
<td>0.32±0.25</td>
<td>-0.31±0.15*</td>
<td>0.18±0.18</td>
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<td>Modeling</td>
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<td>Sit with kids</td>
<td>-1.24±0.46*</td>
<td>-0.03±0.63</td>
<td>0.09±0.19</td>
<td>-0.30±0.04d</td>
<td>0.65±0.17d</td>
<td>0.61±0.20*</td>
<td>-0.17±0.20</td>
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<td>Eat the same food</td>
<td>-0.63±0.54</td>
<td>1.02±0.49*</td>
<td>0.12±0.15</td>
<td>0.33±0.09</td>
<td>0.26±0.12</td>
<td>0.13±0.18d</td>
<td>-0.27±0.22d</td>
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<tr>
<td>Eat less healthy food</td>
<td>0.99±0.52</td>
<td>0.06±0.44</td>
<td>0.16±0.15</td>
<td>0.17±0.08</td>
<td>0.11±0.05d</td>
<td>0.16±0.17</td>
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<td>External satiety cues</td>
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<tr>
<td>Food used to reward</td>
<td>-2.40±0.41***</td>
<td>-0.01±0.55</td>
<td>-0.26±0.16</td>
<td>0.28±0.04d</td>
<td>0.44±0.13d</td>
<td>-0.50±0.18*</td>
<td>-0.74±0.18***</td>
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<tr>
<td>Food used to control</td>
<td>0.92±0.43*</td>
<td>0.33±0.51</td>
<td>0.17±0.16</td>
<td>-0.10±0.03</td>
<td>0.08±0.02d</td>
<td>-0.05±0.18</td>
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<td>General</td>
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<tr>
<td>Encourage to try a bite</td>
<td>-2.18±0.53***</td>
<td>0.38±0.73</td>
<td>-0.28±0.21</td>
<td>-0.70±0.04d</td>
<td>-1.11±0.25*</td>
<td>0.65±0.24***</td>
<td>0.37±0.22</td>
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<td>Family style</td>
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<td>-0.09±0.18</td>
<td>0.37±0.10</td>
<td>-0.10±0.13</td>
<td>-0.28±0.20</td>
<td>-0.17±0.24</td>
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<tr>
<td>Talk about healthy food</td>
<td>0.92±0.33*</td>
<td>0.95±0.40</td>
<td>0.03±0.13</td>
<td>0.14±0.02</td>
<td>-0.24±0.11d</td>
<td>-0.14±0.14</td>
<td>-0.65±0.15***</td>
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*aMultilevel mixed-model analysis adjusted for age, sex, race, number of child-care staff, staff nutrition behaviors, and random effects within each classroom. Staff behaviors were observed with the use of the Environmental and Policy Assessment Observation, a validated tool to measure obesogenic characteristics in classrooms. Responses of staff behaviors were yes/no dichotomous variables coded as 1 for “yes” and 2 for “no” or “not observed.”

*bChildren’s taste of food was measured through direct observation at mealtimes by trained observers using the Dietary Observation in Child Care method: behavior vs reference within the model.

*cStandard error, which reflects the difference in mean tastes of each food item between exposed and unexposed children for each behavior.

*dThe magnitude of the difference is statistically nonsignificant at P=0.05. P values are between 0.05 and 0.10.

*eP<0.05.

***P<0.001.
food had higher adjusted mean tastings of fruits (mean difference = 0.92; \( P < 0.05 \)) and lower adjusted mean tastings of high-fat/high-sugar food (mean difference = -0.65; \( P < 0.0001 \)) and fried meat (mean difference = -0.24; \( P = 0.052 \)) compared to children who did not have staff talk about healthy foods.

**DISCUSSION**

This study expanded limited research on the influence of child-care staff’s nutrition-related behaviors on children’s frequency of tasting nutrient-dense fruit, vegetable, and low-fat dairy, as well as fried vegetable, fried meat, high-fat meat, and high-fat/high-sugar food during the lunch meal. Best-practice recommendations are 1) determine fullness before plate removal with half of the food uneaten, 2) eat the same food as children, and 3) talk about healthy food with children. In contrast to past research, family-style meal service was not associated with healthier food choices.21,22

While some findings from the present study agree with previous literature, other results differ. The EPAO overall staff behavior score of 14.4 was similar to centers in Georgia (15.4).19 A study in North Carolina27 did not report the overall staff behavior score, but did report mean constituent staff behavior scores. Encouraging a picky eater was more frequently observed in Oklahoma than in North Carolina (92% vs 76%).27 but similar frequencies were observed for staff sitting with children during the meal (75% vs 71%).27 Staff’s use of food to reward behavior was much higher than observations in North Carolina (24% vs 6%).27 The overall staff nutrition behavior score derived from the EPAO in the present study was associated with higher tastings of low-fat dairy, but lower tastings of fruit and high-fat/high-sugar food.

Internal satiety cue behaviors conflicted in relation to adjusted mean tasted outcomes. While children in classes where staff determined fullness before plate removal was associated with higher fruit and lower caloric-dense food tastings, exposure to staff who determined hunger before serving seconds was associated with lower tastings of fruit and high-fat meat.

