



The costs and calorie content of à la carte food items purchased by students during school lunch

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ABSTRACT

School environments influence student food choices. À la carte foods and beverages are often low nutrient and energy dense. This study assessed how much money students spent for these foods, and the total kilocalories purchased per student during the 2012–2013 school year. Six elementary and four intermediate schools in the Houston area provided daily food purchase transaction data, and the cost and the calories for each item. Chi-square analysis assessed differences in the number of students purchasing à la carte items by grade level and school free/reduced-price meal (FRP) eligibility. Analysis of covariance assessed grade level differences in cost and calories of weekly purchases, controlling for FRP eligibility. Intermediate grade students spent significantly more on à la carte food purchases and purchased more calories (both $p < 0.001$) than elementary school students. Lower socioeconomic status (SES) elementary and intermediate school students purchased fewer à la carte foods compared to those in higher SES schools ($p < 0.001$). Intermediate school students purchased more à la carte foods and calories from à la carte foods than elementary students. Whether the new competitive food rules in schools improve student food selection and purchase, and dietary intake habits across all grade levels remains unknown.

1. Introduction

The school food environment influences the dietary habits of children and adolescents. The National School Lunch Program (NSLP) foods account for only a portion of the foods available to students at school. À la carte foods and beverages are sold in snack bars or vending machines and compete with the NSLP meal. They are often called competitive foods.

Previous studies have found that students with access to à la carte foods consumed more low nutrient, energy dense foods like sugar sweetened beverages, French fries, and fewer fruits and vegetables (Cullen et al., 2000). Students with access to à la carte foods also consumed fewer healthy foods compared to the previous year when the same students did not have access to à la carte foods (Cullen and Zakeri, 2004). On an average school day in 2004–2005, approximately 40% of school aged children purchased and consumed at least one à la carte food (Fox et al., 2009). Among students who consumed à la carte foods, those in elementary school consumed 216 cal; middle and high school students consumed 273 and 336 cal, respectively (Fox et al., 2009). Sixth grade students in Kentucky consumed 234 cal from à la carte

foods (Templeton et al., 2005). Energy intakes from such high calorie foods may lead to poor energy balance and obesity risk.

The Healthy Hunger-Free Kids Act of 2010 gave the U.S. Department of Agriculture (USDA) the authority to set standards for all foods sold in schools (Food and Nutrition Service - U.S. Department of Agriculture, 2017). New standards for à la carte foods were to be implemented in the fall of 2014. Foods meeting these standards are called “Smart Snacks” and must be fruits, vegetables, whole-grain rich, dairy, or a protein food, or contain 10% of the daily value of calcium, potassium, vitamin D, or fiber (Food and Nutrition Service - U.S. Department of Agriculture, 2017). Limits were also placed on calories, total and saturated fats, trans fat, sugar, and sodium in competitive foods. Improved school food policies providing more healthful food options like fruit and vegetables, and limiting the availability of low-nutrient, energy-dense food products may positively impact children's dietary habits and prevent obesity.

Legislation to limit or eliminate the sale of à la carte foods has been met with concern from School Food Authorities because of the potential for lost revenue from à la carte foods food sales may make it more difficult to support the cost of federal school meals programs (Peterson,

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2011). Although schools receive federal reimbursement for meals served in the schools that meet guidelines, food service directors have reported using à la carte food revenue to cover the operational costs of their meal programs, such as utilities, cleaning supplies, and waste disposal (Nollen et al., 2011). In 2002–03, school districts reported obtaining about 12% of revenue from competitive foods (Guthrie et al., 2013). Using national data from 2005, the average annual revenue from competitive foods was estimated at \$16 per elementary school student, \$82 per middle school student, and \$64 per high school student (Guthrie et al., 2013). School level revenues may also vary by the percentages of students eligible for FRP meals (Guthrie et al., 2013).

The objectives of this paper are to identify the types of à la carte foods purchased by elementary and intermediate school students, the average amount of money spent by students to purchase these foods, and the calories provided by these foods prior to the implementation of the new Smart Snacks rules in 2014. School level eligibility for FRP meals was used as a covariate.

