

STUDENTS' IN-SCHOOL MEAL EXPERIENCES: A STUDY OF K - 5TH GRADERS' LEVEL OF SATISFACTION

**Marianne Swaney-Stueve, PhD; Janelle Elmore, PhD; and
Jennifer Hanson, PhD, RD**

ABSTRACT

PURPOSE/OBJECTIVE

To explore the relationships between grade level and students' in-school meal experiences including school food service outcome measures and satisfaction with food from home.

METHODS

Outcomes were measured using an online survey conducted within one urban school district. Food selection was self-reported while a 7-point emoji facial scale was used to measure students' satisfaction with their dining experience, school foods, and food brought from home. A convenience sample of 1942 elementary students was solicited among kindergarten to 5th grade students in nine schools. Cluster analysis on mean responses was used to classify grades into like groups. Analysis of variance was used to determine differences in mean values for each item by grade group.

RESULTS

Results show that grade level had a significant impact on mean satisfaction ratings. Two distinct grade groups were identified: kindergarten through 2nd grades and 3rd through 5th grades. As grade level increased from kindergarten to 5th grade, students selected a wider variety of entrees but their ratings indicated decreased satisfaction. One striking exception was noted, satisfaction with food brought from home became more positive with increasing grade level.

APPLICATION TO CHILD NUTRITION PROFESSIONALS

Findings from this study highlight the importance of obtaining feedback as evenly as possible across grades in an effort to ensure collected data reflects the opinions of the whole population. If even sampling is not achieved, nutrition programs striving to gather information from their student body can apply grade-level weighting factors to compensate for over- or under-sampling. Findings from this study also suggest that there are opportunities to improve satisfaction and possibly increase program participation with solicitation of feedback. Understanding grade level differences in food item selection and satisfaction can provide valuable insights for food service professionals planning menus and making procurement decisions for their operations. Furthermore, results suggest a better understanding of the phenomena surrounding students' satisfaction with food brought from home is needed.

KEYWORDS: students, school food service, school lunch, satisfaction, elementary school, developmental

INTRODUCTION

Food service operators have encountered challenges implementing the Healthy, Hunger-Free Kids Act (HHFKA) meal standards (United States Department of Agriculture [USDA], 2012), including loss of revenue, increased plate waste, and reduced participation (Billings, 2019; United States Government Accountability Office [US GAO], 2014). Prior to the implementation of the HHFKA, participation in the National School Lunch Program (NSLP) peaked at 31.8 million children in the 2010-2011 school year. During the first year of HHFKA implementation in 2012-2013, participation declined to 30.7 million students (US GAO, 2014) and continued to decrease to 29.7 million children in 2017-2018 (USDA, 2019). Based on a survey conducted by the School Nutrition Association in July 2015, the leading reason cited for the decrease in lunch participation was low satisfaction with meals. Because meal satisfaction appears to be closely tied to lunch participation, there is a pressing need to measure satisfaction of specific food selections.

Efforts have been made to develop surveys to assess perceptions and satisfaction of students regarding their school dining experience. The Institute of Child Nutrition developed a school dining experience survey to assess general satisfaction among high school students (Asperin & Carr, 2009). That survey was subsequently modified and extended to middle/junior high students (Rushing, 2015). These surveys are well established and provide school nutrition professionals the tools they need to establish internal performance benchmarks to guide program improvement on characteristics contributing to student satisfaction (e.g., food quality, customer service). The Institute of Child Nutrition has yet to develop a similar guide for elementary-aged children, although a comparable survey was developed by Meyer (2005). The response option format utilized in Meyer's survey included the use of visuals (progression of happy to sad faces) with the descriptive terms. The survey was employed to measure the satisfaction upper elementary school (3rd through 5th grades) students had with their school's food service program and food quality. All three of these surveys identified food quality as a key operational factor contributing to student satisfaction. However, while these surveys measure characteristics such as the appearance, aroma and taste of foods in general, none measure satisfaction with specific food items.

Childhood is an important stage with regard to the development of food preferences and eating habits (Briley & McAllaster, 2011), and student satisfaction with specific menu items has been shown to be associated with grade level (Pagliarini et al., 2005). In a longitudinal study of children's eating preferences, Skinner and colleagues (2002) found that compared to a later stage, acceptance of new foods was greater between roughly 2 and 4 years of age. Likewise, among a cohort of elementary aged students, the frequency of breakfast, fruit, vegetable, and milk consumption decreased steadily between third and eighth grade (Lytle et al., 2000) while results from a national survey indicate the diets of younger children are of better quality compared to those of older children (Gu & Tucker, 2017). Although the NSLP provides the foods most lacking in the diets of older children and adolescents, not liking the taste is an important reason older students have cited for throwing food away (Haas et al., 2014).

While satisfaction with specific school lunch items has been collected in a number of studies among elementary aged students (Caporale et al., 2009; Pagliarini et al., 2005; Tuorila et al., 2015), relatively little is known about the relationship between elementary school grade level and student satisfaction. The purpose of this study was to explore the relationships between grade level and

students' in-school meal experiences, including food service outcomes and satisfaction with food from home. The food service outcomes included: a) satisfaction with the school dining experience, b) satisfaction with specific school foods, and c) selections rates for specific school foods among elementary school students. Because a preference for food brought from home has been identified as a reason for not eating school lunch (Asperin & Carr, 2009; Smith et al., 2015), satisfaction with food from home was measured in an effort to establish a rating benchmark and to explore the relationship between grade level and this source of food.

METHODOLOGY

STUDY DESIGN

This cross-sectional survey utilized a convenience sample to measure in-school meal experience outcomes in an urban school district. The school district participates in the NSLP, the School Breakfast Program (SBP), and the Fresh Fruit and Vegetable Program. Based on the Community Eligibility Provision, free breakfast and lunch are offered to all students utilizing an "offer versus serve" model. Free milk, fruit, and vegetables are offered to students bringing a home packed lunch. Kitchen facilities vary from school to school. Schools with adequate space, equipment, and facilities prepare school meals on site. Schools with facility limitations receive deliveries of meals from a central kitchen which are reheated and served. While there were variations due to equipment and facilities, the menu is the same for each school, every day.

