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Is adolescent smoking related to the density and proximity of tobacco outlets and retail cigarette advertising near schools?

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ABSTRACT

Objective. To examine the quantity (density) and location (proximity) of tobacco outlets and retail cigarette advertising in high school neighborhoods and their association with school smoking prevalence.
Methods. Data from the 135 high schools that participated in the 2005–2006 California Student Tobacco Survey were combined with retailer licensing data about the location of tobacco outlets within walking distance (1/2 mi or 805 m) of the schools and with observations about the quantity of cigarette advertising in a random sample of those stores (n=384). Multiple regressions, adjusting for school and neighborhood demographics, tested the associations of high school smoking prevalence with the density of tobacco outlets and retail cigarette advertising and with the proximity of tobacco outlets to schools.
Results. The prevalence of current smoking was 3.2 percentage points higher at schools in neighborhoods with the highest tobacco outlet density (>5 outlets) than in neighborhoods without any tobacco outlets. The density of retail cigarette advertising in school neighborhoods was similarly associated with high school smoking prevalence. However, neither the presence of a tobacco outlet within 1000 ft of a high school nor the distance to the nearest tobacco outlet from school was associated with smoking prevalence.
Conclusions. Policy efforts to reduce adolescent smoking should aim to reduce the density of tobacco outlets and retail cigarette advertising in school neighborhoods. This may be achieved through local zoning ordinances, including limiting the proximity of tobacco outlets to schools.

Introduction

An estimated one half million stores sell cigarettes in the U.S., approximately one for every 11 smokers under the age of 18 (DiFranza et al., 2001). In California, where this study was conducted, approximately 36,000 stores are licensed to sell cigarettes — one store for every 8 smokers under the age of 18. Tobacco outlets are more highly concentrated in neighborhoods where a larger proportion of residents are under 18 (Novak et al., 2006), and adolescents are routinely exposed to the widespread advertising for cigarettes that these stores contain (Henriksen et al., 2004a; Pucci et al., 1998). Because the risk of moving from experimentation to habitual smoking is greatest for adolescents, new policies are needed to reduce both the availability of cigarettes and the visibility of cigarette ads in adolescents' environments.

Using zoning ordinances to limit the concentration of alcohol retailers (i.e. outlet density) in communities has reduced alcohol consumption (National Research Council and Institute of Medicine, 2003). There is considerable interest in adapting this strategy to benefit tobacco control (Institute of Medicine, 2007; Schneider et al., 2005). For example, Ashe and her colleagues recommend that local governments use zoning laws to (a) limit tobacco outlet density, which would reduce the availability of cigarettes and the visibility of cigarette ads in a community, and (b) require that tobacco outlets be located away from places frequented by children, such as schools and playgrounds (Ashe et al., 2003). The study we report here describes the density of tobacco outlets and retail cigarette advertising near California high schools and their association with school smoking prevalence. School neighborhoods are the focus of this study because adolescents frequently visit tobacco outlets near school (Feighery et al., 2006; Henriksen et al., 2004a), and because outlets near schools have been found to contain more cigarette advertising than outlets farther from schools (Pucci et al., 1998; Rogers et al., 1995).

The expectation that limiting tobacco outlet density in school neighborhoods would reduce adolescent smoking assumes the two variables are positively correlated, but the three studies to date yield dissimilar findings. The number of tobacco outlets was unrelated to school smoking prevalence in one study of Canadian high school

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neighborhoods (Lovato et al., 2007), but positively correlated in another (Leatherdale and Strath, 2007). Tobacco outlet density near 11 middle schools was associated with higher odds of students' ever trying smoking, but not with current smoking (Pokorny et al., 2003). Not all of these studies considered confounders such as neighborhood income and race/ethnicity, which are correlated with tobacco outlet density and tobacco use (Hyland et al., 2003; Novak et al., 2006; Schneider et al., 2005). To address several shortcomings in the literature, the study reported here examined tobacco outlet density near a larger sample of high schools, adjusted for both school and neighborhood demographics, and observed the quantity of retail cigarette advertising near schools.

