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Changes in cigarette expenditure minimizing strategies before and after a cigarette tax increase

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Abstract

Background—Smokers use cigarette expenditure minimizing strategies (CEMS) to alleviate the effect of tax increases on their cigarette expenses. We examined changes in smokers' CEMS use before and after a 2013 Minnesota \$1.75 cigarette tax increase.

Methods—Data were from representative samples of smokers who participated in the Minnesota Adult Tobacco Survey 2010 (n=948) and 2014 (n=1229). Participants indicated CEMS used in the past year from a list. Weighted multiple logistic regressions were used to examine changes in prevalence of each CEMS use over time adjusting for demographics and cigarette consumption. Characteristics associated with CEMS use in 2014 were examined.

Results—Between 2010 and 2014, more smokers tried to save money on cigarettes by rolling their own cigarettes (from 18% to 29%), using other tobacco products (from 13% to 25%), and buying cigarettes from cheaper places (from 48% to 55%). Yet, fewer smokers used coupons/promotions (from 63% to 50%) and bought cigarettes by the carton (from 38% to 32%). These changes varied somewhat by race/ethnicity and education, e.g., more smokers with <high school education used discount brands over time than more educated smokers. CEMS use in 2014 varied by demographics, e.g., smokers with lower education were more likely than those with higher education to purchase discount brands, roll their own cigarettes, use coupons/promotions, and cut back on smoking ($p<0.05$).

Conclusions—Socially-disadvantaged smokers were most likely to use CEMS and continue smoking after a cigarette tax increase. Regulations that would reduce CEMS use could boost the effectiveness of cigarette tax increases.

Keywords

Cigarette tax; smoking; tax avoidance; price-minimization

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INTRODUCTION

Tobacco use accounts for 6 million deaths worldwide annually, and is projected to claim 8 million lives globally, which is to 10% of all deaths, by 2030. [1] Tobacco taxes are the most effective tobacco control strategy included in the Framework Convention for Tobacco Control. [2] Two systematic reviews also indicated that tobacco tax increases could reduce tobacco use disparities. [3, 4] However, previous research has indicated that smokers engage in cigarette expenditure minimizing strategies (CEMS) to reduce their cigarette expenditures in response to increasing cigarette prices. These strategies often include: buying a cheaper brand of cigarettes, using discount coupons/promotions, buying from a cheaper place, rolling own cigarettes, using another form of tobacco, buying by the carton instead of pack, cutting down on consumption, and sharing fewer cigarettes with other smokers. [5, 6] For example, data from the 2006–2007 US Current Population Survey Tobacco Use Supplement showed that 27.6% of adult smokers purchased cigarettes by the carton, and 3.2% purchased cigarettes from a different state with lower prices to save money on cigarettes. [7] Previously we examined the use of CEMS in a cohort of smokers from a US Midwest state immediately after the 2009 federal cigarette tax increase (US\$0.61) and found that smokers engaged in a variety of CEMS (e.g., bought from a cheaper place, used coupons/promotions, purchased cigarettes by the carton instead of pack, bought a cheaper brand, rolled their own cigarettes, and used another form of tobacco). [5]

However, the use of CEMS may hinder cigarette smoking cessation, especially among lower income smokers. Based on our previous work, those who purchased cigarettes by the carton to save money were less likely to make a quit attempt. [5] We also found that any use of CEMS and the *number* of CEMS used was negatively associated with subsequent reduction in the number of days smoked in the past 30 days, after accounting for demographic and smoking-related social environment. [5] Moreover, we found that lower income smokers were more likely to use CEMS and to use a higher number of CEMS. [5] Therefore, the negative association between CEMS and cigarette smoking reduction and cessation may limit the effect of cigarette tax increases to reduce socio-economic disparities in cigarette smoking.

The current literature on this topic is limited in the following ways. First, data are generally not available for some CEMS (e.g., sharing fewer cigarettes with others to save money). Second, most studies are limited to the capture of CEMS use at one point in time. Therefore, previous studies were unable to assess how the use of CEMS changes before and after a cigarette tax increase. The current study aimed to overcome these limitations by providing data on an expanded list of CEMS, and to assess changes in CEMS before and after a cigarette tax increase using serial cross-sectional surveys. In 2013, Minnesota, a US Midwest state, implemented a US\$1.75 increase in the excise and sales taxes on cigarettes. [8] Using the surveillance data collected through the 2010 and 2014 Minnesota Adult Tobacco Surveys, we assessed how the use of CEMS changed over time. We further assessed if these changes differed by the socio-demographics of the smokers. Finally, we examined the characteristics associated with CEMS after the recent larger cigarette tax increase (US \$1.75) to explore if these characteristics differed from those after a smaller (US\$0.61) tax increase in 2009.

