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Convenience store visits by US adolescents: Rationale for healthier retail environments

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Abstract

Given interest in the public health impact of convenience stores, it is surprising that so little is known about the popularity of these destinations for youth. We surveyed 2,772 adolescents (age 13–16) from a nationally representative web panel of US households. Nearly half (47.5%) of adolescents reported visiting convenience stores at least weekly. Significant risk factors for frequent visits were age, being African American, living in rural areas and in areas with higher levels of neighborhood deprivation. With approximately 4.1 million US adolescents visiting convenience stores at least weekly, new policies and other interventions are needed to promote a healthier retail environment for youth.

Keywords

retail; marketing; disparities; obesity; alcohol; tobacco

Short report

In 2012, 18.4% of US adolescents were obese, 12.9% drank alcohol and 6.7% smoked cigarettes in the past 30 days (Park et al., 2014). Socio-ecological explanations for these health risks highlight the important role of the retail environment (Mhurchu et al., 2013), where sugar-sweetened beverages, energy-dense snacks, alcohol, and tobacco products are widely available, inexpensive, and heavily advertised (Glanz et al., 2012; Hillier et al., 2009; Paynter and Edwards, 2009). Convenience stores are the dominant channel for sales and marketing of cigarettes (American Heart Association and Campaign for Tobacco Free Kids, 2012), and the presence of unhealthy products as well as the absence of healthy food alternatives in convenience stores are well documented (Horsley et al., 2014; Rinkus et al., 2013; Sharkey et al., 2012).

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High retail availability of tobacco, alcohol and other harmful products reduces search costs for these items and makes them more accessible to youth. In Canada, adolescents who lived near convenience stores were more likely to purchase unhealthy food at those locations (He et al., 2012). In the US, adolescents' proximity to convenience stores is associated with greater consumption of sugar-sweetened beverages (Laska et al., 2010), as well as higher rates of obesity (Powell et al., 2007) and past 30-day alcohol consumption (Reboussin et al., 2011). Similar results have been found in other countries. For example, living in areas with a high concentration of convenience stores has been associated with reduced fruit and vegetable consumption in Australia (Timperio et al., 2008), and greater odds of smoking and greater alcohol consumption in Taiwan (Wang et al., 2013). In addition, cigarettes were more likely to be sold below the recommended retail price at milk bars (i.e. convenience stores) near schools in economically disadvantaged areas of Victoria, Australia (McCarthy et al., 2011).

Regardless of whether convenience stores are a primary source of unhealthy products for adolescents, they are routinely and unavoidably exposed to retail marketing for unhealthy products in such stores. Marketing exposure may influence adolescent health behaviors through multiple mechanisms, including cue reactivity, which occurs when the presence of substances like sugar-sweetened beverages, alcohol, and tobacco or their proxies (e.g., packaging and advertising) induce a desire to consume those products (MacKillop et al., 2010). In the US, adolescents' frequent exposure to retail advertising was associated with higher odds of drinking alcohol (Hurtz et al., 2007), and a higher incidence of smoking initiation (Henriksen et al., 2010). In Japan, adolescents who visited convenience stores on all or some days were significantly more likely than other peers to be current smokers (Watanabe et al., 2013). Similar results were observed in a population-based survey of adolescents in New Zealand (Paynter et al., 2009).

Alternatively, convenience stores may be neighborhood locations where youth with less supervision and a greater propensity for risk taking or sensation seeking choose to congregate (Clampet-Lundquist et al., 2011). For example, adolescents in Nevada who were high-risk drug users were more likely to eat at convenience stores (Benedict et al., 1999) and in New Zealand, areas with a higher concentration of convenience stores had higher rates of violent crime (Day et al., 2012).

Given increased interest in the public health impact of convenience stores, it is surprising that so little is known about the popularity of these destinations for adolescents. A study of post-purchase interviews with Philadelphia youth (grades 4–6) reported that 75.2% visited convenience stores at least once weekly (Borradaile et al., 2009); however, post-purchase interviews could overestimate the frequency of store visits for the general population. From a school-based survey of 6th–8th graders (ages 11–14) in a large California community, we previously reported that two-thirds of adolescents visited convenience, small grocery or liquor stores at least weekly (Henriksen et al., 2004). This report addresses a substantial gap in the literature by estimating the frequency of visiting convenience stores in a nationally representative sample of US adolescents.