Neighborhoods with higher tobacco outlet density may promote adolescent smoking not only by making cigarettes more accessible, but also by increasing environmental cues to smoke. Higher odds of trying smoking were associated with the proportion of stores near schools that advertised cigarette promotions (Lovato et al., 2007; Slater et al., 2007) and with higher levels of self-reported exposure to retail cigarette advertising (Feighery et al., 2006; Henriksen et al., 2004b). Based on these findings, we hypothesized that the prevalence of current smoking would be greater at schools in neighborhoods with more retail cigarette advertising.

A precedent for limiting the proximity of tobacco outlets to schools may derive from the establishment of drug-free school zones, which intend to safeguard children from drug activity in a designated area, typically 1000 ft from schools (Greene et al., 2006). Living in close proximity to a tobacco outlet is associated with tobacco use by adults: The shorter the distance from home to the nearest convenience store, the more cigarettes California adults reported smoking in the previous month (Chuang et al., 2005). This study is the first we are aware of to examine whether the proximity of tobacco outlets to high schools is associated with the prevalence and frequency of adolescent smoking.

Methods

This cross-sectional study combined data from multiple sources: a statewide survey of California high school students, retailer licensing data about the location of tobacco outlets near the schools, observations about the quantity of cigarette advertising in a random sample of those stores, and census tract data about school neighborhood demographics.

Outcomes

Adolescent tobacco use data were obtained from the 2005–2006 California Student Tobacco Survey (CSTS), a biennial survey conducted by the California Department of Public Health. Approximately 24,875 students attending 135 randomly selected high schools completed the 2005–2006 CSTS. The high school participation rate was 87.4% and the student participation rate was 79.4% (McCarthy et al., 2007). The California Committee for the Protection of Human Subjects and Stanford University's Panel on Medical Human Subjects approved secondary analyses of these data.

The primary outcome was smoking prevalence, represented by the weighted proportion of students within each school who reported any cigarette smoking in the past 30 days. A secondary outcome was the number of cigarettes smoked in the past 30 days, which was estimated from items about smoking frequency and quantity. High school smokers indicated the number of days smoked (0, 1–2, 3–5, 6–9, 10–19, 20–29, and all 30) and the number of cigarettes per day (less than 1, 1, 2–5, 6–10, 11–20, and more than 20). We multiplied the midpoints of the response categories and calculated a school-level measure by averaging the weighted responses within each school.

Tobacco outlet density and proximity to schools

A 1/2-mile radius from each high school defined the boundaries of each school neighborhood because 1/2 mi (805 m) is frequently cited as walking distance in studies of transportation to and from school (Centers for Disease Control and Prevention, 2002; DiGuiseppi et al., 1998). In addition, a 1/2-mile radius from a central point is commonly used to characterize environmental contributions to health behaviors, including cigarette smoking (Chuang et al., 2005), alcohol use (Pollack et al., 2005), and exercise (Kirtland et al., 2003).

Tobacco outlet addresses were culled from the state's retailer licensing data using the unique postal zip codes within 1/2 mi of the high schools. Distance from each school street address to every tobacco outlet within 1/2 mi was measured "as the crow flies." Tobacco outlet density was measured by the total number within 1/2 mi of each school. Two measures of proximity were computed: the presence of at least one tobacco outlet within 1000 ft of school, and the distance from each school to the nearest tobacco outlet up to 1/2 mi.

Cigarette advertising density

We collected data in 384 tobacco outlets within 2 to 12 weeks of the school surveys. In school neighborhoods with 6 or fewer tobacco outlets, we observed all of them. In 28 neighborhoods with more than 6 tobacco outlets, we randomly selected 6 or 50% of the outlets (M=13.5, SD=8.2), whichever yielded the larger number.

Using an established protocol (Feighery et al., 2001; Henriksen et al., 2004a), trained observers described the quantity and brand of all forms of cigarette advertising, including signs, displays, and branded functional items, such as shopping baskets and clocks. Few stores (1.5%) refused to let an observer complete the protocol. Ad density was measured by summing the total number of retail cigarette ads in each school neighborhood. In 28 neighborhoods where stores were randomly selected, ad density was imputed from the average number of ads per store.