Kansas State's Institutional Review Board approved the research protocol. Because the survey was noninvasive and voluntary, students and their parents were not required to complete consent forms. The survey was a self-administered, on-line survey using Compusense Cloud (Compusense, Inc., Guelph, Ontario, Canada) available from February 22, 2018 through March 13, 2018.

PARTICIPANTS

The study group consisted of students (N = 1942) in kindergarten through 5th grade who indicated that they had eaten school meals (either breakfast or lunch, or breakfast and lunch). Participants attended one of nine elementary schools, serving 3250 students in grades kindergarten through fifth grade in a school district with over 160,000 students in kindergarten to 5th grade in 462 elementary schools.

SURVEY INSTRUMENT

The survey was developed in cooperation with the school district's nutrition services department and the food service management company responsible for furnishing meals to the district's schools. It was designed to assess students' satisfaction with their school dining experience, satisfaction with specific HHFKA food items, selections rates for specific HHFKA food items, and satisfaction with food from home among elementary school students. School dining experience satisfaction was measured using a scale composed of items, such as "When I am eating the school breakfast food, I feel...", "When I go through the line in the cafeteria, I feel...", and "The people that work in the cafeteria make me feel...". Selection rates for food items were determined by totaling the number of students indicating they had selected a particular food and dividing that number by the total number of responses in each grade group.

The survey included items to measure satisfaction with 32 specific school foods as well as with food brought from home. The school foods included 14 core breakfast items, 18 core lunch items,

fruit as a broad category, cold vegetables as a broad category, and hot vegetables as a broad category. Statements for specific school food items included a pictorial prompt. The statement for fruit, cold vegetables, and hot vegetables included a graphic illustrating a variety of items within each category. Students only rated their satisfaction with items which they indicated they had eaten at school with three exceptions: fruit, hot vegetables, and cold vegetables. Based on the concept of generic memory (Willet, 1998) rather than on memories of specific eating occasions, the survey questions were designed to measure student's overall eating experience. An outline of the survey is presented in Figure 1.

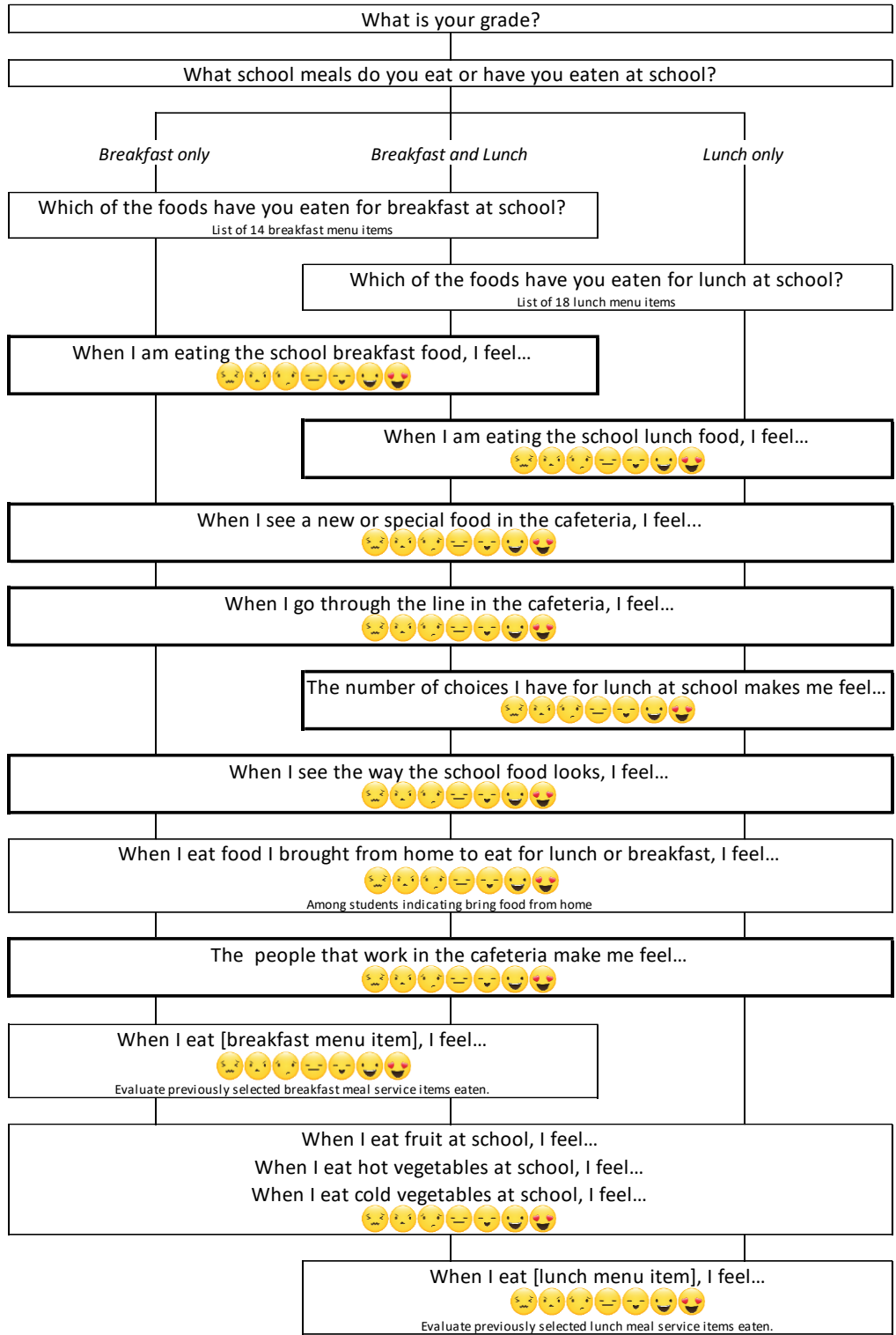
The survey was pilot tested in 2017 at 10 elementary schools within the school district to ensure readability. Six hundred and sixty students in 2nd through 5th grades completed the pilot survey. Based upon the results, the survey was deemed acceptable for implementation. While acknowledging kindergarten and 1st grade students may have difficulty with some question stems, the school district chose to extend the survey to all elementary students assuming a parent or teacher would be available to address questions if needed. A summary of the results was shared with the school administrators and school food service team to assist with menu development and customer service training.

