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Compliance with the City of Chicago's partial ban on menthol cigarette sales

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Abstract

Introduction—In the USA, menthol cigarettes are associated with smoking initiation and decreased likelihood of cessation, particularly for low-income and non-White populations. Local ordinances to restrict menthol cigarette sales are an emergent policy option. In July 2016, Chicago, Illinois became the first major US city to ban menthol cigarette sales within 500 feet of schools. This study assessed ban compliance in June 2017.

Methods—We randomly selected 100 of 154 stores within 500 feet of a high school. Ninety stores were included in the analysis, excluding permanently closed stores or stores that did not sell tobacco prior to the ban. Compliance was determined by whether a menthol cigarette pack was purchased. We also assessed presence of menthol cigarette replacement packs. Multivariable logistic regression modelled compliance by store type, school (distance to high school, school type) and neighbourhood-level factors (poverty level, proportion of non-White residents).

Results—Compliance rate was 57% (weighted, n=53) and no replacement packs were observed. Non-compliant stores were more likely to advertise menthol cigarettes, but ads were present in

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eight compliant stores. Gas stations had 81% lower odds (OR=0.19, 95% CI 0.06 to 0.58) of complying with the menthol cigarette ban compared with larger/chain stores. School-level and neighbourhood factors were not associated with compliance.

Discussion—The poor compliance observed with Chicago's partial menthol cigarette ban highlights the need for comprehensive efforts. Optimising local resources to target enforcement efforts in gas stations could improve compliance. Ordinances that also restrict advertising could potentially enhance ban impact by reducing exposure to product and promotions.

INTRODUCTION

In recent years, market share of menthol cigarettes in the USA has grown and prevalence of menthol cigarette use has remained stable or increased across demographic groups.¹² Menthol makes cigarettes more palatable and menthol cigarettes are associated with greater likelihood of initiation, progression to established smoking and decreased likelihood of cessation, particularly for African-American and Latino populations.^{3–9} Menthol cigarettes are more likely to be advertised and sold in low-income, African-American and Latino communities across the USA,^{10–12} and neighbourhoods with a larger proportion of residents less than 18 years old.^{12,13}

In 2009, the Family Smoking Prevention and Tobacco Control Act (FSPTCA) banned the sale of cigarettes with a characterising flavour but excluded menthol.¹⁴ Under the FSPTCA, the Food and Drug Administration (FDA) has the authority to issue a product standard to ban menthol cigarettes.¹⁴ However, the FDA has yet to act on a menthol ban. In the absence of national regulation, local retail policies have become a pathway to regulate access to flavoured tobacco, including menthol cigarettes.¹⁵ The FSPTCA preserves localities' ability to adopt a 'measure relating to or prohibiting the sale' of tobacco products.¹⁴ Several cities have used this authority to ban the sale of flavoured tobacco products, like cigarillos and smokeless products in retail stores.¹⁶

Effective July 2014 but implemented July 2016, Chicago became the first major US city to ban the sale of menthol cigarettes as part of its ban on all flavoured tobacco products in stores within 500 feet of schools.^{16,17} Chicago's ban applies to stores that make less than 80% of profits from the sale of tobacco and tobacco accessories.¹⁷ Initially, this ban extended to retail stores within 500 feet of elementary, middle and high schools; however, political pressure from a retail group association resulted in a December 2016 City Council vote to limit the ban to stores within 500 feet of high schools, effective February 2017.^{17,18} Other localities have taken similar action to ban menthol cigarettes through partial and comprehensive efforts. In January 2017, Berkeley, California enacted a flavoured tobacco ban, including menthol cigarettes, in stores within 600 feet of schools.¹⁹ Recently, Minneapolis and St Paul, Minnesota and Oakland, California passed comprehensive bans that restrict menthol cigarette sales to specialty tobacco stores in 2018.^{20–22} In 2017, the San Francisco Board of Supervisors passed a city-wide flavoured tobacco ban, which included menthol cigarettes; however, an RJ Reynolds-supported campaign successfully petitioned for a public vote on the measure, reflecting opposition by the tobacco industry.²³

Given the growth of local efforts, assessing compliance with Chicago's partial menthol cigarette ban can inform current and future enforcement efforts and provide support for stakeholders as they develop policies to regulate menthol cigarette sales. To date, only a handful of studies have evaluated compliance with a flavoured tobacco ban. These studies suggest that stores comply with comprehensive flavoured tobacco bans such as the FSPTCA flavoured cigarette ban,² New York City's ban on flavoured other tobacco products (OTP), such as cigars, chew and snus,²⁶ and the province-wide menthol cigarette sales bans in Nova Scotia and Alberta, Canada.²⁷ However, compliance would likely be more variable in a partial versus comprehensive ban setting where the local supply of menthol cigarettes is not disrupted.

