Cost of children's healthy versus unhealthy snacks do not differ at convenience stores

Research Brief

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Abstract

Objective: This study compared the prices of unhealthy (chips) and healthy (ready-to-eat fruit) snacks that students are likely to purchase from corner stores.

Methods: Snacks were purchased from 325 New Jersey corner stores; chip prices were compared to fruit prices overall and by store sales volume and block group characteristics.

Results: Prices did not differ significantly between chips and fruit in the overall sample in which both items were available (n=104) (chips: $\$0.46 \pm \0.15 ; fruit: $\$0.49 \pm \0.19 ; $p=0.48$), or by store or block group characteristics. Neither mean fruit prices nor mean chip prices differed by store sales volume or by neighborhood characteristics.

Conclusions and Implications: Promoting ready-to-eat fruits in corner stores to children as a price-neutral alternative to calorically dense snacks can be a viable strategy to improve the nutritional quality of snacks commonly purchased at corner stores. (136 words)

Keywords: diet, food, and nutrition

Introduction

Small retail food stores tend to concentrate near schools,¹ providing students ready access to snacks on the way to and from school each day.² While some corner stores may stock healthier options, these tend to be more expensive compared to their less nutritious counterparts.³ Food prices contribute to students' eating behaviors, as adolescents, most of whom have a limited amount of spending money, consider price, among other factors, when choosing which foods to purchase and eat.^{4,5} The purpose of this study was to compare corner store prices of an energy-dense, nutrient-poor snack students are likely to purchase (chips),² to prices for healthy, ready-to-eat snacks (fruit). We hypothesized that fruit would cost more than chips.

Methods

Store audits were conducted in 2014 for a cross-sectional study that developed and validated a reduced audit instrument.⁶ Details of that study are provided elsewhere.⁶ Briefly, it was part of the New Jersey Child Health Study, and the sample of 325 New Jersey corner stores was powered for that project. The sampling frame consisted of small food stores listed in 2013 commercially available business lists (InfoUSA and Nielsen) for the metro areas of Camden, Newark, New Brunswick, and Trenton, NJ. Because the only data collected from participants related to store inventories, the study was granted an exempt status by the Arizona State University IRB.

Addresses of stores were geocoded using ArcGIS to obtain Census block group codes. Stores were matched with their corresponding block group's characteristics including proportion of residents at least 25 years old with at least a high school education, median income, proportion of

households earning less than 150% of the federal poverty level (FPL), race/ethnicity, proportion of female-headed households, proportion of households with residents under 18 years old, and proportion of residents at least 16 years old who are unemployed. Block group characteristics were obtained from the American Community Survey Summary File Retrieval Tool.⁷ Store sales volume was obtained from business files.

Data collectors completed the 325 audits in June, July, August, and December. After completing each audit, data collectors purchased the smallest bag of chips sold in the store and a ready-to-eat fresh fruit if available. In most stores the smallest bag of chips was one ounce; in some cases, however, only larger sizes were available. Fresh fruits were considered ‘ready-to-eat’ if they did not require peeling (e.g., apple), if they could be peeled without a utensil (e.g., orange), or if they were cut up and in a single-serve container (e.g., cup of watermelon). Purchased fruits that qualified for this analysis included bananas, apples, oranges, pears, plums, peaches, nectarines, strawberries, and a mixed fruit cup. Data collectors recorded the name, size, and price of each purchase they made. The present analysis includes only stores from which a one-ounce bag of chips and a ready-to-eat fruit were purchased.

Means and standard deviations were used to summarize purchase prices, store sales volume, and block group characteristics. Paired t-tests were conducted to compare fruit and chip prices overall, by store sales volume and block group characteristics, and by time of year (3 summer months vs December). A one-way between-groups analysis of variance was conducted to analyze differences in chip and fruit price differences and to analyze fruit and chip prices

separately according to store sales volume and block group characteristics. Chip and fruit prices were not normally distributed, and were log-transformed for analysis.

Results

Characteristics of the stores included in the sample and of the block groups where these stores were located are presented in Table 1. On average $45\% \pm 19\%$ of households in block groups where sampled stores were located earned less than 150% of the FPL. Block groups were predominately non-Hispanic black and Hispanic, with an average unemployment rate of $13\% \pm 6\%$. Further, $70\% \pm 16\%$ of residents across all block groups had at least a high school education or general education diploma (GED). The average sales volume of all stores was less than \$1 million. One-ounce bags of chips were purchased from 56% of stores, 54% of stores had ready-to-eat fruit, and 32% of stores had both. The mean price of all chips ($n=181$) was $\$0.47 \pm \0.16 compared to $\$0.52 \pm \0.20 for all ready-to-eat fruit ($n=177$) (Table 2). Prices did not differ between summer months and December. When comparing the mean price of chips to that of fruit in only stores where both items were available ($n=104$), chips were $\$0.46 \pm \0.15 and fruit was $\$0.49 \pm \0.19 (Table 2, Figure). This difference was not significant. As shown in the figure, while mean fruit prices tended to be a few cents higher than mean chip prices were across all subgroups, none of the differences were statistically significant, nor were any of the differences between the mean cost of fruit and chips significant. Neither mean fruit prices nor mean chip prices differed by store sales volume or by neighborhood characteristics.