It should be noted that the demographic information solicited from student participants was limited to grade level. While gender identity is a common demographic solicited in surveys, the school district did not plan on using gender data and considered the question sensitive in nature, therefore it was specifically excluded from the survey.

SURVEY IMPLEMENTATION

The school food service team worked with school administrators to coordinate participant recruitment. All but two schools chose to have the survey conducted by teachers as a classroom activity. These schools chose to distribute a flyer to students containing a survey link allowing students to complete the survey on their own time. Whether completed on their own time or completed in the classroom, survey participation was voluntary. Controls were not established to prevent students from taking the survey more than once. However, given that the vast majority of the surveys (98.8%) were completed during the school day and that average time to complete the survey was approximately 10 minutes, the occurrence of duplicate survey submissions was unlikely. Information regarding whether the survey was read aloud for children with reading difficulties was not obtained.

Figure 1: Survey Flowchart



Note: School Dining Experience Scale items are enclosed in boxes with bold type borders.

DATA ANALYSIS

School dining experiences and food item satisfaction were rated using a 7-point emoji facial scale (Swaney-Stueve et al., 2018) as illustrated in Figure 1. For analysis purposes, the response options were coded 1 through 7, with the most negative emoji being coded as a 1, and the most positive emoji being coded as a 7. Initial data analysis included descriptive statistics (means, standard deviation and sample size) for each item by grade.

Meal participation was categorized as breakfast only, lunch only, or breakfast and lunch. Factor analysis, followed by Cronbach's alpha, was used to evaluate the dimensionality and internal consistency of the school dining experience satisfaction construct for each category of meal participation (5 items for breakfast only, 6 items for lunch only, and 7 items for breakfast and lunch). A scale index was computed by taking the mean response on the experience items. Univariate analysis of variance (ANOVA) of school eating experience scale index was conducted to test differences in responses by grade level and participation category. Post hoc analysis was conducted to determine significant differences if needed.

To explore the relationship between grade level and food item satisfaction, cluster analysis was performed on mean emoji responses using Ward's hierarchical clustering technique to classify grades into groups. ANOVA was used to examine differences in responses for each item by grade group. Pearson's correlation coefficients were calculated to measure the relationships between satisfaction and selection by grade group.

Statistical analysis was performed using the IBM SPSS Statistics for Windows, Version 25 (IBM SPSS Statistics for Windows, IBM Corporation, Armonk, NY). For all analyses, the significance level was identified at $p < 0.05$ level.

RESULTS AND DISCUSSION

Of the 3250 students attending the nine participating schools, 1942 kindergarten through 5th grade students who participated in meal service (breakfast, lunch, or breakfast and lunch) completed the survey. Each grade was well represented, with the percent contributions by each grade to the total sample and number of participants as follows: kindergarten, 14.5% ($n=281$); 1st grade, 17.7% ($n=344$); 2nd grade, 15.6% ($n=302$); 3rd grade, 17.8% ($n=346$); 4th grade, 17.1% ($n=332$); and 5th grade, 17.4% ($n=337$). Of those participating in the study, 13% ($n=261$) ate breakfast only at school, 21% ($n=402$) had eaten lunch only at school, with 66% ($n=1279$) eating both breakfast and lunch at school.

Significant grade level differences were found for the average response time per item time ($p < 0.001$). Younger students needed more time than older students with response time steadily decreasing from 1st through 5th grade (9.3 seconds, 10.0 seconds, 7.1 seconds, 6.1 seconds, 5.4 seconds and 5.3 seconds for kindergarten through 5th grades, respectively). This is consistent with the findings of Mavletova (2015), who found older students (children ages 7 to 15) took less time to complete a survey.

SCHOOL DINING EXPERIENCE SCALE

Survey items related to the school dining experience satisfaction construct were grouped together into one factor. These items included statements related to aspects of service including the food (in general), service line, appearance of the food, and staff. Factor analysis of student responses revealed that student satisfaction toward the school dining experience was unidimensional for each category of meal participation. The Cronbach's alpha values for these items, herein referred to as the School Dining Experience Scale, were 0.79, 0.78, and 0.80 for breakfast only, lunch only, and breakfast and lunch, respectively. All meal participation categories showed alpha levels above 0.70. The mean index on the 7-point Emoji scale ranged from 5.4 for kindergarten students to 4.1 for 5th grade students.

ANOVA comparing the mean index of the School Dining Experience Scale by grade level revealed significant differences (Table 1). Kindergarten students reported the highest level of satisfaction. There was a consistent decrease in mean index scores from kindergarten through 5th grades, with 5th graders having the lowest levels of satisfaction. When comparing mean index scores by category of participation, students who participated in both the breakfast and lunch meal service programs had a significantly higher level of satisfaction (5.0) than students who participated in only breakfast (4.7) or only lunch (4.7). There was not a significant interaction of grade by meal participation, therefore, only the main effects of the ANOVA are reported.

Table 1: *School Dining Experience Mean Index by Grade Level and Meal Participation Category*

Statistic	GRADE					
	Kindergarten	1 st Grade	2 nd Grade	3 rd Grade	4 th Grade	5 th Grade
Mean	5.4 ^a	5.4 ^{ab}	5.2 ^b	4.9 ^c	4.6 ^d	4.1 ^e
SD	1.0	1.1	1.1	1.2	1.2	1.1
N	281	344	302	346	332	337

Statistic	MEAL PARTICIPATION		
	Breakfast Only	Lunch Only	Breakfast & Lunch
Mean	4.7 ^b	4.7 ^b	5.0 ^a
SD	1.3	1.2	1.1
N	261	402	1279

Note: The mean index is an average of students' responses to School Dining Experience Scale items (5 items for breakfast only, 6 items for lunch only, and 7 items for breakfast and lunch). Response options coded 1 through 7, most negative emoji coded as 1 and most positive emoji coded as 7. Higher scores indicate more satisfaction. Means with different superscript letters differ at $p < .05$ level using the Tukey Test.