Compliance may also be influenced by store type and neighbourhood-level factors. National and international studies suggest that smaller, independent convenience stores and gas stations were less likely to comply with local ordinances compared with larger chain stores,^{28–30} and stores located near public high schools or in neighbourhoods with a higher proportion of low-income, youth and African-American residents were less likely to comply with efforts to regulate underage tobacco sales and restrictions against loose cigarette sales.^{24,30} The presence of menthol cigarette replacement packs developed by the tobacco industry adds an additional layer of complexity to understanding compliance. In Canada, Brown *et al* found that stores were overwhelmingly compliant with a provincial ban on menthol cigarette sales.²⁷ However, the authors also observed cigarette packs labelled as menthol prior to the ban were rebranded as menthol cigarette replacement packs postban, using descriptors such as 'green' or 'smooth taste [redesigned] without menthol' to communicate to consumers that they could substitute menthol cigarettes with these new packs.²⁷ While replacement packs follow the letter of the law, their sale could create the impression that menthol cigarettes are still available, potentially undermining the public health benefit of such bans.²⁷

The literature suggests that stores are largely compliant with comprehensive flavoured tobacco bans; however, no research has investigated compliance with a partial ban on the sale of menthol cigarettes, including how compliance may vary across store type. The current study addresses these gaps by assessing compliance with Chicago's menthol cigarette ban among a sample of stores within 500 feet of a high school. Additionally, we build on Brown *et al*'s study to explore whether retailers sell menthol cigarette replacement packs in a partial ban setting. Although Chicago's ordinance restricts the sale of all flavoured tobacco products, we focused our compliance assessment only on whether stores sold menthol cigarettes given the reported burden of menthol cigarette use and interest in efforts to regulate their sale. As more local jurisdictions develop and implement menthol cigarette bans, results from this study can inform stakeholders about the extent of retailer compliance, including which store types or neighbourhood locations may need increased enforcement efforts.

METHODS

Study setting and sample

The Chicago Department of Public Health (CDPH) provided the list of all 154 tobacco retailers within 500 feet of a high school, updated in April 2017. We selected a stratified

random sample of 100 stores from this list to assess compliance. Each store was geocoded and assigned to one of Chicago's 77 community areas, a geographic region used in city planning efforts that encompasses multiple neighbourhoods. Each community area was assigned a Hardship Index score using publicly available data from the CDPH Epidemiology and Public Health Informatics team based on US Census American Community Survey (ACS) 5-year estimates (2008–2012). Hardship Index score ranged from 1 to 100, where a higher score reflects worse economic conditions. The score was derived from six equally weighted indicators: crowded housing, poverty, income, education, unemployment and proportion of residents under 18 or over 64 in a community area.³¹ We categorised Hardship Index score as follows: low (score 1–33), medium (score 34–66) and high (score 67). We then selected our sample through stratified random sampling proportional to the number of stores located within each category.

The final sample was 90 tobacco retailers. Five stores were permanently closed and no audit data were collected. An additional five stores did not sell tobacco products at the time of data collection. A follow-up call to the manager/owner established that the store never sold tobacco (n=3) or stopped prior to the ban's implementation (n=2). Data collection took place in June 2017. A Johns Hopkins University Bloomberg School of Public Health Institutional Review Board reviewed this study and determined it to be non-human subjects research.

Procedures

We developed an assessment protocol and variable glossary based on previous studies.^{32,33} We captured information on store type, presence of menthol cigarette advertising, presence of menthol cigarette replacement packs and whether menthol cigarettes were sold to the research team. Data were collected covertly on a smartphone using the data collection application, doForms. A single team of two trained researchers visited all 90 stores.

