Tobacco Promotions at Point-of-sale

The Last Hurrah

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ABSTRACT

Objectives: The retail environment provides important opportunities for tobacco industry communication with current, former, and potential smokers. This study documented the extent of tobacco promotions at the retail point-of-sale and examined associations between the extent of tobacco promotions and relevant city and store characteristics.

Methods: In each of 20 Ontario cities, 24 establishments were randomly selected from lists of convenience stores, gas stations, and grocery stores. Trained observers captured the range, type and intensity of tobacco promotions from April to July 2005. The extent of tobacco promotions was described using weighted descriptive statistics. Weighted t-tests and ANOVAs, and hierarchical linear modeling, were used to examine the relationships between tobacco promotions and city and store characteristics.

Results: Extensive tobacco promotions were found in Ontario stores one year prior to the implementation of a partial ban on retail displays, particularly in chain convenience stores, gas station convenience stores and independent convenience stores. The multivariate hierarchical linear model confirmed differences in the extent of tobacco promotions by store type ($p < 0.01$); in addition, tobacco promotions were found to be higher among stores close to a school ($p = 0.01$) and in neighbourhoods with lower median household incomes ($p < 0.01$). Independent convenience stores with a greater number of employees had more tobacco promotions; however, the relationship was reversed for grocery stores.

Discussion: Tobacco promotions were extensive at the point-of-sale. Public health messages about the harms of tobacco use may be compromised by the pervasiveness of these promotions.

Key words: Tobacco; marketing; smoking; socioeconomic factors; observation

La traduction du résumé se trouve à la fin de l'article.

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Acknowledgements: This research was funded through the strategic initiative Advancing the Science to Reduce Tobacco Abuse and Nicotine Addiction. This initiative is a partnership of government and non-profit organizations under the coordination of the Canadian Tobacco Control Research Initiative (CTCRI). The authors acknowledge the following individuals who have contributed to this research: J. Charles Victor (sampling, GIS mapping); Dolly Baliunas, Ellie Goldenberg and Maya Saibil (map and store list preparation); Dolly Baliunas, Brooke Filsinger and Jessica van Exan (data collection); Joanne Cordingley (data entry); Shannon Gordon (obtaining store data from the Canadian Business Directory); Itasha O'Gilvie (determining school proximity to stores); and Tamara Arenovich (data analysis, statistical consulting and manuscript review).

Given extensive restrictions on tobacco advertising and promotion required under the 1997 Canadian *Tobacco Act*, the retail point-of-sale has become an important environment for the tobacco industry to communicate with current, former, and potential smokers.¹⁻⁴ Point-of-sale promotions include large tobacco-product displays called "powerwalls," countertop displays, and signs advertising tobacco. In 2005, tobacco manufacturers paid retailers \$100 million, mainly for prominent displays, representing a 35% increase from 2001.⁵

Widespread tobacco marketing at the point-of-sale has been reported in the United States.⁶⁻¹⁰ A positive association has been found between cigarette promotional activities and adolescent smoking initiation.¹¹⁻¹⁵ Further, exposure to point-of-sale advertising can increase the amount people smoke, as well as former smokers' likelihood of relapse.^{4,7,16}

The peer-reviewed empirical literature on the amount of tobacco promotions at point-of-sale has emanated entirely from the United States. Because the regulatory environment for tobacco advertising and sponsorship is quite different in Canada, and because of the recent interest in restricting tobacco promotions at point-of-sale in this country,¹⁷ it is important to develop the evidence base for this type of policy intervention in the Canadian context. In Ontario, the provincial government instituted a partial tobacco display ban, prohibiting powerwall display panels, coloured shelf liners, and countertop displays in May 2006; a complete ban of all visible displays will come into effect in May 2008.

The present study was undertaken to describe the extent of tobacco promotions in Ontario retail outlets one year prior to the partial ban coming into effect, and to examine the relationships between tobacco promotional activities and store and neighbourhood characteristics.

METHODS

Development of a tobacco promotion checklist

A data collection checklist was developed to capture detailed information on the type, range, and frequency of tobacco promotional strategies used in Ontario retail outlets. The checklist included items per-

taining to powerwalls (approximate size, prominent brands, colours, and display panels), countertop displays, tobacco signage, as well as information on promotions for confectionary and stop-smoking aids, to serve as comparisons (Appendix A). In developing the checklist, previous research and existing data collection instruments for tobacco promotions at point-of-sale were consulted (e.g., Project Impact, ImpacTeen, Operation Storefront, New York Department of Health Retail Tobacco Advertising Survey, Battelle Store Alert Training Guide, storealert.org). Two experts provided feedback on the checklist and data collection strategies.