School and neighborhood demographics

Data from the California Basic Educational Data System (Education Data Partnership, 2007) described the race and ethnicity of the school population and the proportion that qualified for free or reduced price meals. Neighborhoods were categorized by combining large and mid-size city into urban; urban fringes of large and mid-size city and large town into suburban; small town and rural area into rural.

The 1/2-mile boundaries around each high school were overlaid onto Census 2000 tract data using the Topologically Integrated Graphical Encoding and Referencing (TIGER) files, and no school neighborhoods overlapped. Census data described the race (proportion African American, Asian Pacific Islander, and non-Hispanic white residents), ethnicity (proportion Hispanic residents), population density, and median household income of these areas. In neighborhoods with more than one census tract, data were weighted in proportion to tract area. Correlations between the ethnic/racial composition of school enrollment and neighborhood residents were r=0.92 for proportion Asian/Pacific Islander, r=0.89 for proportion Hispanic, and r=0.72 for proportion African American. Thus, census data about residents' race/ethnicity were excluded from the set of covariates because they were redundant with school enrollment data and the latter was expected to be a better predictor of smoking prevalence.

Statistical analyses

Individual-level data about smoking behavior were aggregated because schools were the primary sampling unit of the CSTS, and because our hypotheses were about relationships between school neighborhood characteristics and school smoking prevalence. To adjust for the complex sampling design, probability weights were used to compute both outcome measures. Ordinary least squares (OLS) regressions tested whether smoking prevalence was higher at schools in neighborhoods with higher tobacco outlet density, higher cigarette advertising density, or at least one tobacco retailer within 1000 ft of schools, than in other school neighborhoods. Separate models were estimated for each variable of interest because the density of tobacco outlets and retail cigarette ads were highly correlated (rho=0.75, p<001). Because the distributions of the two variables were quite skewed, they were coded as tertiles.

All models included covariates that described the school enrollment (race, ethnicity and proportion qualified for free or reduced price meal), and neighborhoods (median household income, population density, and neighborhood type). Continuous covariates were standardized and all analyses used SPSS 14.0.

Results

High school neighborhoods contained an average of 5.0 tobacco outlets (SD=6.9, Min=0, Max=35) and an average of 123 retail cigarette ads (SD=173, Min=0, Max=988). As shown in Table 1, a higher concentration of tobacco outlets was found in the most densely populated school neighborhoods, near schools with the largest proportion of Hispanic students, and near schools with the most economically disadvantaged students.

The average prevalence of current smoking at the 135 high schools was 15.6% (SD=5.1). Smoking prevalence was significantly higher in suburban than urban schools and higher in schools with smaller proportions of Asian/Pacific Islander and Hispanic students (see Table 2). Adjusting for school demographics and neighborhood characteristics, the average prevalence of current smoking was 3.2 percentage points higher at schools in neighborhoods with highest tobacco outlet density (>5 outlets) than in neighborhoods without any tobacco outlets (see model 1). However, school smoking prevalence in neighborhoods with moderate tobacco outlet density (1–4 outlets)

Table 1
Association of tobacco outlet density with school and school neighborhood characteristics: 135 California high schools, academic year 2005–2006