Measures

Outcomes—The main outcome for this study was compliance determined by whether menthol cigarettes were sold in affected stores (yes/no). We did not assess compliance with the sale of other flavoured tobacco products, including menthol flavoured OTPs. If a store did not sell the research team a pack of menthol cigarettes, then it was marked compliant. We ascertained compliance by asking the clerk for a pack of Newport menthol cigarettes, the most popular menthol cigarette brand sold in the USA and widely available in Chicago.^{34,35} If unavailable, we asked for another menthol cigarette brand. As a final step, we checked all non-compliant stores against the enforcement agency's list of stores in the appeals process. Store owners are allowed to formally contest whether their store is subject to the ban (eg, distance between store and school believed to be greater than 500 feet) and may sell flavoured tobacco products while their appeal is processed.¹⁷ We found two stores that sold menthol cigarettes were in the appeals process at the time of data collection. These stores were marked as compliant in the final analysis.

We also assessed whether any menthol cigarette replacement packs were present through visual observation of the cigarettes for sale. In addition, the data collection team asked the clerk whether there was anything like menthol cigarettes for sale if they were told menthol

cigarettes were not available (eg, ‘Do you have anything like a pack of menthol cigarettes for sale?’). Given the exploratory nature of this part of the study, we had a wide-ranging concept of what a menthol cigarette replacement pack could be and instructed the data collection team to purchase any cigarette pack they suspected was marketed as a substitute for menthol cigarettes. This included cigarette packs that were labelled ‘Green’ rather than ‘Menthol’ or packs that stated they were redesigned without menthol.

Menthol advertising—We assessed the presence of menthol cigarette advertising—defined as any sign/poster, price promotion, or branded functional ad (eg, counter mat)—on the interior (yes/no) and exterior of the store (yes/no).³³

Other independent variables—Store type was based on the following categories: independent convenience store, gas station, chain convenience store, grocery store, liquor store, pharmacy, dollar discount store, and other, which included restaurants and a tobacco accessory store. In this sample, all gas stations were affiliated with a corporate chain.

School-level variables included high school type (public vs private) and distance between the store and a high school, which was dichotomised to reflect stores 250 feet versus those 251–500 feet away. These data were provided by the CDPH, and distance was measured as the shortest distance between the property line of the high school and the property line of the store. If two high schools were present (n=5), the distance and type of the closest high school was included in the analysis.

We used ArcGIS Online to link stores to neighbourhood-level variables, derived from US Census ACS 5-year estimates (2011–2015). We defined neighbourhood as the census tract. Neighbourhood characteristics included proportion of residents living under the poverty level, percentage of residents <18 years old, and proportion of non-Latino White, non-Latino African-American and Latino residents (categorised for descriptive analysis but included as continuous variables otherwise). We accounted for total number of tobacco retail stores in the census tract (<4 stores, 4 stores). We also accounted for regional variation by including the location of the store in relation to the city centre (Central, North, West and South). Chicago is highly segregated by race and income.^{36,37} The North and Central regions of the city are generally more affluent and contain census tracts with a greater proportion of non-Latino White residents, while the West and South sides are generally less affluent and contain census tracts with a greater proportion of Latino and non-Latino African-American residents.³⁷

Statistical analyses

All bivariate and regression analyses took into account the sampling design: each store was assigned a design weight to reflect the inverse probability of selection from within one of the three Hardship Index strata (low, medium, high). We used Pearson χ^2 to describe associations between compliance and menthol advertising, store type, school and neighbourhood-level factors, and geographic region. Using logistic regression models, we first looked at the independent effect of each independent variable on odds of ban compliance (crude). Models were subsequently adjusted for store type and school-level variables (model 1) and then further adjusted for neighbourhood-level characteristics (model

2). In these models, chain convenience stores, grocery stores, liquor stores, pharmacies, dollar discount stores and other stores were combined into the category 'Larger or Chain Store'. We took the initial point estimate for a demographic characteristic (eg, 15% Latino residents) and divided by 10 to create a scaled variable. Thus, each 1-unit change in the variable reflects a 10% increase in the characteristic.²⁴ Due to high correlation with other census tract variables and multicollinearity, we did not include proportion of non-Latino White residents or geographic region in the regression models. Tests of associations were two tailed ($\alpha=0.05$). All analyses were conducted using Stata (V.14.2).

RESULTS

Compliance with menthol cigarette ban

Overall, 57% ($n=53$) of stores in this study were compliant with Chicago's menthol cigarette ban (weighted prevalence, table 1).

In this sample, the majority of stores were independent convenience stores (25%) or gas stations (35%). Approximately 7.5% of stores were located in the city centre, while the remaining stores were distributed throughout the North (29%), West (29%) and South (35%) sides. In the bivariate analysis, compliance did not vary significantly by store type ($p=0.13$), although a greater proportion of non-compliant stores were gas stations (table 1). All pharmacies assessed were owned by the same company and all were compliant. In contrast, grocery stores and dollar stores owned by the same company were not consistently compliant. Compliance did not vary significantly by distance to a high school, high school type, neighbourhood characteristics or geographic location in the bivariate analysis.