FOOD SATISFACTION AND SELECTION

To better understand grade level differences in food satisfaction, mean food item ratings by grade were sorted into groups using hierarchical cluster analysis. Two distinct grade groups, lower-elementary, consisting of kindergarten through 2nd grades, and upper-elementary, consisting of 3rd

through 5th grades, emerged. Means and sample size for each item by grade group are presented in Table 2. The lowest rated food item for both age groups was hot vegetables, receiving a mean of 3.8 and 3.3 for lower and upper-elementary, respectively. As a mean of less than 4 on the 7-point scale would indicate dissatisfaction, findings showed hot vegetables were disliked by most students in all grades. Satisfaction with specific breakfast and lunch items ranged from 5.0 to 6.4 for lower-elementary students, and 4.3 to 6.1 for upper-elementary students. The most and least liked breakfast and lunch items were specific to grade group. Lower elementary students most liked the fruit parfait ($M = 6.3$) and chicken nuggets ($M = 6.4$), while they least liked mini breakfast pizza ($M = 5.0$) and salad ($M = 5.1$). The upper elementary students most liked pancakes ($M = 6.1$) and nachos ($M = 6.1$), and least liked the egg & cheese quesadilla ($M = 4.4$) and peanut butter & jelly sandwiches ($M = 4.3$). Mean and sample sizes for combined breakfast and combined lunch items are presented in Table 3.

ANOVA of food item satisfaction by grade group found significant differences between lower-elementary and upper-elementary student responses for 27 of the 36 food items. There was a decrease in mean scores from lower to upper-elementary students for all food items, except satisfaction with food from home increased from lower-elementary to upper-elementary students.

ANOVA on the number of breakfast and lunch items chosen by grade group found significant differences ($p=.001$ and $p=.024$, respectively) with students in upper-elementary grades choosing to eat from a larger variety of breakfast and lunch items. Lower-elementary students had eaten an average of 4.5 breakfast items and 4.6 lunch items, while upper-elementary students reported eating an average of 5.4 breakfast and 7.0 lunch items. Consistent with the average number of items eaten, the frequency at which a particular breakfast or lunch item was selected was higher for upper-elementary students than lower-elementary students for all meal items. The breakfast items selected least and most often were the same for both grade groups: egg & cheese quesadillas (6.6% and 11.0%, lower and upper-elementary, respectively) and Benefit bars (54.8% and 63.0%, lower and upper-elementary, respectively). The most selected lunch items were cheeseburgers (46.6%) for lower-elementary students and chicken nuggets (65.8%) for upper-elementary students, while the least selected lunch item was cheese quesadilla (7.3%) for lower-elementary students, and chicken and waffles (14.4%) for upper-elementary students. There was moderate positive correlation between satisfaction with a food item and frequency of the item being selected ($r=.430$, $p=.012$ and $r= .517$, $p=.002$ for lower and upper-elementary, respectively).

Table 2: Mean Satisfaction by Grade Group

Food Items	Grade Group							
	Lower Elementary				Upper Elementary			
Other Foods	Mean	SD	n	%	Mean	SD	n	%
Food brought from home	6.1 ^b	1.3	580	62.6	6.4 ^a	1.0	706	69.6
Fruit	6.1 ^a	1.4	927	100.0	5.5 ^b	1.6	1015	100.0
Cold vegetables	4.3 ^a	2.3	927	100.0	4.0 ^b	2.0	1015	100.0
Hot vegetables	3.8 ^a	2.3	927	100.0	3.3 ^b	2.0	1015	100.0
Breakfast Foods	Mean	SD	n	%	Mean	SD	n	%
Pancakes	6.2 ^a	1.4	192	20.7	6.1 ^a	1.3	370	36.5
French toast	6.0 ^a	1.4	270	29.1	6.0 ^a	1.4	496	48.9
Fruit parfait	6.3 ^a	1.4	168	18.1	5.9 ^b	1.5	224	22.1
Benefit bars	6.1 ^a	1.4	508	54.8	5.9 ^b	1.4	639	63.0
Mini cream cheese bagels	5.9 ^a	1.6	382	41.2	5.9 ^a	1.7	481	47.4
Cherry or apple frudel	5.8 ^a	1.8	204	22.0	5.8 ^a	1.6	300	29.6
Cereal	6.2 ^a	1.2	302	32.6	5.8 ^b	1.3	515	50.7
Waffles	6.2 ^a	1.3	339	36.6	5.7 ^b	1.5	503	49.6
Cubbie pancakes & sausage griddles	6.0 ^a	1.4	157	16.9	5.6 ^b	1.7	229	22.6
Pancake on a stick	5.7 ^a	1.8	295	31.8	5.3 ^b	2.0	377	37.1
PB & graham cracker bars	5.8 ^a	1.7	86	9.3	5.3 ^b	2.0	130	12.8
Mini breakfast pizza	5.0 ^a	2.3	138	14.9	5.0 ^a	2.2	225	22.2
Hot breakfast sandwiches	5.4 ^a	2.0	191	20.6	4.9 ^b	2.1	250	24.6
Egg & cheese quesadilla	5.3 ^a	2.0	61	6.6	4.4 ^b	2.2	112	11.0
Lunch Foods	Mean	SD	n	%	Mean	SD	n	%
Nachos	6.1 ^a	1.6	140	15.1	6.1 ^a	1.4	423	41.7
Chicken nuggets	6.4 ^a	1.1	370	39.9	5.8 ^b	1.5	668	65.8
Cheese pizza sticks with marinara sauce	5.8 ^a	1.9	245	26.4	5.8 ^a	1.8	531	52.3
Chinese orange chicken	6.1 ^a	1.4	92	9.9	5.7 ^b	1.9	249	24.5
Chicken sandwiches	6.0 ^a	1.5	344	37.1	5.7 ^b	1.6	563	55.5
Cheeseburgers	6.1 ^a	1.5	432	46.6	5.5 ^b	1.7	567	55.9
Tacos	5.9 ^a	1.6	195	21.0	5.4 ^b	1.8	318	31.3
Popcorn chicken & mashed potato bowl	5.6 ^a	2.0	73	7.9	5.4 ^a	1.8	247	24.3
Chicken & waffles	5.8 ^a	1.7	77	8.3	5.3 ^b	1.9	146	14.4
Macaroni & cheese	6.2 ^a	1.5	242	26.1	5.2 ^b	1.9	385	37.9
Cheese quesadilla	5.9 ^a	1.8	68	7.3	5.1 ^b	1.9	217	21.4
Chicken leg	5.7 ^a	1.7	306	33.0	5.1 ^b	1.9	510	50.2
Pizza	6.0 ^a	1.5	378	40.8	5.1 ^b	2.0	662	65.2
Salad	5.1 ^a	2.1	177	19.1	4.9 ^a	1.9	348	34.3
Burritos	5.4 ^a	2.1	123	13.3	4.9 ^b	2.1	165	16.3
Catfish strips	5.6 ^a	1.9	137	14.8	4.7 ^b	2.1	232	22.9
Rotini with pasta sauce	5.7 ^a	1.8	131	14.1	4.5 ^b	2.1	264	26.0
Peanut butter & jelly sandwiches	5.5 ^a	1.9	236	25.5	4.3 ^b	2.2	355	35.0