2. Methods

2.1. Setting

One school district in the Houston area provided à la carte sales data for 10 schools for the 2012–2013 school year. All lunch transactions for each student in the cafeteria were entered into Point-of-Service (POS) software by the cashiers. The Child Nutrition Director selected the schools based on eligibility for FRP, which ranged from 10 to 79% in the district. Details on school selection have been previously published (Cullen et al., 2015). Three elementary schools with 49–79% of students eligible for FRP and two intermediate schools with about 34% of students eligible for FRP were considered to be lower socioeconomic status. There was an average of 734 kindergarten through grade 5 students enrolled in the six elementary schools: 6.6% African American, 37.6% Hispanic/Latino, 49.3% White, and 6.6% other. The four intermediate schools enrolled an average of 912 students in grades 6–8: 10.9% African American, 28.8% Hispanic/Latino, 45.8% White, and 14.5% other. The study was approved by the Institutional Review Board at Baylor College of Medicine (H-28086). Because the data did not include student identifying information, consent forms were not required.

2.2. Data

The district POS software provides the following daily information: transaction date and identification (ID) number, whether it was a reimbursable lunch meal, the name of each of the individual components selected (fruit #1, fruit #2, entrée, milk, vegetable), and purchased à la carte items (chips, cookies). The school district data manager retrieved the daily transaction data for each school for the 2012–2013 school year, saved each as a text file, and prepared it for the researchers. A separate excel file was created with the calories and cost for every à la carte item available in the schools. This information was obtained from the district's Child Nutrition Department. The school text files were merged with the calorie and cost information of each food item.

A separate spreadsheet was created with the calories and cost for every à la carte item available in the schools from information provided by the district. The school text files were merged with the calorie and cost information of each food item.

2.3. Statistical analyses

The resulting data file was aggregated by transaction ID, school, and date; the calorie and cost for each transaction was summed. The aggregated data file had one transaction per transaction ID and included the amount of money spent for à la carte items, the calories provided by those items, grade level (elementary, intermediate), and whether it was low income school, based on percent of students eligible for FRP meals.

The frequency of à la carte food items purchased was calculated. Differences in the number of students purchasing à la carte items by grade level and school FRP by grade level were assessed with chi-square analysis. Analysis of covariance (ANCOVA) assessed differences in the average weekly cost and calories of à la carte foods purchased by grade level (elementary or intermediate), with FRP status as a covariate. One ANCOVA included all transaction data and one only included the transactions for those students who purchased an à la carte food. The level of significance was set as $p < 0.05$. All the analyses were performed using SAS (version 9.3, 2011, SAS Institute Inc.).

3. Results

The elementary school students purchased a total of 221,343 à la carte food and beverage items over the school year. Nine items were available and included baked chips, crackers, pretzels, yogurt, rice crispy treats, fresh fruit, and pickles as well as bottled water, and plain or flavored milk. The most popular à la carte foods purchased were baked chips at 34.5% of all purchases, followed by rice crispy treats (15.7%), bottled water (7.3%), Goldfish Crackers (6.5%), yogurt cup (4%), and pretzels (3.5%).

The intermediate school students had over forty à la carte food and beverage options available to them, including mozzarella sticks, pizza, burgers, corn dogs, baked chips, frozen desserts, baked goods, sports drinks, and slushies. They made a total of 728,584 purchases: the top items were baked chips (17.5%), sports drinks (13.4%), chocolate chip cookies (13.3%), pizza slice (9.2%), slushies (4.9%), and tea (3.5%).

Significantly more intermediate school students purchased à la carte foods and beverages than elementary school students ($p < 0.001$) (Table 1). Significant differences were also found in à la carte purchases by school FRP status within grade level ($p < 0.001$). Fewer elementary and intermediate students in schools with high FRP eligibility (more low income students) purchased à la carte foods compared with elementary and intermediate school students in low FRP eligibility schools (higher income schools) ($p < 0.001$) (Table 1).

Elementary school students spent significantly less money each week on à la carte food items compared with intermediate school students ($p < 0.001$) (Table 2). The à la carte food items purchased by intermediate school students provided significantly more calories on a weekly basis than those purchased by elementary school students ($p < 0.001$).

When only including those transactions for students who purchased an à la carte food item, similar results were found, but the amounts of money spent and calories purchased were higher (Table 2). Elementary

Table 1
Frequency of à la carte purchase transactions by grade level, school income status based on school FRP^a eligibility, and FRP eligibility by grade level for 6 elementary and 4 intermediate schools in the Houston TX area during the 2012–2013 school year.