Selection of cities and stores

All Ontario municipalities with a population of at least 50,000 were eligible for inclusion in the study. The sample design involved 2 levels of stratification, first by health planning region and then by store type. Probability proportional to population size sampling was performed to sample cities from each of the seven health planning regions in Ontario. Each city was weighted according to population size.

The Ontario Yellow Pages Directory (yellowpages.ca) was used to identify and create lists of eligible stores in each of four retail groups: 1) chain convenience, 2) independent convenience, 3) gas stations, and 4) grocery stores. Within each selected city, 15 stores were randomly selected from each retail group using a random number generator programmed in SAS. Within each list, the first 6 retail locations were selected for data collection, and the remaining 9 served as alternate stores in case a selected store was closed or did not sell cigarettes. MapQuest®, Google Maps™ and Yahoo!® Maps were used to identify the location of each retail outlet. The locations were plotted on hard-copy MapArt folding maps for navigational purposes during data collection.

Data collection

Data collectors received two days of training, during which they familiarized themselves with the checklist and performed coding exercises in nearby convenience stores. From April to July 2005, three data collectors traveled to the 20 selected communities. Upon entering the retail location, data collectors scanned the store envi-

ronment for checklist items, spending the majority of time at the cash counter. At grocery stores, data collectors observed the cash counter where cigarettes were sold, most often a customer service desk. Data collectors employed strategies for appearing as legitimate customers, such as making a small purchase and maximizing in-store time by simulating cellphone conversations. Each checklist was completed immediately after leaving the retail outlet. If necessary, data collectors re-entered the store to collect additional information. Ethics approval was obtained from the University of Toronto.

Of the 667 stores visited, 114 did not sell cigarettes: 2 chain convenience stores, 5 independent convenience stores, 17 gas stations, 70 grocery stores, 6 "other" store types (i.e., did not meet the criteria for a grocery store or convenience store), and 14 stores with missing data on store type. Additionally, 5 stores were closed on the day of observation, 17 stores were out of business, and 50 stores were unable to be observed for some other reason (e.g., store could not be located, cigarettes were sold but not visible to customers, or the store was considered ineligible for observation). Thus, complete observations were obtained for 481 stores: 149 independent convenience, 121 chain convenience, 83 grocery stores, 69 gas stations with no attached convenience store, and 59 chain gas stations with an attached convenience store.

Dependent and independent variables

A tobacco promotion index (TPI) was developed as a summary outcome measure for point-of-sale promotions, which included 15 items on powerwalls, countertop displays, and signage (Table I). Stores received one point for each feature present, plus one point for each countertop cigarette display. Scores ranged from 0 to 16. To provide some context for the level of tobacco promotions, a confectionary promotion index was also developed; it included 4 items related to countertop confectionary displays and signage. High index scores represented a high level of promotions.

Information on neighbourhood characteristics (median household income and education level) were obtained from the 2001 Canadian census and merged into the dataset by postal code. Number of

store employees and store sales were extracted from the Canadian Business Directory database.¹⁸ To determine the number of schools within close proximity to our stores, a 1000-foot radius circle was drawn around each store on the hard-copy maps. The number of elementary and secondary school symbols falling within the circle were counted, and verified with ESRI ArcMap geographic information systems (GIS) software using CanMap Route Logistics Ontario v2005.3 and Enhanced Points of Interest v2005.3 map files from DMTI Spatial Inc. Smoking prevalence data were derived from Statistics Canada's 2005 Canadian Community Health Survey.

Data analysis

All analyses were conducted in SAS version 9.2. Each store was weighted based on the total number of eligible stores of its store type within the respective city. For example, stores in cities with a relatively high number of a particular store type were assigned a higher weight than those in other cities with a lower number of a particular store type. T-tests and ANOVAs were used to assess bivariate associations between the TPI and health region, city, city-level variables, and store-level variables. Hierarchical linear modeling was conducted to examine the relationship between the TPI and the predictor variables, while accounting for city and region variances (Appendix B). Bonferroni-adjusted pairwise comparisons were conducted to identify differences across variable categories.