In contrast to observations by Kharofa and colleagues,21 the present study did not find an association between staff sitting with children and desirable food tasting outcomes. However, positive associations between mean adjusted tasting outcomes were observed when staff ate the same food as children. Hendy and Raudenbush28 suggested that the effectiveness of modeling may not simply be due to the act but rather the degree of interaction during the meal. While sitting with the children may be beneficial, further engagement such as eating, as suggested here, or making enthusiastic comments about vegetables29 may be more likely to influence children to “try peas” during the meal.
The constituent external satiety cue behaviors were associated with food tasting outcomes, although not in a consistent pattern. Classrooms where staff used food as a reward were associated with lower adjusted mean fruit, high-fat meat, and high-fat/high-sugar food tastings. In contrast, classrooms where staff used food to control behavior were associated with higher adjusted mean fruit and low-fat dairy tastings. The use of control during a meal and higher nutrient-dense outcomes is not necessarily desirable. According to a study in the home environment, children were more likely to meet fruit and vegetable recommendations, but less likely to prefer these food items when parents used controlling feeding practices. Although controlling feeding behaviors may initially contribute to children eating more fruits and vegetables, controlling behaviors may have detrimental effects on children’s food behavior development by deterring them from choosing these foods on their own.

Encouragement of picky eaters was the most frequent behavior, but was not associated with desirable outcomes in the present study. These results should be interpreted with caution due to the small number of children who were not exposed to the behavior. Staff who encouraged was associated with lower adjusted mean fruit, fried vegetable, and fried meat tastings in children compared to those not exposed to the behavior. High-fat meat was the sole outcome associated with encouragement to picky eaters and higher adjusted mean tastes. Other studies have reported inconsistent outcomes when staff encouraged picky eaters. Karofa and colleagues reported that staff gently encouraging children to try a less-favorite food was not significantly associated with fruit intake, and repeated exposure was associated with a decrease in fruit consumption, suggesting that the behavior may be ineffective at influencing children.

Family-style meal service was not associated with any of the children’s food variables, which conflicts with past findings. The difference may be explained by the present study’s method for counting tasted food items rather than food volume. Staff members are an integral part of creating an environment in which children are allowed to develop fruits and vegetables, controlling behaviors may have detrimental effects on children’s food behavior development by deterring them from choosing these foods on their own.

Similar to Gubbels and colleagues, the present study found that classrooms where staff talked about healthy food was associated with desirable outcomes. This study found that children had higher adjusted mean tastings of fruit and lower adjusted mean tastings of high-fat/high-sugar food compared to children who were not exposed to staff that talked about healthy food. These two studies support the continued effort of staff to talk and teach about healthy food choices with the children in their classrooms.

Strengths of the present study include the use of EPAO and Dietary Observation for Child Care tools that are common to the field and have established validity and reliability that enhance the quality of collected data. Observers were trained according to established protocols for the Dietary Observation for Child Care and EPAO. Training was repeated annually to maintain rigor and to prevent drift from the established reliability of the tools. The measurement of children’s tastes of each food instead of volume of food items eaten is a strength rather than a limitation. Counting tastes addresses the importance of repeated exposure to nutrient-dense foods, not their consumed volume, which is necessary to children’s life-long eating pattern development. This method also assumes that each child’s daily nutritional needs can vary based on the individual and are not limited to the standardized serving size. While potentially favoring the child care for serving a variety of fruit and vegetables, this method may underestimate the volume of consumption (i.e., 10 nuggets equal one taste of fried meat). This decision placed importance on possible factors that can influence children’s eating behavior as they mature by exposing them early to a variety of food groups that can become part of a sustainable eating pattern, as emphasized by the DGA.

Dietary assessment in the emerging area of ECE staff behaviors and child nutrition is complex and varied. Previous studies used the EPAO to collect staff behavior data but did not employ the same method for defining dietary variables. Direct comparison, where separate studies utilize the same tools for data collection as well as measure variables identically, has not occurred in the literature. Given the lack of standardization among dietary intake measurements, the present study examined variety rather than volume of food to address the research question. Measurement of children’s taste of food does limit direct comparison to other studies that measured the amount of foods eaten; however, conceptual comparison of behaviors associated with desirable meal profiles as operationalized by the use of EPAO staff behavior measures with dependent variables is still appropriate.

A discussion of limitations is also warranted. Demographic data for child-care staff, ECE participation in Child and Adult Care Food Program, and ECE nonprofit status were not collected and could not be obtained retroactively due to the nature of the dynamic child-care business. This limits the generalization of study findings to other populations. The population demographics, cultural differences, and meal content may vary considerably between these differing entities.

Due to the nuanced nature of the staff behaviors, the study would have benefited from two observers concurrently observing each classroom so that inter-rater reliability among the responses could be calculated and to prevent protocol drift. Observations of the children and child-care staff occurred in the classroom environment during the typical day, which involves less control and more potential for error than does a laboratory setting or other simulated environment. Actions and behaviors by the staff and children occurred in a natural setting with limited interference by the observers and is strength. The present study was conducted in the state of Oklahoma, which limits the generalizability of the results.

CONCLUSIONS

Child-care staff best-practice behaviors supported by outcomes were: 1) staff “determine fullness before plate removal,” 2) staff “eat the same food as children,” and 3) staff...
“talk about healthy food.” The most frequent behaviors, staff “sit with children at meal times” and staff “encourage a ‘picky eater’ to try a food,” were not associated with desirable outcomes, such as children tasting nutrient-dense foods more frequently and unhealthy foods less frequently. These findings suggest that the degree that staff engaged with the children may be a better indicator of influencing food choices than the frequency of a behavior. Behaviors supported by this study facilitate better communication compared to more frequently observed staff behaviors such as sitting with children during the meals. Future studies to examine child-care staff behaviors and children’s subsequent food acceptance would be beneficial to guide child-care staff in effective food-related interventions with children.

References
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STATEMENT OF POTENTIAL CONFLICT OF INTEREST
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