

Convenience Stores Surrounding Urban Schools: An Assessment of Healthy Food Availability, Advertising, and Product Placement

Hilary Gebauer and Melissa Nelson Laska

ABSTRACT Adolescent obesity is a national public health problem, particularly among urban populations. Recent evidence has linked neighborhood food environments to health and nutrition status, with easier access to convenience stores being associated with increased risk for obesity. Little is known about the availability of healthy purchasing options within small, urban food stores, or the extent to which these factors are relevant to youth. The objective of this research was to characterize various features of the food environment within small convenience stores located nearby urban junior high and high schools. In-store audits were conducted in 63 stores located within 800 m of 36 urban Minnesota public secondary schools. Results indicated that a limited number of healthier beverages (i.e., water and 100% fruit juice) and snack options (i.e., nuts and pretzels) were available at most stores ($\geq 85\%$). However, a wide range of healthy snack options were typically not available, with many specific items stocked in less than half of stores (e.g., low-fat yogurt in 27% of stores and low-fat granola bars in 43%). Overall, 51% of stores had fresh fruit and 49% had fresh vegetables. Few stores carried a range of healthier snack alternatives in single-serving packages. All stores had less healthful impulse purchase items available (e.g., candy) while only 46% carried healthier impulse items (e.g., fruit). Most stores (97%) had food/beverage advertising. Overall, convenience stores located in close proximity to secondary schools represent an important and understudied component of the youth food environment.

KEYWORDS Obesity, Urban food access, Neighborhood food environment, Corner store, Convenience store

INTRODUCTION

Obesity is a major public health concern.¹ Research suggests that better access to supermarkets is associated with healthier dietary intake² and reduced risk for obesity;³ in contrast, access to convenience stores is associated with increased risk for obesity.^{3,4} Overall, supermarkets tend to offer a wider variety of high quality healthy foods at lower prices, whereas convenience stores tend to carry high-calorie processed foods at higher prices.^{3,5} Many urban areas across the USA have little to no access to supermarkets selling healthy foods, making this an important issue for urban populations.³

Most research to date in this area has focused on the impact of neighborhood food stores on adult eating patterns, with scant attention to youth. In a recent study,

Gebauer and Laska are with the School of Public Health, Division of Epidemiology and Community Health, University of Minnesota, Minneapolis, MN, USA.

Correspondence: Melissa Nelson Laska, School of Public Health, Division of Epidemiology and Community Health, University of Minnesota, 1300 S. 2nd Street, Suite 300, Minneapolis, MN 55454, USA. (E-mail: mnlaska@umn.edu)

increased availability of convenience stores near schools was associated with increased body mass index among students.⁶ Other research has yielded similar, though somewhat less consistent, findings among adolescents ages 11–18.⁷ Although many recent nutrition interventions have highlighted the role of school meals in youth obesity prevention,⁸ it is also important to examine opportunities beyond school boundaries.⁹ For example, research indicates that food retailers cluster around secondary schools,¹⁰ providing additional food purchasing opportunities for youth before, during, and after school.

Industry reports indicate that 75% of adolescents shop at convenience stores at least weekly.¹¹ A recent study revealed that 4th–6th graders in Philadelphia purchased 356 cal at a time, on average, in snacks from convenience stores located in close proximity to their schools. Over half of children purchased snacks at these stores daily.¹² This study was the first of its kind and suggests that convenience stores, particularly those near schools, have an important impact on youth eating behaviors. Other recent research has shown that as little as 110 cal daily may be sufficient to close the “energy gap” (i.e., the magnitude of energy imbalance responsible for excess weight gain among children in the USA over the last two decades).¹³ Using the rule-of-thumb that an excess caloric intake of 3,500 cal is equivalent to 1 lb of weight gain,¹⁴ an additional intake of 350 daily snack calories could result in substantial weight gain for many adolescents.