Methods

We report cross-sectional data from an internet panel that uses address-based sampling to create a representative sample of US households (GfK, Inc.). One parent and one age-eligible teenager (age 13–16) per household completed surveys about environmental and social influences on tobacco use, including exposure to retail marketing. In order to obtain a sufficiently large sample, the panelists were recruited at three time points between April 2011 and December 2012. The response rate was 38% among all survey invitations, 70% among screened panelists, and 98.9% among those who qualified, which is typical for web-based and other national surveys of adolescents (Kester et al., 2013; Phillips-Salimi et al., 2012). Parental consent and adolescent assent were obtained following procedures approved by the Stanford University IRB.

Adolescents reported how often they visited a convenience store in the past three months, using a six-point scale (never, once a month, two or three times a month, once a week, two or three times a week, or almost every day). Convenience stores with and without gas were identified by examples of national and regional chains. The same item was repeated for “small markets or corner stores that have only one or two cash registers and a limited selection of fresh fruits, vegetables, and uncooked meats,” which are also considered convenience stores. The primary outcome was whether adolescents visit either store type at least weekly.

Covariates were attributes of adolescents, their household and census tract. Individual demographics were gender, age, race, ethnicity, ever smoking and risk taking score, which was a composite measure including three items about risk (Flay, Hu & Richardson, 1998) and four items about sensation seeking (Stephenson, Hoyle, Palmgreen & Slater, 2003) (Cronbach’s $\alpha=0.87$). Household characteristics were single-parent household, location in a metropolitan statistical area as well as household income (provided by GfK). Income was recoded to compare low-income households (less than \$25,000 per year) with others. In addition, we calculated a neighborhood deprivation index (Messer et al, 2006) comprised of eight intercensal estimates for each tract (Geolytics, Inc) : percent of individuals below poverty level; percent of female-headed households; percent of households with incomes less than \$30,000/year; percent of households with public assistance; percent unemployed; percent of males in management; percent of adults without a high school degree; percent of households with more than one person per room. Index was scored such that higher numbers indicated a greater level of deprivation.

Weighted data were analyzed to yield nationally representative estimates of adolescents (ages 13–16) based on age, gender, race, region and household income. Unadjusted logistic regression models examined the bivariate associations of participant demographics, household characteristics, and neighborhood deprivation with self-reported frequency of visiting convenience stores. A multivariate logistic regression model was used to examine which of these characteristics were associated with higher odds of visiting convenience stores at least weekly when all variables were entered simultaneously.. Analyses were conducted using IBM SPSS Statistics for Windows, version 21.0.

Results

The study sample was diverse, including many minority and low-income adolescents (see Table 1). Nearly half (47.5%) of adolescents reported visiting convenience stores at least weekly and of those, 14.9% visited convenience stores daily.

In unadjusted models, all individual and household/tract characteristics were associated with visiting convenience stores at least weekly (see Table 2). In the multivariate model, age (OR=1.16, 95% CI= 1.07; 1.25) and being African American (OR=1.92, 95% CI=1.49, 2.47) were associated with significantly higher odds of weekly visits, and this racial difference accounted for household income and neighborhood deprivation. Both specific risk behaviors (ever smoking) and the risk taking score were also associated with significantly higher odds of visiting convenience stores at least weekly. Living in rural areas and neighborhood deprivation were the only household/tract characteristics that were associated with higher odds of weekly visits in the multivariate model.

Discussion

This is the first population-based study to document adolescents' exposure to convenience stores -- venues where the presence of unhealthy products and absence of healthy alternatives are well documented. Extrapolating from 2010 Census data about the number of US residents (age 13–16), we estimated that approximately 4.1 million US adolescents visit convenience stores at least once a week. Adolescents who were more likely to visit convenience stores at least weekly were from subgroups that suffer health disparities—African American, rural populations, and those living in areas of greater deprivation. Frequent visits to convenience stores by these subgroups may reflect a relative lack of larger food stores nearby, particularly in rural areas and communities with high levels of neighborhood deprivation where small food stores are numerous and supermarkets are scarce (Larson et al., 2009). Future research should explore the different ways that the built environment in rural areas and in areas with high deprivation affect adolescents' visits to convenience stores.

In this US sample, adolescents who were ever or current smokers were more than twice as likely to visit convenience stores at least weekly. This association is consistent with other cross-sectional and longitudinal surveys about the impact of exposure to tobacco marketing at the point of sale (Henriksen et al., 2010; Robertson et al., 2015). However, this study could not disentangle the extent to which accessibility of tobacco products or visibility of marketing explains this association because the current study did not measure density or proximity of convenience stores. Future research should consider the extent to which the concentration of convenience stores affects health behaviors, in much the same way that research on alcohol outlet density examines different types of outlets (e.g. on- and off-premise) (e.g. Gruenewald, 2007).