RESULTS

Tobacco promotions at point-of-sale in Ontario

Tobacco promotions were extensive (Table I). Mean TPI scores were highest in chain convenience stores (10.1) and lowest in grocery stores (2.7). The vast majority of chain convenience stores had shelf gliders (98.4%), shelf liners (96.6%), a top display panel (88.9%), and had tobacco products placed within one foot of candy (88.8%). Confectionary promotion index scores ranged from 0 to 4. Similar to tobacco promotions, mean confectionary index scores were highest in chain convenience stores (2.2) and lowest in grocery stores

TABLE I

Weighted Descriptive Statistics for Tobacco Promotion Index Items and Overall Tobacco and Confectionary Promotion Index Scores, by Store Type, 2005 (n=481)

	Type of Store				
	Chain Convenience Store (n=121)	Chain Gas Station with Attached Convenience Store (n=59)	Independent Convenience Store (n=149)	Gas Station with No Convenience Store (n=69)	Grocery Store (n=83)
Frequencies of tobacco promotion index items (%)					
Powerwall height greater than median	69.6	13.9	62.4	29.8	22.3
Powerwall length greater than median	66.6	33.6	43.9	1.9	31.9
Presence of danglers*	60.8	61.6	46.6	34.8	16.0
Presence of shelf gliders†	98.4	98.3	78.6	83.9	35.4
Presence of shelf liners‡	96.6	97.5	74.7	77.5	27.9
Presence of top display panel§	88.9	94.3	83.1	61.5	26.3
Presence of side display panel	24.7	11.4	18.4	2.6	6.8
Presence of price sign on powerwall	82.0	81.9	69.4	70.8	41.2
Presence of illuminated feature on powerwall	6.3	0.8	2.5	0.0	0.0
Presence of some "other" distinguishing feature	15.3	0.0	6.2	4.2	3.1
Any tobacco products within one foot of candy	88.8	89.8	83.0	55.8	16.9
Presence of indoor cigarette ads	63.0	46.8	25.8	27.8	17.8
Presence of cigarette packages attached to ads	47.2	2.2	17.4	6.7	8.0
Presence of outdoor cigarette ads	39.1	31.0	21.2	33.6	2.0
Number of countertop cigarette displays (mean, SD)	1.6 (1.3)	1.4 (0.8)	0.8 (1.0)	0.7 (0.9)	0.2 (0.5)
Tobacco promotion index (mean, SD)	10.1 (1.9)	7.9 (1.5)	7.1 (4.3)	5.6 (2.0)	2.7 (4.1)
Confectionary promotion index (mean, SD)	2.2 (0.9)	1.9 (1.1)	2.1 (1.1)	1.2 (1.1)	0.6 (1.1)

* A dangler is a sign or other item that hangs off of the powerwall (traditionally designed to sway when customers walk by it).

† A shelf glider typically sits flat along a metal shelf rail. It may be coloured or have a price sign attached.

‡ A shelf liner is a full coloured piece behind the cigarette packs on the powerwall.

§ A top display panel is a raised horizontal panel above the powerwall.

|| A side display panel is a raised vertical panel on either side of the powerwall.

(0.6). Only 9 of the 481 stores (0.02%) had stop smoking aids displayed in the vicinity of the cash register, and 7 of these stores were chain convenience stores.

Tobacco promotion index and city- and store-level characteristics

Significant differences in TPI scores were found by health planning region and by city. Tobacco promotion scores were significantly lower in large cities compared to medium-sized cities ($p<0.01$) and small cities ($p=0.05$) (Table II). Stores located in cities with higher prevalence of youth smoking, adult smoking, and adult daily smoking all had higher promotion scores ($p<0.01$). Stores in cities that had no bylaw had significantly lower tobacco promotion scores than stores located in cities with more comprehensive bylaws ($p<0.01$).