Urban convenience stores are gaining widespread attention as potential targets for promoting health and healthy food availability.¹⁵ However, there is scant peer-reviewed research to date that has systematically evaluated availability of healthy food and beverage options in these facilities,¹⁶ or other important features, such as advertising, promotion, and placement of more versus less healthful foods. Therefore, our research aims were to: (1) describe the presence of convenience stores within walking distance (800 m) of urban junior high and high schools; (2) describe the availability of healthier foods, snacks, and beverages in these convenience stores, including the availability of snacks in single-serve packages; (3) describe food/beverage advertising and other store advertising (e.g., tobacco advertising) and the availability of “impulse buys” at checkout counters.

METHODS

This study was completed in convenience stores within 800 m (~0.5 miles) of all 36 public junior high and high schools in St. Paul and Minneapolis, Minnesota. Overall, these schools represent a diverse array of students; 25 schools (69%) served populations in which >70% of students were eligible for free/reduced price lunch.

Exemption for this study was granted by the University of Minnesota IRB, as there was no human subject involvement.

Convenience stores were initially identified using straight-line buffers generated via Geographic Information Systems (GIS), including InfoUSA business data to provide facility addresses. Detail describing GIS protocols are publicly available (<http://www.designforhealth.net/techassistance/trec.html>). Stores were identified using North American Industry Classification System (NAICS) codes for “convenience stores,” defined as establishments “primarily engaged in retailing a limited line of goods that generally includes milk, bread, soda, and snacks.”¹⁷ Existence of each store was confirmed during data collection. Additional unidentified stores that met the definition of a “convenience store” were added while data collectors were in the field.

Data were collected in 63 convenience stores in spring 2008. Data consisted of: the presence of selected healthy foods, the presence of single-serving packages of these foods, the presence/promotion of food advertising, and the presence of selected “impulse buy” items at the cash register.

Food, Snack, and Beverage Availability

Data collectors assessed the presence of more healthful food/beverage items using an assessment tool described in previously published research.¹⁶ For the purposes of this analysis, we excluded data on “healthy staple foods” (e.g., brown rice, beans, and lentils),¹⁶ as these foods do not represent typical adolescent snack purchases. We included data on the availability of four additional foods/beverages (soda, diet soda, cold tea, and chips), as a means of comparison. Finally, we assessed the availability of these food/beverage products in single-serving packages. See Table 1 for a complete list of foods included in this analysis.

Specific definitions for individual products (e.g., “low-fat”), determined as part of a larger, multi-site study, have been previously published.¹⁶ (See Table 1.) A single-serving package was defined as a single piece of fruit/vegetable, packaged food/beverage listed as containing one serving, single packaged sandwich or can of soda.

Advertising and Impulse Purchases

Data were collected regarding the presence of advertisements for foods and beverages. The advertisement location and items advertised were recorded, including advertising outside and inside stores. For comparison, the presence of tobacco advertising was also recorded.

Data were collected on the presence of impulse purchase options, defined as items that customers could easily reach while standing at the checkout counter. These included more and less healthful food items. See Table 3 for a complete list of impulse foods assessed.

Analysis

Analyses examined basic descriptive characteristics, including sample means and ranges.

RESULTS

Overall, there was an average of 2.2 convenience stores within the 800-m buffers surrounding each urban school. Among the 36 schools, 83% ($n=30$) had at least one convenience store located within 800 m, with an average of 1.9 stores located within 800 m of junior high schools and 2.5 stores located within 800 m of high schools. During data collection, data collectors found that eight stores identified via the geocoded business data were not in operation. Fifteen additional stores meeting NAICS criteria for convenience store were identified that were not included in the business data; these were included in the sample.