		Tobacco outlet density tertiles			
	Total (n=135)	None (n=45)	Low (1–5) (n=43)	High (>5) (n=47)	p-value
High school demographics					
% African American students	6.3 (7.2)	5.9 (6.9)	5.6 (5.7)	7.2 (8.6)	0.52
% Asian or Pacific Islander students	14.5 (15.5)	10.7 (13.3)	16.1 (18.2)	16.6 (14.4)	0.13
% Hispanic students	35.8 (25.0)	30.2 (23.3)	33.6 (22.9)	43.1 (22.8)	0.04
Free or reduced price meals (% qualified)	30.9 (23.5)	26.7 (22.5)	26.2 (19.5)	39.2 (25.8)	0.01
School neighborhood demographics					
Median household income (10 k)	5.8 (2.3)	6.3 (2.3)	6.3 (2.4)	4.8 (1.8)	0.001
Population density	5546 (4647)	2343 (2287)	4938 (3263)	9170 (4937)	0.001
Neighborhood type (column %s)					
Urban	41%	31%	42%	49%	
Suburban	48%	49%	46%	49%	
Rural	11%	20%	12%	2%	0.08
Proximity of tobacco outlets					
At least one outlet within 1000 ft	24%	0%	21%	51%	0.001
Distance to nearest outlet up to 1/2 mi[a]	0.25 (0.14)	–	0.31 (0.14)	0.19 (0.12)	0.001
Density of retail cigarette ads[b]					
None	34%	100%	0%	0%	
Low (1–144, M=73, Sd=41)	33%	0%	79%	26%	
High (>144, M=312, Sd=193)	33%	0%	21%	74%	0.001

Note. Cell entries are mean and sd unless otherwise noted; p-values from one-way ANOVA or chi square to test association.
[a] Excludes 45 school neighborhoods without any tobacco outlets within 1/2 mi.
[b] Excludes 4 school neighborhoods missing store observations.

was not different from neighborhoods without any tobacco outlets. Fig. 1 portrays the predicted prevalence of current smoking for tenth graders at urban, suburban, and rural high schools with mean values for all other covariates. Roughly the same pattern was observed in each type of neighborhood. In fact, no interactions between tobacco outlet density and any covariates were significant (data not shown).

Compared to neighborhoods without any retail cigarette ads, the average school smoking prevalence was 2.2 percentage points higher in neighborhoods with moderate density of retail cigarette ads and 2.3 percentage points higher in neighborhoods with the highest density of retail cigarette ads (see model 2). However, only the difference between neighborhoods with moderate ad density and no cigarette ads was statistically significant.

Approximately one fourth of the high schools were located within 1000 ft of at least one tobacco outlet. However, this factor was not associated with school smoking prevalence after adjusting for school demographics and other neighborhood characteristics (see model 3). In the subset of school neighborhoods with at least one tobacco outlet

Table 2
Multiple regression models of the association between high school smoking prevalence and measures of tobacco outlet/ad density and proximity: 135 California high schools, academic year 2005–2006

	Model 1 Tobacco Outlet Density (n=135)		Model 2 Cigarette Ad Density (n=131)		Model 3 Tobacco Outlet Proximity (n=135)	
	B	95% CI	B	95% CI	B	95% CI
Constant	−4.1	−40.5, 32.2	−5.0	−42.8, 32.9	6.1	−30.1, 42.3
School neighborhood demographics						
Tobacco outlet density tertiles			–	–	–	–
Low (0 outlets)	Ref					
Medium (1–5 outlets)	1.7	−0.3, 3.7				
High (>5 outlets)	3.2	0.8, 5.6				
Cigarette ad density tertiles	–	–			–	–
Low (0 ads)			Ref			
Medium (1–144)			2.2	0.1, 4.3		
High (>144)			2.3	−0.1, 4.7		
Tobacco outlet proximity						
At least one within 1000 ft					1.1	−0.9, 3.0
Neighborhood type						
Urban	Ref		Ref		Ref	
Suburban	2.3	0.5, 4.0	2.3	0.5, 4.2	2.4	0.6, 4.2
Rural	1.8	−1.2, 4.8	1.6	−1.5, 4.8	1.4	−1.7, 4.4
Population density	−0.5	−1.6, 0.6	−0.3	−1.4, 0.8	0.0	−1.1, 1.1
Median household income	−0.2	−1.3, 0.9	−0.4	−1.5, 0.7	−0.5	−1.6, 0.6
High school demographics[a]						
Enrollment race/ethnicity						
% African American	−0.8	−1.6, 0.1	−0.7	−1.5, 0.2	−0.8	−1.6, 0.0
% Asian/Pacific Islander	−1.5	−2.5, −0.5	−1.5	−2.5, −0.5	−1.3	−2.3, −0.3
% Hispanic	−2.0	−3.3, −0.8	−2.1	−3.4, −0.9	−2.1	−3.4, −0.9
% Qualified free/reduced meal	0.7	−0.6, 2.0	0.8	−0.5, 2.1	0.7	−0.6, 2.0
Adjusted R-square	0.25		0.24		0.22	

Note. B=beta; CI=confidence interval; Ref=referent category.
[a] All models also adjusted for the average grade level of the respondents at each school.