In terms of advertising, 29% of stores had interior advertisement for menthol cigarettes and 11% had exterior advertisement. Price promotions were the most common type of exterior and interior advertisement, and a higher proportion of stores with any menthol cigarette advertisements were gas stations (*data not shown*). Compliance varied significantly by presence of exterior ($p=0.01$) and interior menthol cigarette advertising ($p<0.001$). Around half of non-compliant stores had interior menthol cigarette advertisements; the majority of these ads were industry-provided price promotions or signs (*data not shown*). There were also eight compliant stores that displayed signs/ posters for menthol cigarettes (*data not shown*).

Table 2 presents results of the unadjusted and adjusted logistic regression. In the unadjusted model, gas stations had 77% lower odds of compliance compared with larger or chain stores ($OR=0.23$, 95% CI 0.08 to 0.68, crude). Distance to a high school, high school type and neighbourhood characteristics were not significantly associated with compliance in the unadjusted analysis.

When controlling for school-level characteristics (model 1), gas stations remained less likely to comply with the ban. In the full model controlling for store, school and neighbourhood-level characteristics (model 2), gas stations had 81% lower odds of compliance compared with larger stores ($OR=0.19$, 95% CI 0.06 to 0.58) and the OR for compliance among independent convenience stores approached significance ($OR=0.27$, 95% CI 0.07 to 1.01).

Distance to a high school, high school type and neighbourhood characteristics were not associated with compliance in the adjusted models.

Presence of menthol cigarette replacement packs

No menthol cigarette replacement packs were observed.

DISCUSSION

To the best of our knowledge, this study is the first assessment of compliance with a partial menthol cigarette ban in a US city. Around half of affected stores (57%) did not sell menthol cigarettes. Compared with the evaluation of Canada's province-wide menthol cigarette bans, which found very high levels of compliance,²⁷ our study demonstrates a lower level of compliance with this partial ban in one city. This finding is similar to studies in New Zealand and Canada that found compliance with partial point of sale display bans was lower compared with more comprehensive efforts.^{28,38}

In this study, we did not find any menthol cigarette replacement packs as was previously observed in stores affected by Alberta, Canada's comprehensive menthol cigarette ban.²⁷ This is likely because menthol cigarettes are still available to consumers due to the partial nature of Chicago's ban, leaving little incentive for the tobacco industry to market replacement packs in Chicago. Packs of menthol cigarettes were also still being sold in many stores affected by the ordinance. If menthol cigarette replacement packs were being sold under the conditions of Chicago's partial ban, this could have signified that tobacco companies were developing replacement packs in anticipation of other local and potential national efforts to restrict menthol cigarette sales. Tobacco companies may be waiting for more cities to implement comprehensive bans before introducing replacement packs into the US marketplace. Future observational studies are warranted to track this response and its potential to undermine the public health benefit of such bans.

Overall, results of this compliance evaluation can inform ongoing or future efforts to develop and implement menthol cigarette bans, including partial bans. In our analysis, we observed that gas stations were significantly less likely to comply with the partial menthol cigarette ban. Local jurisdictions could maximise enforcement efforts by focusing on gas stations first to achieve a higher rate of compliance with a partial or comprehensive ban. In this sample, all gas stations were affiliated with a regional or national chain and other cities are likely to have a similarly high proportion of corporate gas stations. It is possible that these stores could be incentivised to follow the law in an effort to protect their parent company's image.²⁸ Efforts could operate on multiple levels, including outreach to the parent company and individual franchise store owners.

Our results, in combination with other studies conducted in New Zealand and the USA, suggest that corporate chain stores are generally compliant with tobacco ordinances.^{28,29} However, we did observe some variation in compliance across grocery and dollar discount stores within the same chain. To increase compliance in chain stores, enforcement agencies could prioritise sharing materials and trainings through corporate communication channels to improve awareness and knowledge of a ban among staff in chain stores.