Findings regarding snack and beverage availability are outlined in Table 1. All convenience stores assessed offered less healthful foods and beverages (e.g., soda and chips). Bottled water, diet soda, and 100% fruit juice were available at 98% of stores. Nuts and pretzels were available at 97% and 89% of the stores, respectively; however, they were available in single-serving packages in 56% and 14% of the stores, respectively. Low-fat crackers were in 60% of stores but only in single-

TABLE 1 Availability of food, snack, and beverage items in convenience stores located within 800 m of urban, public secondary schools in Minneapolis and St. Paul, MN (*n* = 63)

	Percent of stores with item available (<i>n</i>)	Percent of stores with item available in single-serving packaging (<i>n</i>)
Fruits and vegetables	92% (58)	60% (38)
Fresh vegetables	49% (31)	33% (21)
Fresh fruit	51% (32)	43% (27)
Pre-packaged salad	29% (18)	22% (14)
Canned/frozen vegetables	86% (54)	0% (0)
Canned fruit (in light syrup or juice)	79% (50)	21% (13)
Applesauce (no added sugar)	10% (6)	2% (1)
Beverages and dairy	100% (63)	100% (63)
Skim/1% milk	89% (56)	29% (18)
Yogurt (low-/non-fat) ^b	27% (17)	24% (15)
Low/reduced fat cheese ^b	56% (35)	22% (14)
Water	98% (62)	98% (62)
100% fruit juice	98% (62)	57% (36)
Snacks	100% (63)	94% (59)
Fresh/pre-packaged sandwiches	81% (51)	79% (50)
Granola/cereal bars (low sugar/fat) ^{b, c}	43% (27)	32% (20)
Baked/low-fat chips ^b	63% (40)	41% (26)
Pretzels	89% (56)	14% (9)
Low-fat popcorn (popped) ^b	51% (32)	11% (7)
Low-fat crackers ^b	60% (38)	8% (5)
Graham/animal crackers	44% (28)	8% (5)
Trail mix/dry fruit (low-fat) ^b	41% (26)	17% (11)
Nuts	97% (61)	56% (35)
Additional items	100% (63)	98% (62)
Soda	100% (63)	90% (57)
Diet soda	98% (62)	89% (56)
Cold tea	97% (61)	40% (25)
Chips	98% (62)	44% (28)

^aSingle-serving is defined as a single piece of fruit or single vegetable; packaged food/beverage items listed as containing only one serving; a single packaged sandwich; single can of soda. Items packaged as single servings but sold in multiples were not counted as single-serving unless you could purchase one serving individually (i.e., pudding cups sold in a four pack were not counted as a single serving)

^bLow-fat items were defined as having <10% of the daily value (DV) for fat

^cLow sugar items were defined as having <10 g sugar per serving

serving packages in 8% of stores. Fresh vegetables were in 49% of the stores and fresh fruits in 51% of stores. Availability of single-serving options for vegetables and fruits were 33% and 43%, respectively.

Table 2 describes the presence and placement of advertisements. Most stores displayed advertising for food and beverages (97%) and tobacco products (97%), primarily outdoors and on checkout counters. Overall, 94% of the advertisements were for less healthful products (e.g., soda, beer, chips, and prepared foods), and 36% were for more healthful products (e.g., milk, juice, and produce).

Table 3 describes the availability of impulse buys (i.e., items that can be easily reached while standing at the checkout). All stores carried less healthful impulse buys, while only 46% of stores carried more healthful impulse buy options. Candy, the mostly widely available impulse item, was available at 94% of stores. Of the healthful items, bagged seeds/nuts (in 27% of stores) and fresh fruit (in 22% of stores) were most commonly available.

TABLE 2 Presence and placement of advertisements in convenience stores ($n=63$)

	Percent of stores with food and/or beverage advertisements (n)	Percent of stores with tobacco advertisements (n)
Total	97% (61)	97% (61)
At checkout	81% (51)	87% (55)
Below checkout/on floor	37% (23)	30% (19)
Above checkout	40% (25)	83% (52)
Outdoors	83% (52)	87% (55)

DISCUSSION

Discussions about food availability in small, urban corner and convenience stores often assume that few, if any, healthy options are available. Scant research has objectively assessed the types of foods available in small stores, yet could be instrumental in guiding the development of nutrition programs targeting these markets. Data collected in this study reveal that there are indeed healthier food options available in some stores and that some foods are available in single-serving packages. However, healthier foods are not as widely or consistently available as less healthful foods. The fact that convenience stores are so easily accessible makes them an important part of the adolescent food environment. Knowledge of which foods are available is important for research, education, and health promotion.