Note: Food items are organized by like items, satisfaction with school provided breakfast items, satisfaction with school provided lunch items and satisfaction with other items including food brought from home and school provided fruit and vegetables. Within like items, survey items are presented in descending order of upper-elementary mean response. Response options coded 1 through 7, most negative emoji coded as 1 and most positive emoji coded as 7. Higher scores indicate more satisfaction. Means with different superscript letters differ at $p < .05$.

Table 3: Mean Satisfaction by Grade Group

Food Items	Grade Group							
	Lower Elementary				Upper Elementary			
	Mean	SD	n	%	Mean	SD	n	%
Food brought from home	6.1 ^b	1.3	580	62.6	6.4 ^a	1.0	706	69.6
Fruit	6.1 ^a	1.4	927	100.0	5.5 ^b	1.6	1015	100.0
Cold vegetables	4.3 ^a	2.3	927	100.0	4.0 ^b	2.0	1015	100.0
Hot vegetables	3.8 ^a	2.3	927	100.0	3.3 ^b	2.0	1015	100.0
Breakfast foods	6.0 ^a	1.0	721	77.8	5.8 ^b	1.1	819	80.7
Lunch foods	6.0 ^a	1.1	786	84.8	5.5 ^b	1.2	886	87.3

Note. Response options coded 1 through 7, most negative emoji coded as 1 and most positive emoji coded as 7. Higher scores indicate more satisfaction. Means with different superscript letters differ at $p < .05$.

DISCUSSION

In this cross-sectional survey of elementary school children, grade level was found to be related to all four measures of the students' in-school meal experience. These measures included three school food service program outcomes and satisfaction with food from home. Similar to the trends observed among upper elementary-students (Meyer, 2005; Pagliarini et al., 2005) as well as among middle school students (Kjosen et al., 2015; Smith et al., 2015), school food service satisfaction was higher in the lower versus the upper grades. This finding is consistent with those reported by Pagliarini et al. (2005) and Moskowitz (2002), who observed that younger children provide systematically higher liking ratings than older peers. Pagliarini et al. (2005) speculated that the difference was not related to understanding how to use the scale, but rather to the development of preference due to the acquisition of a more critical attitude toward food as a consequence of exposure to a more varied diet. Borgers and colleagues (2000) review of children's capabilities as survey respondents within the framework of Piaget's cognitive developmental stages indicate that young children (ages 4 to 7) have a strong desire "to please and go-along," which results in children providing positive responses. Although this desire to please may have been somewhat diminished among the students completing the survey independently, it appears that nearly all students completed the survey in school.

In addition to the grade-level differences noted for school dining experience satisfaction, grade level differences were also noted for food selection and satisfaction. Compared to the students in the lower-elementary grades, students in the upper-elementary grades reported eating a larger variety of breakfast and lunch items. Similar findings related to food selection were reported by Cooke & Wardle (2005), who observed in their study of school children that the number of foods tried increased with age. Moreover, students in the upper-elementary grades in the current study also indicated less satisfaction with all school food items and greater satisfaction with food from home. The relationship between grade and food satisfaction uncovered here is in line with previous research among elementary students in which preference ratings differed by grade level (Epstein-Solfield et al., 2018).

The finding of greater satisfaction with food from home is of concern, as the majority of packed lunches contain a dessert, many include sugar-sweetened beverages, and a large number are void of both fruits and vegetables (Farris et al., 2015). In addition to students' preference for food from home (Smith et al., 2015), parental perception of school meals has been found to be predictive of students' school lunch participation (Ohri-Vachaspati, 2014). Farris and colleagues (2016) found that parents' motives for packing lunch differed by the free and reduced lunch (FRL) eligibility

rates of the schools their children attended. Compared to parents of students attending schools with lower FRL eligibility rates, parents of students attending schools with higher eligibility rates were more likely to agree that the “NSLP does not offer enough food”, less likely to agree that packed lunch “is more nutritious”, and less likely to agree that the “NSLP is not organic or sustainable.” However, across all schools in their study, the most frequently cited motives for NSLP participation were convenience and saving time.

Vegetables were the lowest rated food in the current study, with hot vegetables receiving lower ratings than cold vegetables. Vegetables as a whole have not received favorable ratings from school aged children (Cooke & Wardel, 2005), and they tend to be the most wasted form of school food (Haas et al., 2014). The diets of children fall short of current dietary guidelines regarding vegetable intake (Banfield et al., 2016), thereby making vegetable intake an important area for improvement.