Not surprisingly, industry-provided signs and price promotions were commonly observed in non-compliant stores, especially gas stations. What was more unexpected was that we also observed menthol cigarette signs in eight compliant stores. These results indicate sustained exposure to both the product and promotions in areas where menthol cigarette sales are banned. This may be intentional in the case of price promotions in non-compliant stores or reflect infrequent changes made to exterior or interior signage. Because advertising and product access are associated with smoking susceptibility and difficulty quitting,³⁹ ordinances that restrict both may be more likely to achieve the public health goal of reducing initiation with and continued use of menthol cigarettes. It is unlikely that removing menthol cigarette advertising in stores where the sale of menthol cigarettes is restricted would violate commercial speech protections under the First Amendment, as commercial speech 'is not protected if it proposes an unlawful transaction.'⁴⁰

Finally, we did not find significant variation in compliance by distance to a high school or high school type. We also did not observe variation in compliance across neighbourhood demographic characteristics. These results are encouraging and suggest that compliance in a partial ban setting is just as high in areas where menthol cigarettes are more likely to be sold and marketed in the USA.¹²¹³ However, there may be variation in why some stores comply and others do not, related to neighbourhood location, that this analysis does not fully capture.

Limitations

There are several limitations to this research. First, it is possible that we overestimated compliance if stores that sold menthol cigarettes through covert means did not sell to our data collection team. One data collector identified as a Latino man in his early 20s (C1); the other identified as a White woman in her early 30s (C2). At each store, C1 captured the assessment data, while C2 asked for the pack of menthol cigarettes and interacted with the clerk as a customer. Directly purchasing packs and using the same data collection team to complete all assessments improves the validity and consistency of our compliance measure; however, it may not capture all stores that only sell menthol cigarettes to known regulars. Additionally, the study results may not be fully generalisable to other cities, but findings are likely relevant for other medium to large cities with a high proportion of non-White populations that enact a partial menthol cigarette ban. Further, findings can generally inform other urban jurisdictions as they develop draft ordinance language and enforcement plans.

CONCLUSION

Our study results suggest that compliance is poor with a partial menthol ban. A comprehensive ban would be the most ideal policy option to reduce access to menthol cigarettes. However, the potential political challenges associated with passing and implementing such an ordinance, like the tobacco-industry sponsored campaign against San Francisco's comprehensive flavoured tobacco ban, which includes menthol cigarettes,²³ may make a partial menthol cigarette ban the most feasible policy solution for some jurisdictions. In our study, we observed that approximately half of the stores assessed complied with the ban. This finding indicates that some stores do follow a partial ban, although this rate is

lower than the results from other comprehensive menthol cigarette and flavoured tobacco ban evaluations.^{24–27} Surprisingly, compliance did not vary significantly across neighbourhood demographic characteristics, suggesting that partial bans are not less effective in reducing access to menthol cigarettes in low-income, non-White neighbourhoods disproportionately exposed to menthol cigarette advertising and sales. Our results also suggest that including a restriction on both menthol cigarette advertising and product sales could strengthen partial and comprehensive bans by reducing dual exposure to product and promotion. As more jurisdictions develop partial or comprehensive menthol cigarette bans, the results of this study demonstrate opportunities to address anticipated challenges in compliance across store types through targeted communication and enforcement efforts, particularly in gas stations

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What this paper adds

- ▶ In 2009, the US Family Smoking Prevention and Tobacco Control Act banned the sale of cigarettes with a characterising flavour but excluded menthol.
- ▶ Local ordinances have become a pathway to regulate access to menthol cigarettes in the USA and the City of Chicago is the first major American city to restrict the sale of menthol cigarettes through a partial ban on flavoured tobacco sales in stores within 500 feet of high schools.
- ▶ Only a handful of studies have evaluated compliance with a flavoured tobacco ban and results suggest compliance is generally high in jurisdictions with comprehensive flavoured tobacco bans (excluding menthol) in the USA and provincial menthol cigarette bans in Canada.
- ▶ No research has investigated compliance with a partial ban on the sale of menthol cigarettes, including variation across store type.
- ▶ Our study indicates that compliance with Chicago's partial menthol cigarette ban was poor.
- ▶ Gas stations were less likely to comply, suggesting these stores should be a priority for enforcement efforts.
- ▶ Comprehensive bans that also restrict menthol cigarette advertising would be the most ideal policy option to reduce access to menthol cigarettes.