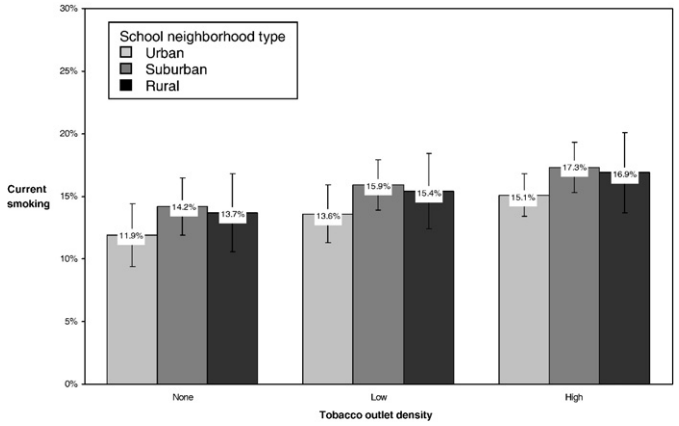

Fig. 1. Predicted prevalence of current smoking, by tobacco outlet density and neighborhood type: 135 California high schools, academic year 2005–2006. Note. Predicted prevalence and 95% confidence interval; values for all covariates other than neighborhood type were set to the mean.

within 1/2 mi, the distance from school to the nearest tobacco outlet was not associated smoking prevalence (data not shown).

The average number of cigarettes high school smokers reported smoking in the past month was 67.0 (SD=37.3). Contrary to expectation, neither the density nor proximity of tobacco retailers and cigarette advertising in the school neighborhoods was associated with this variable (data not shown).

Discussion

This study observed a higher prevalence of current smoking at schools with more tobacco outlets within walking distance, adjusting for both school and neighborhood demographics. This finding is consistent with a previous study in which the odds of being a current smoker were higher for adolescents living in Chicago neighborhoods with more tobacco outlets than for those in areas with fewer tobacco outlets (Novak et al., 2006). Thus, the current study extends the association of adolescent smoking and tobacco outlet density from the context of residential neighborhoods to school neighborhoods, a focal area for policy interventions to create healthy environments (Ashe et al., 2007).

A novel aspect of the current study was measuring the quantity of retail cigarette advertising within walking distance of schools. Its association with school smoking prevalence lends credence to the argument that higher tobacco outlet density promotes adolescent tobacco use by increasing environmental cues to smoke. Although smoking prevalence at schools was not correlated with their proximity to tobacco outlets, regulating the minimum distance between schools and tobacco outlets could effectively reduce their density in school neighborhoods. Thus, limiting the density of tobacco outlets, their proximity to schools, and the quantity of cigarette advertising that these stores contain, may all be plausible strategies to reduce adolescent smoking.

None of the factors this study considered were correlated with the number of cigarettes high school smokers consumed in the previous month, perhaps because tobacco outlets are less important than other sources of cigarettes for adolescent smokers (Kaufman et al., 2002; Robinson et al., 2006). The density of tobacco outlets near Canadian high schools was correlated with greater odds of attempting to purchase cigarettes (Leatherdale and Strath, 2007), and future research should consider how tobacco outlet density affects other aspects of tobacco access, such as cigarette prices and sales to minors.