Lastly, satisfaction was found to be associated with greater food item selection as well as with participation in both breakfast and lunch. Both of these findings illustrate the important role student satisfaction plays in successful school meal programs.

CONCLUSIONS AND APPLICATION

School nutrition professionals are challenged to maximize participation in their meal programs. To achieve this, they must provide foods that are both liked by the students and compliant with the requirements of the NSLP and the SBP, while also providing students with a pleasant dining experience. Although this may seem simple in concept, it can be quite difficult in practice given the varying grade levels of students served. As children move from grade to grade, they develop physically, emotionally, and cognitively; these developmental changes, in turn, influence their opinions, attitudes, and behaviors. As such, the purpose of this study was to explore the relationships between grade level and in-school meal experiences including satisfaction with the school dining experience, satisfaction with specific food items, selection rates for specific food items, and satisfaction with food from home among elementary school students.

Regardless of whether only breakfast or lunch, or both meals were from the school meal programs, there were major differences in school dining experience satisfaction across grades with kindergarten students reporting the highest level of satisfaction and 5th grade students reporting the lowest level of satisfaction. There were also grade level differences in food selection and specific food item satisfaction. At this time, research regarding the differences between upper and lower elementary grade levels is limited. Given that participation in both breakfast and lunch is associated with greater dining experience satisfaction, additional research is needed to better understand school food service outcomes. In this regard, grade level should be included along with factors such as food presentation, preparation method, and cafeteria environment, as well as other demographic variables in research aimed at improving school nutrition outcomes. In the interim, those in charge of school food programs should consider efforts to tailor their programs to meet the needs of upper elementary students. As children progress through the elementary school grades, they move away from dependence on their parents as they become more interested in friendships and the world around them (Institute of Medicine, 2006). By being mindful of these developmental differences, and using techniques such as grade-level specific focus groups, nutrition program directors can adopt a market segmentation approach to meeting the needs of their elementary school clients.

In promoting the SBP and the NSLP, school nutrition professionals should not overlook the role of parents. As convenience and time savings are an issue for virtually all parents, these aspects should be highlighted. Although parents' motives for packing lunch may vary with FRL eligibility status (Farris, et al., 2016), school districts utilizing the Community Eligibility Provision to provide free meals should also include cost savings as a part of their messaging to parents.

Given the important role of food presentation, displaying foods in visually appealing ways is believed to significantly increase student satisfaction with individual entrées and the overall dining experience, possibly mitigating the decline in participation observed among the upper elementary grades. As participation in a school lunch program is partially driven by satisfaction with specific menu items, having a means to survey and assess the relative acceptance of current and new menu items is critical. Nutrition program professionals can utilize a variety of methods to assess acceptance including a review of production and service records, or conducting plate waste studies, surveys, and taste-testing activities. Quality controls to assure optimal temperature, texture, taste, and appearance are essential, as sensory characteristics can impact the acceptance of meals (Tuorila et al., 2015). Interventions to increase vegetable consumption are particularly important, and practices based on behavioral economics, such as choice architecture, social marketing, education, the use of non-food incentives, tasting opportunities, or a combination thereof can be implemented to increase acceptance (DeCosta et al., 2017; Epstein-Solfield et al., 2018; Lakkakula et al., 2010, 2011; Thapa & Lyford, 2018).

While it has been previously hypothesized that students tire of the menu and the lunchroom atmosphere with repeated exposure (Meyer, 2005), differences in ratings may also be a result of the cognitive development of food preference development among students during this particular period in children's lives. Differences in selection and food satisfaction ratings may also be a result of the overall food environment, including exposure to (Lakkakula et al., 2011) and availability of foods (Bassul et al., 2020), advertising (Institute of Medicine, 2006), and parental practices (Bassul et al., 2020). In this regard, school nutrition professionals should approach the issues related to food acceptance from a community perspective and seek out partnerships and coalitions for the purpose of improving the dietary patterns of children.

Our findings suggest that the design of an effective menu should incorporate feedback from all students with even sampling across grades in an effort to assure aggregated data reflects the whole population. If even sampling is not achieved, nutrition programs can apply grade-level weighting factors to compensate for over- or under-sampling. Menu design should also consider the developmental stages of childhood. For example, packaging that requires a higher level of fine motor skills might be easily managed by a 5th grader but prove too difficult for a kindergartener to open. In addition to using rating scales and other quantitative methods, feedback on menu items may be obtained by observing meal service and soliciting feedback from parents, teachers, and students at every grade level. In this regard, an advisory board comprised of an array of stakeholders can prove to be extremely valuable.

STRENGTHS AND LIMITATIONS

A major strength of this study is that the students' responses add to the limited research about the satisfaction of elementary students, particularly lower elementary students, with their in-school meal experiences. In an effort to make the survey more appealing to students in the younger grades, emoji, rather than text response options, were used to record participant satisfaction. The School Dining Experience Scale used in this study proved to be a reliable tool for measuring the dining experience satisfaction construct. This survey solicited practical and useful information about elementary school students' perceptions of performance on key environmental attributes of school

meals (variety of food, appearance of food, line speed, and staff friendliness) and satisfaction with current and new menu offerings. Results of the survey were utilized by the school district to identify student-preferred breakfast and lunch items, to identify ways to improve upon the dining experience, and to establish baseline satisfaction ratings and performance benchmarks against which to measure change.

However, there are several limitations that should be noted. The student data were self-reported, and students could have provided multiple assessments or may have been influenced by a family member or adult helper. In addition, the data were limited to nine schools within one school district, thereby limiting generalizability. Nonetheless, the finding of an association between grade level and each of the four in-school measures is noteworthy.