Table 1

Store-level and neighbourhood characteristics for selected stores affected by Chicago's partial menthol cigarette ban, overall and by ban compliance

	N	Total analytic n=90 Weighted %	Compliant with ban n=53 Weighted %	Not compliant n=37 Weighted %	P values
Store type					
Independent convenience store	23	24.5	22.6	26.9	0.13
Gas station	30	34.8	24.4	48.7	
Chain convenience store	5	5.1	6.6	3.2	
Grocery store	9	10.7	10.3	11.1	
Liquor store	7	8.4	12.4	3.1	
Pharmacy	6	6.2	10.9	0.0	
Dollar discount store	6	6.4	7.5	4.8	
Other	4	3.9	5.3	2.2	
Interior menthol cigarette ads					
No	65	71.0	86.1	50.9	<0.001
Yes	25	29.0	13.9	49.1	
Exterior menthol cigarette ads					
No	81	89.3	96.4	79.9	0.01
Yes	9	10.7	3.6	20.1	
Distance to nearest high school (feet)					
250	34	36.6	41.0	30.8	0.34
251–500	56	63.4	59.0	69.2	
Type of high school					
Private	26	29.3	29.8	28.6	0.90
Public	64	70.7	70.2	71.4	
Tobacco retail outlets in neighbourhood					
<4 stores	38	43.4	48.6	36.5	0.28
4 stores	52	56.6	51.4	63.5	
Neighbourhood characteristics (census tract)					
% Non-Latino White residents					
<25	50	59.0	51.5	68.9	0.24
25–60	27	28.8	33.7	22.4	
>60	13	12.2	14.8	8.7	
% Non-Latino African-American residents					
<25	51	54.1	59.5	46.9	0.08
25–60	7	7.5	11.2	2.6	
>60	32	38.4	29.3	50.5	
% Latino residents					
<25	55	60.0	60.5	59.3	0.97
25–60	18	19.5	18.5	20.8	
>60	17	20.5	21.0	19.9	

	N	Total analytic n=90 Weighted %	Compliant with ban n=53 Weighted %	Not compliant n=37 Weighted %	P values
% <18 years old					
<15	23	22.8	29.4	14.1	0.24
15–30	51	58.7	52.8	66.5	
>30	16	18.5	17.8	19.4	
% Living below poverty line					
<15	23	23.8	28.8	17.2	0.43
15–30	36	40.9	39.8	42.3	
>30	31	35.3	31.4	40.5	
Geographic region					
Central	8	7.5	11.5	2.2	0.29
North	26	28.5	31.2	25.0	
West	28	29.2	27.2	31.8	
South	28	34.8	30.1	41.0	

Weighted %=proportion of the sample weighted to account for stratified sampling design.

Bolded text indicates statistical significance (p<0.05).

Table 2

OR (95% CI) for compliance with Chicago's partial menthol cigarette ban by store and neighbourhood characteristics (n=90)

	<u>Crude</u>		<u>Model 1</u>		<u>Model 2</u>	
	OR	CI	OR	CI	OR	CI
Store type						
Larger or chain store [†]	Ref		Ref		Ref	
Independent convenience store	0.39	(0.12 to 1.23)	0.37	(0.11 to 1.18)	0.27	(0.07 to 1.01)
Gas station	0.23	(0.08 to 0.68) **	0.21	(0.07 to 0.63) **	0.19	(0.06 to 0.58) **
Distance to nearest high school (feet)						
250	Ref		Ref		Ref	
251–500	0.64	(0.26 to 1.60)	0.54	(0.20 to 1.42)	0.57	(0.20 to 1.68)
Type of high school						
Private	Ref		Ref		Ref	
Public	0.94	(0.36 to 2.46)	0.80	(0.29 to 2.26)	0.99	(0.34 to 2.96)
Tobacco retail outlets in neighbourhood						
<4 stores	Ref				Ref	
4 stores	0.61	(0.25 to 1.50)			0.43	(0.16 to 1.19)
Neighbourhood characteristics, per 10% increase						
% Non-Latino African-American residents	0.92	(0.82 to 1.03)			0.86	(0.64 to 1.15)
% Latino residents	1.01	(0.87 to 1.16)			0.92	(0.66 to 1.27)
% Residents <18 years old	0.59	(0.34 to 1.02)			0.69	(0.27 to 1.73)
% Residents living below poverty line	0.82	(0.60 to 1.13)			1.09	(0.65 to 1.81)

Crude=unadjusted analysis.

Model 1=adjusted for store type and school-level factors.

Model 2=further adjusted for neighbourhood-level factors.

**
p<0.01

[†] Defined as chain convenience store, grocery store, pharmacy, liquor store, dollar discount store and other (eg, restaurant, tobacco accessories store). Ref, reference group.