Several limitations of the current study point to other directions for future research. The primary limitations are its cross-sectional design and inability to control for unmeasured confounders. Time series data that examine whether decreases in tobacco outlet density predict decreases in smoking prevalence could make a stronger case for policy regulations. Plotting "walkable" distances from all physical boundaries of a school rather than a fixed point would yield more detailed information about the proximity of tobacco outlets. This study did not consider other ways in which local zoning ordinances may be used to reduce tobacco outlet density in school neighborhoods, such as limiting the proximity of all tobacco retailers to each other and either banning or restricting the location of tobacco-only stores in a community.

As long as retail cigarette advertising in the U.S. enjoys First Amendment protections, the most effective means to reduce such advertising may be to limit the density of tobacco outlets. This may be achieved by using zoning ordinances to control land use and by other means. For example, states may permit cities and counties to enact local tobacco retail licensing ordinances, and to suspend or revoke a license for a violation of any state tobacco control law, such as selling tobacco to a minor (California Business and Professions Code § 22971.3). The costs of complying with responsible-retailer requirements and an annual licensing fee may temporarily or permanently reduce the number of tobacco retailers.

Local governments might also prohibit tobacco sales along certain avenues of access to schools that are designated as "safe routes" for youth. Such designations may formally acknowledge the de facto routes that students travel to school, or may be created with the intent that students begin to use the routes preferentially. Because courts are likely to be more tolerant of regulations intended to protect a "youth focused" environment (Garfield, 2005), even advertising regulation along "safe routes" to school might be permissible. The potential of such policies to limit the availability of cigarettes and visibility of cigarette advertising in communities should be explored.

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References

Ashe, M., Feldstein, L.M., Graff, S., Kline, R., Pinkas, D., Zellers, L., 2007. Local venues for change: legal strategies for healthy environments. J. Law Med. Ethics 35, 138–147.
Ashe, M., Jernigan, D., Kline, R., Galaz, R., 2003. Land use planning and the control of alcohol, tobacco, firearms, and fast food restaurants. Am. J. Public Health 93, 1404–1408.
California Business and Professions Code § 22971.3.
Centers for Disease Control and Prevention, 2002. Point-of-purchase tobacco environments and variation by store type — United States, 1999. MMWR. Morb. Mortal Wkly. Rep. 51, 184–189.
Chuang, Y.C., Cubbin, C., Ahn, D., Winkleby, M.A., 2005. Effects of neighbourhood socioeconomic status and convenience store concentration on individual level smoking. J. Epidemiol. Community Health 59, 568–573.
DiFranza, J.R., Peck, R.M., Radecki, T.E., Savageau, J.A., 2001. What is the potential cost-effectiveness of enforcing a prohibition on the sale of tobacco to minors? Prev. Med. 32, 168–174.
DiGuiseppi, C., Roberts, I., Li, L., Allen, D., 1998. Determinants of car travel on daily journeys to school: cross sectional survey of primary school children. BMJ 316, 1426–1428.
Education Data Partnership, 2007. Fiscal, demographic, and performance data on California's K-12 schools. Retrieved March 15, 2007, from http://www.ed-data.k12.ca.us/welcome.asp.
Feighery, E.C., Henriksen, L., Wang, Y., Schleicher, N.C., Fortmann, S.P., 2006. An evaluation of four measures of adolescents' exposure to cigarette marketing in stores. Nicotine Tob. Res. 8, 751–759.
Feighery, E.C., Ribisl, K.M., Schleicher, N.C., Lee, R.E., Halvorson, S., 2001. Cigarette advertising and promotional strategies in retail outlets: results of a statewide survey in California. Tob. Control 10, 184–188.
Garfield AE, 2005. Protecting children from speech, 57 FLA. L. REV. 565.
Greene, J., Pranis, K., Ziedenberg, J., 2006. Disparity by design: How drug-free zone laws impact racial disparity - and fail to protect youth. A Justice Policy Institute Report commissioned by the Drug Policy Alliance, Washington, D.C.
Henriksen, L., Feighery, E.C., Schleicher, N.C., Haladjian, H.H., Fortmann, S.P., 2004a. Reaching youth at the point of sale: cigarette marketing is more prevalent in stores where adolescents shop frequently. Tob. Control 13, 315–318.