	No à la carte purchase		À la carte purchase		x ²	p-Value
	N	%	N	%		
Grade level						
Elementary	269,267	69.9	153,219	28.5	154,755	< 0.0001
Intermediate	116,210	30.2	38,4541	71.5		
Elementary school						
Low income ^a	181,998	67.6	51,535	33.6	45,542.95	< 0.0001
Not low income	87,269	32.4	101,684	66.4		
Intermediate school						
Low income ^a	62,936	54.2	134,864	35.1	13,602.72	< 0.0001
Not low income	53,274	45.8	249,677	64.9		

^a Free or reduced price meal eligibility.

Table 2

Average weekly cost and kilocalories of à la carte purchases from all transactions and from transactions that only included an à la carte item by grade level during the 2012–2013 school year in the Houston TX area^a.

	Elementary schools		Intermediate schools		t	p-Value
	Mean	SE	Mean	SE		
	N = 6		N = 4			
All transactions						
Cost (\$)	0.33	0.07	1.84	0.08	– 14.03	< 0.0001
Kilocalories	49.1	9.6	291.5	11.8	– 15.97	< 0.0001
Only transactions with à la carte purchases						
Cost (\$)	0.84	0.06	2.43	0.07	– 17.86	< 0.0001
Kilocalories	132.8	7.37	390.2	9	– 22.07	< 0.0001

SE = standard error.

^a ANCOVA with school FRP meal eligibility as a covariate.

school students spent significantly less money and purchased fewer calories on competitive foods than intermediate school students ($p < 0.001$ for both) (Table 2).

4. Discussion

In this study almost 72% of students in four intermediate school purchased at least one à la carte food in a cafeteria transaction during the 2012–2013 school year, compared with 28% of students in elementary schools. Intermediate school students purchased significantly more à la carte items, spent significantly more money and purchased significantly more calories on a weekly basis compared to the elementary students. The intermediate schools in the study offered > 40 competitive food items; only nine were available in the elementary schools. The higher availability of items might have resulted in a food environment more enticing for intermediate school students to purchase more à la carte foods.

Previous research has documented that school food environments become less healthy as students move to higher grade levels, and that the food environment influences student choices and consumption (Finkelstein et al., 2008). During the 2004–2005 school year, more secondary school students (53%) consumed à la carte foods on the day of a dietary recall compared to elementary school students (33%) (Guthrie et al., 2013). The older students also consumed twice as many à la carte food items than the elementary school students (Guthrie et al., 2013). Compared to when they were in the fourth grade and did not have access to a snack bar, fifth grade students in middle schools with access to à la carte foods in snack bars consumed less milk, fruit, and non-fried vegetables, and more sugar-sweetened beverages (Cullen and Zakeri, 2004). The third School Nutrition Dietary Assessment Study in 2005 reported a similar trend with consumption of à la carte foods increasing after transition from elementary to middle school (Gordon et al., 2007). Texas students in the 8th grade reported consuming more chips, cookies, brownies, pies, or cakes; and any soda or soft drink compared with 4th grade students (Perez et al., 2007).

The intermediate school students might have had more disposable income to purchase à la carte foods. Peer group influence also increases during this time period (Blum et al., 2014), and could result in more frequent purchases of à la carte foods by intermediate school students.

There were also differences in à la carte food purchases by FRP eligibility of the schools in this study. Only about one-third of students in high FRP eligible elementary and intermediate schools (those with more low income students) purchased an à la carte food, compared with about two-thirds of students in low FRP eligible schools (those with higher income students). National data show that schools in higher income areas report higher revenue from à la carte food sales compared with those in higher poverty areas; 16.9% vs. 12.3% of total district revenues, respectively (Guthrie et al., 2013).

In a study that examined the impact of the Texas Public School Nutrition Policy on middle school student intake, low income students consumed significantly more vegetables and less candy and sugar-sweetened beverages than middle-income school students both pre and post policy (Cullen et al., 2009). The middle income students also reported significantly greater reductions in the percentages of nutrients from the snack bar post-policy than students in the low SES schools (Cullen et al., 2009). These results suggest that the low income students selected the healthy school meal and did not purchase as many snack bar foods prior to the Texas policy implementation, supporting the results in the current study.