Chain convenience stores had significantly higher levels of promotions compared to gas stations with attached convenience stores ($p=0.01$), gas stations alone ($p<0.01$), independent convenience stores ($p<0.01$) and grocery stores ($p<0.01$). Grocery stores had significantly lower scores compared to independent convenience stores ($p<0.01$) and compared to gas stations with no convenience store ($p<0.01$). Independent convenience stores and gas stations with convenience stores with a higher number of employees tended

TABLE II

Bivariate Relationships Between the Tobacco Promotion Index and City- and Store-level Variables, 2005 (n=481)

	Tobacco Promotion Index - Mean (SD) or Correlation Coefficient	Statistical Significance
City-level variables		
City population size		
Small (<100,000)	7.2 (2.3)	$p<0.01$
Medium (100,000-500,000)	7.0 (3.2)	
Large (>500,000)	5.6 (6.9)	
Prevalence of youth smoking	$r=0.24$	$p<0.01$
Prevalence of adult smoking	$r=0.20$	$p<0.01$
Prevalence of adult daily smoking	$r=0.20$	$p<0.01$
Degree of smoke-free bylaw*		
None	5.3 (5.4)	$p<0.01$
One location	7.4 (3.1)	
Three locations	7.0 (2.4)	
Four locations	6.9 (3.9)	
Store-level variables		
Store type		
Chain convenience store	10.1 (1.9)	$p<0.01$
Gas station with convenience store	7.9 (1.5)	
Independent convenience store	7.1 (4.3)	
Gas station alone	5.6 (2.0)	
Grocery store	2.7 (4.1)	
Number of employees per store†	$r=0.12$	$p=0.03$
Total sales per store†	$r=0.07$	$p=0.17$
Median household income of neighbourhood‡	$r=-0.08$	$p=0.08$
Percentage no high school diploma in neighbourhood‡	$r=0.08$	$p=0.08$
Store located within 1000 feet of a school		
No	6.2 (3.9)	$p=0.47$
Yes	6.4 (4.6)	

* Based on number of locations with smoke-free bylaws: restaurants, bars, bingo, and billiards.

† Grocery stores removed due to much higher total sales and number of employees compared to the other store types.

‡ Based on 2001 Canadian census data by dissemination area. A dissemination area is a small, relatively stable geographic unit composed of one or more blocks, and the smallest standard geographic area for which all census data are disseminated.

to have higher TPI scores ($p=0.03$); however, among grocery stores, promotion scores increased with a decreasing number of employees ($p=0.04$).

The random effects for city and region were not significant ($p=0.17$, $p=0.32$ respectively) when controlling for other predictors in the multivariate hierarchical

TABLE III

Hierarchical Linear Modeling of Fixed Effects with City and Region as Random Effects, 2005 (n=481)

Effect	Betas	F-value, Degrees of Freedom	Statistical Significance
City population size		F=0.12, df=2,389	p=0.89
Large	-0.39		
Medium	-0.45		
Small*	0		
Store type		F=7.37, df=4,389	p<0.01
Chain	4.18		
Gas with convenience store	0.29		
Gas only	-1.92		
Grocery	-1.63		
Independent convenience store*	0		
Store located within 1000 feet of a school		F=6.07, df=1,389	p=0.01
No (vs. yes)	-0.81		
Percentage no high school diploma in neighbourhood	-2.22	F=2.95, df=1,389	p=0.09
Median household income of neighbourhood	-0.33	F=13.39, df=1,389	p<0.01
Prevalence of youth smoking	0.26	F=2.07, df=1,389	p=0.15
Prevalence of adult smoking	-0.20	F=0.93, df=1,389	p=0.34
Degree of smoke-free bylaw		F=1.32, df=3,389	p=0.27
0	-1.23		
1	-1.71		
3	1.22		
4*	0		
Number of employees per store	1.14	F=0.94, df=1,389	p=0.33
Store type x Number of employees per store		F=6.85, df=4,389	p<0.01
Chain	-1.62		
Gas with convenience store	-0.32		
Gas only	-0.43		
Grocery	-1.78		
Independent convenience store*	0		

* Reference category.

Note: The units are different for different predictor variables so it is not possible to compare 'effect sizes' based on the magnitude of the beta coefficients. All categorical effects are described in relation to a reference category; selecting a different reference category changes the coefficients of the other categories.