Discussion

This study focused on two food items students might be inclined to purchase as snacks from small stores often located near schools.^{1,2} In the overall sample as well as in all subsamples, a student would spend approximately the same amount on either a ready-to-eat fruit or a one-ounce bag of chips.

This is good news for communities instituting healthy corner store programs to increase the availability of healthy foods in their neighborhoods. Small-store owners might be reluctant to lower prices on fruits and vegetables to increase sales, but in this sample, price reductions seem unnecessary. Promoting ready-to-eat fruits to children may result in students choosing fruit over an unhealthy snack, and would be more viable for store owners than would lowering prices. Borradaile et al. found that, on average, children purchased approximately 360 calories per trip to a corner store on the way to/from school, and that those purchases were primarily composed of chips, candy, and sugary beverages.² A student who visited a corner store just three times per week and exchanged an energy dense, nutrient poor snack for a fruit or vegetable snack could reduce his/her calorie consumption by approximately 300 calories per week, while also adding vitamins, minerals, and fiber to his/her diet.

Healthy corner store initiatives targeting children for interventions to encourage them to choose healthy snacks over unhealthy ones have not always proven effective.^{8,9} A change in societal norms concerning what constitutes a “snack,” a process that could require years of exposure, may be necessary for a change in children’s snacking preferences.

Healthier foods and food patterns have been found to be more expensive overall compared to their less nutritious counterparts.¹⁰ Almost half the stores in this sample had no ready-to-eat fruits, and an alternative fruit or vegetable, such as a mango, was purchased. When these fruits and vegetables were included in analyses, healthy snacks cost significantly more compared to chips. The increased price of these types of fruits and vegetables is relatively inconsequential when considering their impact on children's purchasing behaviors, as children are unlikely to select as a snack a fruit or vegetable requiring any sort of preparation before it can be consumed. The more important issue is the lack of any child-friendly ready-to-eat fruits or vegetables in 46% of stores sampled. Making healthy snacks that children can immediately eat available in corner stores is another important consideration in addition to price and promotion considerations.

Implications for Research and Practice

Promoting ready-to-eat fruits in corner stores to children as a price-neutral alternative to calorically dense snacks can be a viable strategy to improve the nutritional quality of snacks commonly purchased at corner stores. These promotions will require considerable ongoing effort to be effective as they are competing both with societal norms of snacking, and with established and constantly evolving promotional efforts by large corporations.

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138 **Figure caption**

139 Figure. Comparison of mean chip prices overall; by store sales volume; and by block group
140 majority race, education level proportion, proportion earning <150% of the Federal Poverty
141 Level, and unemployment proportion. Only stores that have both chips and ready-to-eat fruit.
142 Paired t-tests used to compare fruit prices to chip prices in each category. None of the
143 comparisons were significant. Data transformed for analysis.

Table 1

Table 1. Mean proportions of education level, employment status, race/ethnicity, household income, and head of household status in block groups in which study stores were located; mean employee count, sales volume, and square footage of study stores

Block group characteristics (n=104)	Mean ± SD (%)
At least high school/general education degree (GED) education	70±16
Unemployed	13±6
White, non-Hispanic	5±12
Black, non-Hispanic	54±34
Hispanic/Latino	37±31
Household income <150% of federal poverty level	45±19
Female head of household w/children	28±12
Store characteristics (n=100)	Mean ± SD
Number of employees	2.8±1.2
Sales volume (\$)	739,177±268,067
Floor area (square feet)	1272±129

Table 2. Price means, medians, and inter-quartile ranges of one-ounce chips and ready-to-eat fruit purchased from study stores

	Mean ± SD (\$)	Median (\$) (IQR)
All		
Chips (n=181)	.47±.16	.50 (0.35-0.50)
Fruit (n=177)	.52±.20	.50 (0.40-0.50)
Stores with both chips & fruit (n=104)		
Chips	.46±.15	.50 (0.35-0.50)
Fruit	.49±.19	.50 (0.35-0.50)