Beverages are a popular convenience store purchase for youth, particularly soda and artificially flavored fruit drinks;¹¹ thus, interventions promoting healthy beverages could be highly impactful. Our findings indicate that alternatives to soda (e.g., bottled water and 100% fruit juice) were widely available; however, serving sizes may be inappropriate. For example, 100% fruit juice was often sold in multiple-serving containers, which may promote excess intake. Youth interventions promoting healthy snack alternatives should include a focus on portion sizes, and work with store owners to stock single-serving packages.

Barriers for storeowners in stocking healthier snack products may include the challenge of switching over stock, lack of infrastructure (e.g., coolers and display space), and fear of losing business. However, there may be creative solutions to these perceived barriers. For example, while many convenience stores are small, nearly all have beverage coolers. Storeowners could convert cooler space to stock healthy snacks (e.g., low-fat yogurt, fresh fruit, and ready-to-eat vegetables). Several convenience stores in

TABLE 3 Availability more healthful and less healthful impulse purchase offerings in convenience stores ($n=63$)

Less healthful items		More healthful items	
Product	Percent of stores offering (n)	Product	Percent of stores offering (n)
Any	100% (63)	Any	46% (29)
Candy	94% (59)	Bagged nuts/seeds	27% (17)
Gum/candy machine	52% (33)	Fresh fruit	22% (14)
Chips	40% (25)	Bottled water	8% (5)
Soda	16% (10)	Granola bars	0% (0)

Impulse purchase items were defined as items that could easily be reached while standing at the checkout counter

this study (particularly those operated by larger retail chains) had “grab-and-go” cases, carrying yogurt, individual bags of baby carrots, and pre-made sandwiches. These stores often had baskets of apples, oranges, or bananas available in close proximity to the cash register. Therefore, there appear to be examples of viable business strategies that could be used to promote sales of healthful food items.

Advertising practices deserve additional research, as many food, alcohol and tobacco companies may provide incentives for stores to feature their products. Storeowners may feel that advertising revenue is essential for the success of their business. It is critical that public health professionals address these concerns in future efforts.

To our knowledge, this work is among the first of its kind to document important features of urban convenience stores surrounding public secondary schools, which may have a substantial impact on youth purchasing patterns. One strength of this study was the objective data collection methods. This type of research can be time and labor intensive, and thus has only been used in current research to a limited extent.² In light of these factors, we could not conduct comprehensive audits of all products, nor could we record specific nutritional contents of many foods. We do not have in-depth data available to characterize pricing, quality, or quantity of specific foods or the specific number of advertisements present; these are factors that likely play a role in food purchasing decisions. These data were collected across one geographic region, and previous research suggests that there are important regional differences in small store food availability.¹⁶ In addition, given our limited sample size, we were not able to examine relationships between food availability and sociodemographic composition of the schools/neighborhoods in which stores were located. Although a wide range of ethnic and socioeconomic populations are represented in these public schools, data were not differentiated based on these criteria. Finally, this study did not assess adolescent purchasing behaviors of food and beverage items. This is an important area for future research.

In conclusion, understanding the foods available in convenience stores near schools may be useful in developing youth-focused nutrition interventions. Although there has been much recent attention on school-based obesity prevention, we also need to expand efforts to include the food environment surrounding schools.⁹ In our urban sample, nearly all public secondary schools had at least one convenience store within one half mile. While many stores carried healthier beverage alternatives, a wide array of healthy snack options in convenient single-serving packages were lacking. Less healthful snacks were more widely advertised, had better placement in stores and were provided in a consistent and extensive selection in virtually all stores. Convenience stores located in close proximity to junior high and high schools represent an important and understudied component of the youth food environment, particularly in urban areas, and should be a part of future interventions to reduce obesity. Effective intervention strategies partnering with store owners are needed to improve the availability and price promotion of health foods and snacks in small, urban markets, as well as possible regulatory efforts that may limit students' access to unhealthy food options surrounding schools.

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