Henriksen, L., Feighery, E.C., Wang, Y., Fortmann, S.P., 2004b. Association of retail tobacco marketing with adolescent smoking. Am. J. Public Health 94, 2081–2083.
Hyland, A., Travers, M.J., Cummings, K.M., Bauer, J., Alford, T., Wieczorek, W.F., 2003. Tobacco outlet density and demographics in Erie County, New York. Am. J. Public Health 93, 1075–1076.
Institute of Medicine, 2007. Ending the Tobacco Problem: A Blueprint for the Nation. The National Academies Press, Washington, D.C.
Kaufman, N.J., Castrucci, B.C., Mowery, P.D., Gerlach, K.K., Emont, S., Orleans, C.T., 2002. Predictors of change on the smoking uptake continuum among adolescents. Arch. Pediatr. Adolesc. Med. 156, 581–587.
Kirtland, K.A., Porter, D.E., Addy, C.L., Neet, M.J., Williams, J.E., Sharpe, P.A., et al., 2003. Environmental measures of physical activity supports: perception versus reality. Am. J. Prev. Med. 24, 323–331.
Leatherdale, S.T., Strath, J.M., 2007. Tobacco retailer density surrounding schools and cigarette access behaviors among underage smoking students. Annals Behav. Med. 33, 105–111.
Lovato, C.Y., Hsu, H.C., Sabiston, C.M., Hadd, V., Nykiforuk, C.I., 2007. Tobacco point-of-purchase marketing in school neighbourhoods and school smoking prevalence: a descriptive study. Can. J. Public Health 98, 265–270.
McCarthy, W.J., Dietsch, B.J., Dent, C., Zheng, H., Bono, G., Bailey, J.D., Hanson, T.L., 2007. Evaluation of the in-school tobacco use prevention education program, 2005–2006. California Department of Public Health: Sacramento, CA.
National Research Council and Institute of Medicine, 2003. Reducing underage drinking: a collective responsibility. Committee on Developing a Strategy to Reduce and Prevent Underage Drinking. In: Bonnie, Richard J., O'Connell, Mary Ellen (Eds.), Board on Children, Youth, and Families, Division of Behavioral and Social Sciences and Education. The National Academies Press, Washington, D.C. 0-309-08965-4.
Novak, S.P., Reardon, S.F., Raudenbush, S.W., Buka, S.L., 2006. Retail tobacco outlet density and youth cigarette smoking: a propensity-modeling approach. Am. J. Public Health 96, 670–676.
Pokorny, S.B., Jason, L.A., Schoeny, M.E., 2003. The relation of retail tobacco availability to initiation and continued smoking. J. Clin. Child Adolesc. Psychol. 32, 193–204.
Pollack, C.E., Cubbin, C., Ahn, D., Winkleby, M.A., 2005. Neighbourhood deprivation and alcohol consumption: does the availability of alcohol play a role? Int. J. Epidemiol. 34, 772–780.
Pucci, L.G., Joseph Jr., H.M., Siegel, M., 1998. Outdoor tobacco advertising in six Boston neighborhoods: evaluating youth exposure. Am. J. Prev. Med. 15, 155–159.
Robinson, L.A., Dalton 3rd, W.T., Nicholson, L.M., 2006. Changes in adolescents' sources of cigarettes. J. Adolesc. Health 39, 861–867.
Rogers, T., Feighery, E.C., Tencati, E., Butler, J., Weiner, L., 1995. Community mobilization to reduce point-of-purchase advertising of tobacco products. Health Educ. Q. 22, 427–442.
Schneider, J.E., Reid, R.J., Peterson, N.A., Lowe, J.B., Hughey, J., 2005. Tobacco outlet density and demographics at the tract level of analysis in Iowa: implications for environmentally based prevention initiatives. Prev. Sci. 6, 319–325.
Slater, S.J., Chaloupka, F.J., Wakefield, M., Johnston, L.D., O'Malley, P.M., 2007. The impact of retail cigarette marketing practices on youth smoking uptake. Arch. Pediatr. Adolesc. Med. 161, 440–445.