Caution should be used when extending a survey like this to lower elementary students. Elementary students vary significantly in age and developmental abilities. Their cognitive, communication, and social skills are developing as they grow. In particular, language and reading skills are emerging across this age range (ASTM Standard E2299, 2013). The acquisition of reading skills is an important prerequisite for participation in structured surveys. While the researchers took great care to keep statements clear, concise, and age-appropriate, a review of the time required to complete the survey suggests lower elementary students took substantially longer to complete the survey than their upper elementary student counterparts indicating that some lower elementary students may lack sufficient language skills to complete this survey when self-administered. As a result, adult assistance and additional allotted time is advised for lower elementary students. Alternate methods should also be considered in future assessments of satisfaction among lower level elementary students. Nutrition programs should bear in mind the potential language barriers and assist lower elementary students in identifying menu items through alternate means such as pictures or verbal descriptions.

SUMMARY

Grade level was found to be associated with all four of the in-school meal experience measures explored in this study. These measures included dining experience satisfaction, school food selection, school food satisfaction, and satisfaction with food from home. The results suggest that grade level is an important factor that should not be overlooked in research aimed at improving school nutrition outcomes. The results also reinforce the importance of sampling as evenly as possible across grades in an effort to assure aggregated data reflects the whole population. By being mindful of these grade level differences, school nutrition professionals can collect data directly from their elementary school clients and use this information to best meet their unique needs.

REFERENCES

- Asperin, A. E., & Carr, D. H. (2009). High school student satisfaction and non-participation survey guide: Internal benchmarking for school nutrition programs. (Resource Item No. R-147-09). University, MS: National Food Service Management Institute.
- ASTM Standard E2299. (2013). Standard Guide for Sensory Evaluation of Products by Children and Minors. ASTM International, West Conshohocken, PA.
<https://doi.org/10.1520/E2299-13>

- Banfield, E.C., Liu, Y., Davis, J.S., Chang, S., & Frazier-Wood, A.C. (2016). Poor adherence to US Dietary Guidelines for children and adolescents in the National Health and Nutrition Examination Survey population. *Journal of the Academy of Nutrition and Dietetics*, 116, 21–27. <https://doi.org/10.1016/j.jand.2015.08.010>
- Bassul, C., Corish, C.A., & Kearney, J.M. (2020). Associations between the home environment, feeding practices and children's intakes of fruit, vegetables and confectionary/sugar-sweetened beverages. *International Journal of Environmental Research and Public Health*, 17(13). <https://doi.org/10.3390/ijerph17134837>
- Billings, K. C. (2019). Child nutrition programs: Current issues (CRS Report No. R45486). Congressional Research Service. <https://fas.org/sgp/crs/misc/R45486.pdf>
- Borgers, N., Leeuw, E., & Hox, J. (2000). Children as respondents in survey research: Cognitive development and response quality. *Bulletin de Méthodologie Sociologique*, 66, 60-75. <https://doi.org/10.1177/075910630006600106>
- Briley, M., & McAllaster, M. (2011). Nutrition and the child-care setting. *Journal of the American Dietetic Association*, 111(9):1298-1300. <https://doi.org/10.1016/j.jada.2011.06.012>
- Caporale, G., Policastro, S., Tuorila, H., & Monteleone, E. (2009). Hedonic ratings and consumption of school lunch among preschool children. *Food Quality and Preference*, 20(7), 482-489. <https://doi.org/10.1016/j.foodqual.2009.04.008>
- Cooke, L.J., & Wardle, J. (2005). Age and gender differences in children's food preferences. *British Journal of Nutrition*, 93, 741–746.
- DeCosta, P., Møller, P., Frøst, M.B., & Olsen, A. (2017). Changing children's eating behavior—A review of experimental research. *Appetite*, 113, 327–357. <https://doi.org/10.1016/j.appet.2017.03.004>
- Epstein-Solfield, A., Arango, C., Ogan, D., & Stendell-Hollis, N. (2018). The effects of a nutrition education intervention on third- and fifth-grade students' fruit and vegetable knowledge, preference and consumption. *Journal of Child Nutrition & Management*, 42(1). https://schoolnutrition.org/uploadedFiles/5_News_and_Publications/4_The_Journal_of_Child_Nutrition_and_Management/Spring_2018/Effects-of-Nutrition-Intervention-on-Third-and-Fifth-Grade-Students-Fruit-and-Vegetable-Knowledge-Spring2018.pdf
- Farris, A. R., Misyak, S., Duffey, K. J., Atzaba-Poria, N., Hosig, K., Davis, G. C., McFerren, M. M., & Serrano, E. L. (2016). Elementary parent perceptions of packing lunches and the National School Lunch Program. *Journal of Child Nutrition & Management*, 40(1). https://schoolnutrition.org/uploadedFiles/5_News_and_Publications/4_The_Journal_of_Child_Nutrition_and_Management/Spring_2016/8-ElementaryParentPerceptions.pdf
- Farris, A. R., Misyak, S., Duffey, K. J., Mann, G. R., Davis, G. C., Hosig, K., Atzaba-Poria, N., McFerren, M. M., & Serrano, E. L. (2015). A comparison of fruits, vegetables, sugar-sweetened beverages, and desserts in the packed lunches of elementary school children. *Childhood Obesity*, 11(3), 275-280. <https://doi.org/10.1089/chi.2014.0134>
- Gu, X., & Tucker, K. L. (2017). Dietary quality of the US child and adolescent population: trends from 1999 to 2012 and associations with the use of federal nutrition assistance programs, *The American Journal of Clinical Nutrition*, 105 (1), 194-202. <https://doi.org/10.3945/ajcn.116.135095>