The use of multiple items to assess visits to a variety of convenience stores (gas stations, corner stores, small markets, bodegas) is a strength of the current study. The cross-sectional design is a limitation, and longitudinal research is needed to explain whether and how

frequent exposure to convenience stores is associated with short- and long-term health risks for adolescents, particularly obesity and use of alcohol and tobacco. The response rate is also a limitation, but is consistent with other web panel and random-digit-dial surveys of adolescents (Kester et al., 2013; Phillips-Salimi et al., 2012).

Results from this survey of a nationally representative sample of households with adolescents (age 13–16) suggests that nearly half of all US youth visit convenience stores weekly, where they are routinely exposed to marketing for tobacco, alcohol, sugar-sweetened beverages and other unhealthy products. Evidence about the frequency with which adolescents visit convenience stores is important to stimulate policy change and other interventions that aim to create a healthier retail environment for youth. In addition to regulating retail marketing, other strategies that could mitigate the health risks for adolescents are zoning ordinances to restrict the location and number of convenience stores as well as tobacco and alcohol licensing practices that could reduce the number of outlets that sell tobacco and alcohol.

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Table 1

Participant demographics and household characteristics: US adolescents (ages 13–16)

	n	%	Convenience store visits	
			Less than weekly (%)	At least weekly (%)
Student characteristics				
Gender				
Female	1351	48.7	54.9	45.1
Male	1421	51.3	50.2	49.8
Age				
13	663	23.9	58.9	41.1
14	679	24.5	53.1	46.9
15	683	24.6	52.9	47.1
16	748	27.0	46.0	54.0
Race				
White	2023	73.0	55.8	44.2
African American	441	15.9	36.1	63.9
Asian Pacific Islander	119	4.3	68.9	31.1
Other	189	6.8	45.2	54.8
Ethnicity				
Non-Hispanic	2216	80.3	53.7	46.3
Hispanic	545	19.7	46.9	53.1
Smoking status				
Never	2247	81.3	57.7	42.3
Ever (not past 30 days)	411	14.9	32.8	67.2
Current (past 30-day use)	106	3.8	16.0	84.0
		Mean(SD)		Mean(SD)
Risk-taking score (max=5)	2270	2.58(0.86)	2.43 (0.80)	2.74(0.90)
Household or tract characteristics				
Household income				
Less than \$25K	492	17.7	40.2	59.8
\$25K or more	2280	82.3	55.2	44.8
Single-parent household				
No	2130	77.1	54.8	45.2
Yes	633	22.9	44.8	55.2
Metropolitan Statistical Area (MSA)				
No	437	15.8	41.6	58.4
Yes	2335	84.2	54.5	45.5
		Mean (SD)		Mean (SD)
Neighborhood deprivation*	2570	−0.21(0.90)	−0.43(0.81)	0.01(0.94)
(min = −1.78, max = 3.77)				

* Note: higher numbers indicate greater neighborhood deprivation; MSA is the abbreviation for metropolitan statistical area.

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Table 2

Logistic regression models predicting at least weekly visits to convenience stores among US adolescents age 13–16, (n=2,772)

	Unadjusted		Adjusted	
	OR	95% CI	OR	95% CI
Student characteristics				
Gender				
Female	Ref.		Ref.	
Male	1.21*	[1.04, 1.41]	1.17	[0.99, 1.38]
Age				
	1.17***	[1.10, 1.25]	1.16***	[1.07, 1.25]
Race				
White or all else	Ref.		Ref.	
African American	2.22***	[1.80, 2.74]	1.92***	[1.49, 2.47]
Ethnicity				
Non-Hispanic	Ref.		Ref.	
Hispanic	1.32**	[1.09, 1.59]	1.16	[0.93, 1.44]
Smoking status				
Never	Ref.		Ref.	
Ever or current	3.26***	[2.65, 4.01]	2.33***	[1.84, 2.93]
Risk-taking score				
	1.53***	[1.40, 1.68]	1.45***	[1.30, 1.60]
Household or tract characteristics				
Low-income household (<\$25,000)				
No	Ref.		Ref.	
Yes	1.83***	[1.50, 2.24]	1.08	[0.84, 1.38]
Single-parent household				
No	Ref.		Ref.	
Yes	1.50***	[1.25, 1.79]	0.98	[0.79, 1.21]
Rural (not in MSA)				
No	Ref.		Ref.	
Yes	1.68***	[1.37, 2.07]	1.55***	[1.23, 1.96]
Neighborhood deprivation				
	1.78***	[1.62, 1.96]	1.57***	[1.41, 1.75]

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Note.
*
p<.05,
**
p<.01,
***
p<.001.

The adjusted model includes all variables in the table as well as a three-category variable for data collection time cohort, which indicated slightly more frequent visits for the second refreshment panel than for the first and third panels.