New “Smart Snack” guidelines developed by the USDA do not include many of the à la carte food items sold in these participating schools, such as chocolate chip cookies, the granola bar, cheese or pepperoni pizza, crispitos, and chicken tenders. A recent study documented that approximately 63% of à la carte food items sold in schools prior to the “Smart Snack” regulations did not meet the new standards (Mann et al., 2015). The new Smart Snacks foods are lower in energy and higher in nutrients, such as fruit, vegetables, whole-grain rich foods and low fat dairy (Food and Nutrition Service - U.S. Department of Agriculture, 2017). So with fewer selections, the amount of calories purchased should decline and help to improve student energy balance. This has been documented in several previous studies (Snelling and Yezeck, 2012; Cullen and Thompson, 2005). After implementation of nutrient-based standards on competitive foods sold in one middle and 2 high schools, students purchased fewer calories, fat, and saturated fat (Snelling and Yezeck, 2012). Using snack bar sales from 23 middle schools, a potential savings of 47 kcal per day per student was found when the calories for the reduced portion sizes of the foods in the Texas Public School Nutrition Policy were substituted (Cullen and Thompson, 2005). Whether this reduction in calories purchased by students improves energy balance over the day is an important question for future research.

A reduction in à la carte food sales could impact meal program finances (Peterson, 2011). The sale of à la carte foods and other non-reimbursable food items may account for up to 16% of total food service revenue (Peterson, 2011). Using national data from the 2004–2005 school year, revenues averaged \$16, \$82 and \$64 per student per year for elementary, middle, and high school students (Guthrie et al., 2013). During the 2009–2010 school year, average weekly à la carte sales per 1000 students from schools offering à la carte sales from the fourth School Nutrition Dietary Assessment Study were calculated (Fox et al., 2012). The weekly sales from middle school students (\$1713) were higher than for elementary school students (\$605). Elementary and middle schools with higher child poverty levels reported lower weekly sales (\$385, \$1289, respectively) than low child poverty elementary and middle schools (\$699, \$1929, respectively) (Fox et al., 2012).

There have been a few studies examining school food revenues after

new competitive food guidelines were implemented. After implementation of new nutritional standards in California, school food service revenues increased due to greater participation in the reimbursable meal program and the reimbursements from the USDA for those meals (Woodward-Lopez et al., 2010). Similar results were found in a Connecticut study (Long et al., 2013). A recent study examined revenue and participation rates in 11 school districts between 2011 and 2014, assessing the impact of a Massachusetts version of the USDA Smart Snack standards implemented in the fall of 2012 (Cohen et al., 2016). There were initial losses of revenue because of lower à la carte food sales. However, total revenues were similar by the second year of implementation because school meal reimbursement revenues increased due to increased NSLP meal participation rates by students eligible for reduced price meals. The impact of the new Smart Snack standards on school food service revenues should be assessed over longer time periods with diverse school districts in future studies.

Strengths of this research study include data collected throughout an entire school year. Additionally, the data collected were objective and not subject to researcher bias. Limitations of this study include human error in data entry into the Point-of-Service system, which would affect the accuracy of the actual items keyed in per transaction, the reported cost and calories provided by à la carte food items. Students might also have purchased items for other students. In addition, whether students consumed the purchased à la carte items was not assessed and the amount of calories consumed from these food items is unknown. Finally, this study was conducted in 10 schools in one school district in southeast Texas. Therefore, these results might not be applicable to students in other areas of the country.

5. Conclusion

This study documented that intermediate school students spent more money to purchase à la carte foods and purchased more calories than elementary school students prior to the new Smart Snacks guidelines for school à la carte foods and beverages. As part of local school wellness policies, school districts should monitor student à la carte purchases to assess whether the revised à la carte food policies resulted in more healthful food choices at school for all students, regardless of grade level. Maintaining student participation in the school meal programs and assessing the impact of these new standards on school revenues is also important, as budget issues are a concern (Peterson, 2011). Marketing and media campaigns, positive encouragement about the foods during meal service, improved cafeteria design and food presentation and taste testings are all strategies that could be used to improve student food choices (Fulkerson et al., 2004; Hanks et al., 2013; Schwartz, 2007; Wansink et al., 2013; Wansink et al., 2012; Wechsler et al., 1998).

Abbreviations

ANCOVA	analysis of covariance
FRP	free/reduced-price meal
ID	identification
NSLP	National School Lunch Program
SE	standard error
SES	socioeconomic status
USDA	U.S. Department of Agriculture

Conflicts of interest

The authors declare there are no conflicts of interest.

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