- Haas, J., Cunningham-Sabo, L., & Auld, G. (2014). Plate waste and attitudes among high school lunch program participants. *Journal of Child Nutrition & Management*, 38(1).
<https://schoolnutrition.org/5--News-and-Publications/4--The-Journal-of-Child-Nutrition-and-Management/Spring-2014/Volume-38,-Issue-1,-Spring-2014---Haas,-Cunningham-Sabo,-Auld/>
- Institute of Medicine (2006). *Food Marketing to Children and Youth: Threat or Opportunity?* Washington, DC: The National Academies Press. <https://doi.org/10.17226/11514>
- Kjosen, M., Moore, C., & Cullen, K. (2015). Middle school student perceptions of school lunch following revised federal school meal guidelines. *Journal of Child Nutrition & Management*, 39(2).
https://schoolnutrition.org/uploadedFiles/5_News_and_Publications/4_The_Journal_of_Child_Nutrition_and_Management/Fall_2015/MiddleSchoolStudentPerceptionsOfSchoolLunch.pdf
- Lakkakula, A., Geaghan, J.P., Wong, W.-P., Zhanovec, M., Pierce, S.H., & Tuuri, G. (2011). A cafeteria-based tasting program increased liking of fruits and vegetables by lower, middle and upper elementary school-age children. *Appetite*, 57, 299–302.
<https://doi.org/10.1016/j.appet.2011.04.010>
- Lakkakula, A., Geaghan, J., Zhanovec, M., Pierce, S., & Tuuri, G. (2010). Repeated taste exposure increases liking for vegetables by low-income elementary school children. *Appetite*, 55, 226–231. <https://doi.org/10.1016/j.appet.2010.06.003>
- Lytle, L. A., Seifert, S., Greenstein, J., & McGovern, P. (2000). How do children's eating patterns and food choices change over time? Results from a cohort study. *American Journal of Health Promotion*, 14 (4), 222-228. <https://doi.org/10.4278/0890-1171-14.4.222>
- Mavletova, A. (2015). Web surveys among children and adolescents: Is there a gamification effect? *Social Science Computer Review*, 33(3), 372-398.
<https://doi.org/10.1177/0894439314545316>
- Meyer, M. K. (2005). Upper-elementary students' perception of school meals. *Journal of Child Nutrition & Management*, 29(1).
https://schoolnutrition.org/uploadedFiles/5_News_and_Publications/4_The_Journal_of_Child_Nutrition_and_Management/Spring_2005/4-meyer.pdf
- Moskowitz, H. (2002). Children and "tween" acceptance of single candy colors and two-color combinations. *Journal of Sensory Studies*, 17(1), 115-120.
<https://doi.org/10.1111/j.1745-459X.2002.tb00336.x>
- Pagliarini, E., Gabbiadini, N., & Ratti, S. (2005). Consumer testing with children on food combinations for school lunch. *Food Quality and Preference*, 16(2), 131-138.
<https://doi.org/10.1016/j.foodqual.2004.03.001>
- Ohri-Vachaspati, P. (2014) Parental perception of the nutritional quality of school meals and its association with students' school lunch participation. *Appetite*, 74, 44–47.
<https://doi.org/10.1016/j.appet.2013.10.024>
- Rushing, K. (2015). ICN best practice guide for increasing middle/junior high school student participation and satisfaction in the National School Lunch Program.
<https://theicn.org/resources/1100/increasing-middle-jr-high-student-participation/111361/increasing-middlejunior-high-school-student-participation-and-satisfaction.pdf>

- School Nutrition Association. (2015). The school nutrition trends report 2015. https://schoolnutrition.org/uploadedFiles/Resources_and_Research/Research/SNA2015TrendsSummary.pdf
- Skinner, J. D., Carruth, B. R., Wendy, B., & Ziegler, P. J. (2002). Children's food preferences: A longitudinal analysis. *Journal of the American Dietetic Association*, 102, 1638-47. [https://doi.org/10.1016/S0002-8223\(02\)90349-4](https://doi.org/10.1016/S0002-8223(02)90349-4)
- Smith, S., Cunningham-Sabo, L., & Auld, G. (2015). Satisfaction of middle school lunch program participants and non-participants with the school lunch experience. *Journal of Child Nutrition & Management*, 39(2). https://schoolnutrition.org/uploadedFiles/5_News_and_Publications/4_The_Journal_of_Child_Nutrition_and_Management/Fall_2015/SatisfactionofMiddleSchoolLunchProgramParticipantsandNonParticipantswiththeSchoolLunchExperience.pdf
- Swaney-Stueve, M., Jepsen, T., & Deubler, G. (2018). The emoji scale: A facial scale for the 21st century. *Food Quality and Preference*, 68, 183-190. <https://doi.org/10.1016/j.foodqual.2018.03.002>
- Thapa, J. R., & Lyford, C. P. (2018). Nudges to increase fruits and vegetables consumption: Results from a field experiment. *Journal of Child Nutrition & Management*, 42(1). https://schoolnutrition.org/uploadedFiles/5_News_and_Publications/4_The_Journal_of_Child_Nutrition_and_Management/Spring_2018/Nudges-to-Increase-Fruit-and-Vegetable%20Consumption-Results-from-a-Field-Experiment-Spring2018.pdf
- Tuorila, H., Palmujoki, I., Kytö, E., Törnwall, O., & Vehkalahti, K. (2015). School meal acceptance depends on the dish, student, and context. *Food Quality and Preference*, 46, 126-136. <https://doi.org/10.1016/j.foodqual.2015.07.013>
- United States Department of Agriculture. (2012). Nutrition standards in the National School Lunch and School Breakfast Programs; Final Rule (7 CFR Parts 210 and 220). *Federal Register*, 77(17). <https://www.federalregister.gov/d/2012-1010>
- United States Department of Agriculture. (2019). National School Lunch Program. <https://www.ers.usda.gov/topics/food-nutrition-assistance/child-nutrition-programs/national-school-lunch-program.aspx>
- United States Government Accountability Office. (2014). Implementing nutrition changes was challenging and clarification of oversight requirements is needed. <https://www.gao.gov/products/GAO-14-104>
- Willett, W. C. (1998). *Nutritional Epidemiology*. Oxford University Press.

BIOGRAPHY

Marianne Swaney-Stueve, PhD is a Research Assistance Professor at the Sensory & Consumer Research Center of Kansas State University in Olathe, Kansas. Janelle Elmore, PhD is Owner of Elmore Consulting LLC in Columbia, Missouri. Jennifer Hanson, PhD, RD is an Assistant Professor in the Department of Food, Nutrition, Dietetics and Health at Kansas State University in Manhattan, Kansas.