Appendix A

Selected Items from the Tobacco Promotion Data Collection Checklist

Type of Store:

1. Chain convenience store	4. Chain gas station	7. Supermarket
2. Independent convenience store	5. Independent gas station	8. Small grocery store
3. Chain gas station convenience store	6. Other (specify):	

Placement of cigarettes:

- ☐ Over or behind counter ☐ Behind customer service desk ☐ Other (specify):

Powerwall Dimensions:

Height: _____ Width: _____

Powerwall Enhancements:

Are there:

Yes	No	Yes	No	Yes	No
☐	☐ Danglers?	☐	☐ Display piece? If yes:	☐	☐ Illuminated features?
☐	☐ Coloured shelf liners?	☐	☐ Top ☐ Side(s) ☐ Other		
☐	☐ Shelf gliders?	☐	☐ Price signs?		
☐	☐ Any other distinguishing features? (specify)				

Countertop Displays:

Cigarettes #: _____

Products Close to Cash, Candy:

- Yes No
☐ ☐ Tobacco products/accessories placed within 12" of candy, snack foods, or toys? Which ones:

Indoor and Outdoor Cigarette Ads:

- Yes No
☐ ☐ Signs advertising cigarettes?
☐ ☐ Cigarettes attached to signs or objects?
☐ ☐ Signs and/or outdoor menu boards advertising cigarettes?

linear model. Tobacco promotion scores were higher in chain convenience stores ($p<0.01$) than in both gas stations without

convenience stores and grocery stores; in stores that were within 1000 feet of a school ($p=0.01$); and in stores located in

neighbourhoods with lower median household income levels ($p<0.01$) (Table III). There was a significant interaction between store type and number of employees ($p<0.01$); there was a positive relationship between number of employees and TPI scores among independent convenience stores and a negative relationship among grocery stores.

DISCUSSION

The current study found extensive tobacco promotions at point-of-sale in Ontario retail locations one year prior to the partial ban being implemented, particularly in chain convenience stores, gas station convenience stores and independent convenience stores.

In a California city, Henrikson et al. reported almost three times more marketing shelf space devoted to brands, such as Marlboro and Camel, in areas where adolescents frequently shop, compared to other stores in the community.¹⁰ Similarly, the current study found increased point-of-sale tobacco promotions at stores located close to an elementary or secondary school. Location close to a school was significantly associated with tobacco promotion score in the multivariate model but not in the bivariate analysis. Further analyses found that larger cities were more likely than smaller cities to have schools close to our sample of stores. Because there were lower tobacco promotions overall in the larger cities, no bivariate association was found. However, after controlling for this partial confound, close proximity to a school was significant in the multivariate model.

Our finding of more tobacco promotion in neighbourhoods with lower median income is consistent with results reported within two US states.^{8,19} Additionally, there was support for our hypothesis that cities with more comprehensive bylaws would have more promotions, perhaps to offset the social unacceptability of smoking brought by restricting where smoking can occur.

While the study design provided a representative sample of various types of retail locations across all seven health planning regions in Ontario, these findings cannot necessarily be generalized to Ontario cities with a population less than 50,000. It is possible that not all potential confounders

were taken into account. For example, one determinant of the amount of tobacco promotions at point-of-sale may be the skill of tobacco company sales representatives in securing retail displays and shelf space.⁴ Unfortunately, information on sales representatives' abilities is not available. We also did not include characteristics of neighbourhoods beyond socio-economic status – age structure, ethnicity and other cultural factors may be associated with the extent of tobacco promotions in stores. Although we assessed whether the store was located within 1000 feet of a school, the store may not be the one most frequented by students of identified schools; nonetheless, the approach used provides a conservative estimate of the relationship between proximity to a school and extent of tobacco promotions.

Across Canada, 10 of the 13 provinces and territories have either prohibited tobacco product displays at point-of-sale or have passed legislation that will come into effect by July 2008. Internationally, Australia, Iceland, Ireland, Singapore, South Africa, Thailand, the United Kingdom, and New Zealand have also implemented some form of restrictions on point-of-sale tobacco promotions.¹⁷ This is an emerging policy issue that requires an evidence base that goes beyond the US context, particularly because the US studies have been conducted in a regulatory environment with minimal, or no, restrictions on promotions at point-of-sale. Upcoming field work will be conducted to document changes in the retail environment before and after the complete ban on visible tobacco displays in Ontario. Data collection will examine bylaw adherence and identify any new promotional strategies employed by the tobacco industry.

REFERENCES

1. Fraser T. Phasing out of point-of-sale tobacco advertising in New Zealand. *Tobacco Control* 1998;7:82-84.
2. Carter SM. New frontier, new power: The retail environment in Australia's dark market. *Tobacco Control* 2003;12(Suppl. III):iii95-101.
3. Dewhirst T. POP goes the power wall? Taking aim at tobacco promotional strategies utilized at retail. *Tobacco Control* 2004;13:209-10.
4. Lavack AM, Toth G. Tobacco point-of-purchase promotion: Examining tobacco industry documents. *Tobacco Control* 2006;15(5):377-84.
5. Canadian Cancer Society. Tobacco companies increase powerwall payments to retailers - Alberta sees largest increase. 2006. Available online at: <http://www.cancer.ca/ccs/internet/mediareleaselist/>

Appendix B

Hierarchical Linear Model Regression Equations

Level I (Store Level):

$$Y_{ijk} = \beta_{0jk} + \beta_{1jk}X_1 + \beta_{2jk}X_2 + \beta_{3jk}X_3 + \beta_{4jk}X_4 + \beta_{5jk}X_5 + \beta_{6jk}X_1X_5 + r_{ijk}$$

Where

Y_{ijk} = tobacco promotion index score for store i in city j and region k

X_1 = store type

X_2 = proximity to a school

X_3 = percentage no high school diploma in neighbourhood

X_4 = median household income of neighbourhood

X_5 = number of employees

β_{0jk} = intercept in city j and region k

β_{1jk} = slope associated with store type in city j and region k

β_{2jk} = slope associated with store proximity to a school in city j and region k

β_{3jk} = slope associated with percentage no high school diploma in neighbourhood in city j and region k

β_{4jk} = slope associated with median household income of neighbourhood in city j and region k

β_{5jk} = slope associated with number of employees in store in city j and region k

β_{6jk} = slope associated with interaction between store type and number of employees in city j and region k

r_{ijk} = random error associated with the ith store in city j and region k

Level II (City Level):

$$\beta_{0jk} = \gamma_{00k} + \gamma_{01k}X_6 + \gamma_{02k}X_7 + \gamma_{03k}X_8 + \gamma_{04k}X_9 + u_{0jk}$$

where

β_{0jk} = intercept in city j and region k

X_6 = city population size

X_7 = prevalence of youth smoking

X_8 = prevalence of adult smoking

X_9 = degree of smoke-free bylaw

γ_{00k} = intercept in region k

γ_{01k} = slope associated with city population size

γ_{02k} = slope associated with prevalence of youth smoking

γ_{03k} = slope associated with prevalence of adult smoking

γ_{04k} = slope associated with smoke-free bylaw

u_{0jk} = random error associated with the jth city in region k

Level III (Region Level):

$$\gamma_{00k} = \tau_{000} + e_{00k}$$

where

τ_{000} = overall intercept

e_{00k} = random error associated with region k

Putting the pieces together, we obtain:

$$Y_{ijk} = ((\tau_{000} + e_{00k}) + \gamma_{01k}X_6 + \gamma_{02k}X_7 + \gamma_{03k}X_8 + \gamma_{04k}X_9 + u_{0jk}) + \beta_{1jk}X_1 + \beta_{2jk}X_2 + \beta_{3jk}X_3 + \beta_{4jk}X_4 + \beta_{5jk}X_5 + \beta_{6jk}X_1X_5 + r_{ijk}$$

which can be rearranged as

$$Y_{ijk} = \tau_{000} + \beta_{1jk}X_1 + \beta_{2jk}X_2 + \beta_{3jk}X_3 + \beta_{4jk}X_4 + \beta_{5jk}X_5 + \beta_{6jk}X_1X_5 + \gamma_{01k}X_6 + \gamma_{02k}X_7 + \gamma_{03k}X_8 + \gamma_{04k}X_9 + r_{ijk} + u_{0jk} + e_{00k}$$

with the first line of the equation denoting fixed effects, and the second line representing random effects.

- 0,3208,3172_615815452_1448542093_langId=en,00.html (Accessed February 2007).
6. Cummings KM, Sciandra R, Lawrence J. Tobacco advertising in retail stores. *Public Health Reports* 1991;106(5):570-75.
7. Feighery EC, Ribisl KM, Schleicher N, Lee RE, Halvorson S. Cigarette advertising and promotional strategies in retail outlets: Results of a statewide survey in California. *Tobacco Control* 2001;10:184-88.
8. Laws MB, Whitman J, Bowser DM, Krech L. Tobacco availability and point of sale marketing in demographically contrasting districts of Massachusetts. *Tobacco Control* 2002;11(Suppl III):iii71-73.
9. Wakefield MA, Terry-McElrath YM, Chaloupka FJ, Barker DC, Slater SJ, Clark PI, Giovino GA. Tobacco industry marketing at point of purchase after the 1998 MSA Billboard Advertising Ban. *Am J Public Health* 2002;92:937-40.
10. Henriksen L, Feighery EC, Schleicher NC, Haladjian HH, Fortmann SP. Reaching youth at the point of sale: Cigarette marketing is more prevalent in stores where adolescents shop frequently. *Tobacco Control* 2004;13:315-18.
11. Pierce JP, Choi WS, Gilpin EA, Farkas AJ, Berry CC. Tobacco industry promotion of cigarettes and adolescent smoking. *JAMA* 1998;279:511-15.
12. Biener L, Siegel M. Tobacco marketing and adolescent smoking: More support for a causal inference. *Am J Public Health* 2000;90:407-11.
13. Sargent JD, Dalton M, Beach M, Bernhardt A, Heatherton T, Stevens M. Effect of cigarette promotions on smoking uptake among adolescents. *Prev Med* 2000;30:320-27.
14. Choi WS, Ahluwalia JS, Harris KJ, Okuyumi K. Progression to established smoking: The influence of tobacco marketing. *Am J Prev Med* 2002;22:228-33.

15. Henriksen L, Feighery EC, Wang Y, Fortmann SP. Association of retail tobacco marketing with adolescent smoking. *Am J Public Health* 2004;94(12):2081-83.
16. Warner KE, Ernster VL, Holbrook JH, Lewit EM, Pertschuk M, Steinfeld JL, et al. Promotion of tobacco products: Issues and policy options. *J Health Politics, Policy Law* 1986;11(3):367-92.
17. Health Canada. A proposal to regulate the display and promotion of tobacco and tobacco-related products at retail. 2006. Available online at: http://www.hc-sc.gc.ca/hl-vs/tobac-tabac/commun/consultation/current-actuelle/tob-ret/tab_e.html (Accessed April 2007).
18. American Business Information. The Canadian Business Directory. InfoUSA. Omaha, Nebraska (Accessed December 2005).
19. Hyland A, Travers MJ, Cummings KM, Bauer J, Alford T, Wiczorek WF. Tobacco outlet density and demographics in Erie County, New York. *Am J Public Health* 2003;93(7):1075-76.

Received: May 18, 2007

Accepted: November 29, 2007

RÉSUMÉ

Objectif : Le commerce de détail offre de bonnes occasions aux fabricants de tabac de communiquer avec les fumeurs (actuels, anciens ou potentiels). Dans cette étude, nous avons documenté l'étendue de la publicité sur le tabac aux points de vente et examiné les associations entre cette publicité et les caractéristiques du point de vente et de la ville.

Méthode : Dans 20 villes de l'Ontario, nous avons choisi au hasard 24 établissements à partir des listes de leurs dépanneurs, stations-service et épicerie. Des observatrices formées ont noté la gamme, le genre et l'intensité des publicités de tabac entre avril et juillet 2005. L'étendue de cette publicité a été analysée à l'aide de statistiques descriptives pondérées. Pour examiner les liens entre la publicité et les caractéristiques du point de vente et de la ville, nous avons utilisé des tests T pondérés, des analyses de variance et des modèles linéaires hiérarchiques.

Résultats : Un an avant la mise en œuvre d'une interdiction partielle de la publicité aux points de vente en Ontario, nous avons observé un nombre considérable de publicités de tabac dans le commerce de détail, surtout dans les chaînes de dépanneurs, les dépanneurs de stations-service et les dépanneurs indépendants. Le modèle linéaire hiérarchique multivarié a confirmé des différences dans l'étendue de la publicité selon le type de point de vente ($p < 0,01$); de plus, les publicités de tabac étaient plus intensives dans les points de vente à proximité des écoles ($p = 0,01$) et dans les quartiers économiquement faibles ($p < 0,01$). Les dépanneurs indépendants qui avaient davantage de personnel avaient aussi davantage de publicités de tabac, mais c'était l'inverse dans les épiceries.

Discussion : La publicité sur le tabac aux points de vente était considérable. Il est possible que les campagnes de mise en garde contre le tabagisme soient compromises par l'omniprésence de cette publicité.

Mots clés : tabac; marketing; tabagisme; facteurs socioéconomiques; observation

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