METHODS

Study population

Data were from the 2010 and 2014 rounds of the Minnesota Adult Tobacco Survey (MATS). MATS is a statewide, cross-sectional telephone survey designed to assess tobacco use behavior and attitudes among Minnesota adults ages 18 or older. The survey design in both 2010 and 2014 included random-digit dialing (RDD) sampling from two telephone frames – cell phone and landline telephone numbers. Sampling involved a two-stage process with a household screening questionnaire to identify households, and then sampling within the households. Cell phone sample numbers were screened and not included if they did not rely exclusively on their cell phone for voice communication. In 2014, the design additionally included geographic stratification to sample within eight regions around the state. The final analytic sample in 2010 was 7,057 and 9,304 in 2014. (See MATS Methodology Report for a more complete description of methods; <http://www.mnadulttobaccosurvey.org>). MATS includes survey weights that account for sampling to ensure statewide representativeness. The current analysis included past 30-day smokers who participated in the MATS 2010 (n=948) and MATS 2014 (n=1229).

Measures

In the 2010 survey, participants were asked, “In the past year have you done any of the following things to try and save money on cigarettes (yes/no)?” A list of six cigarette expenditure minimizing strategies (CEMS) were queried: bought a cheaper brand of cigarettes; rolled your own cigarettes; used another form of tobacco other than cigarettes; used coupons, rebates, buy 1 get 1 free, or other special promotions; purchased cartons instead of individual packs; and found less expensive places to buy cigarettes. The same question was included in the 2014 survey with two additional strategies added based on a study involving in-depth interviews with smokers: smoked fewer cigarettes; and shared fewer cigarettes with others. [6]

Collected demographic information included age, gender, race/ethnicity, annual household income, and education attainment. Because of the small number of participants who were racial/ethnic minorities (reflective of the Minnesota demographics), race/ethnicity was categorized as White versus other (including Black, Asian, Pacific Islander, American Indian, Hispanic, other/mixed). Cigarette smoking behaviors included number of cigarettes smoked and menthol brand. Participants were asked to report the number of cigarettes smoked per day, and responses were categorized into 1–10, 11–20, and >20 cigarettes per day. Participants reported whether their usual cigarette brand was menthol or non-menthol. We included usually smoking menthol cigarettes as a covariate because previous research has found that menthol cigarette smokers were less likely than non-menthol cigarette smokers to quit smoking among race/ethnic minority groups. [9]

Statistical analysis

Survey weights were included to account for multi-stage sampling and to be representative of Minnesota. First, we examined the changes in use of each of the six CEMS measured both in the 2010 and 2014 survey using weighted multivariable logistic regression models,

including survey year (2014 versus 2010), age, gender, race/ethnicity, annual household income, education attainment, cigarettes per day, and smoking menthol cigarettes. Second, we tested the interactions between year and demographics on the use of each of these six CEMS, and presented stratified analysis by demographics that showed significant interactions with year. To test the interactions in each of these models, interaction terms between survey year and demographic variables, together with survey year, age, gender, race/ethnicity, annual household income, education attainment, cigarettes per day, and usually smoking menthol cigarettes were included. Finally, we examined the characteristics associated with using each of the eight CEMS in 2014 using weighted multivariable logistic regression models adjusting for demographics, cigarettes per day, and usually smoking menthol cigarettes. All analyses were conducted in SAS® version 9.4 (SAS Institute, Cary: NC), using PROC SURVEYFREQ and PROC SURVEYLOGISTIC.

RESULTS

Table 1 presents the weighted demographics and smoking behaviors of the 2010 (before the cigarette tax increase) and 2014 (after the cigarette tax increase) samples. We observed significant changes in the use of five out of the six CEMS (Table 2). Between 2010 and 2014, an increasing proportion of Minnesota past 30-day smokers rolled their own cigarettes, used another form of tobacco, and found less expensive places to buy cigarettes ($p<0.05$). Finding cheaper places to buy cigarettes became the most used strategy to save money. In contrast, a decreasing proportion of smokers used coupons/promotions, or purchased cartons instead of packs of cigarettes ($p<0.05$). Despite the decrease from 2010, using coupons/promotions remained the second most used strategy.

Table 3 summarizes the significant differences in changes in use of CEMS by demographics before and after the cigarette tax increase. Buying a cheaper brand of cigarettes to save money was increasingly prevalent among White smokers, compared to smokers of other races/ethnicities (interaction $p=0.0272$). This strategy was also more commonly used by smokers with less than high school education and those with college education and beyond, but not among smokers with high school/GED or some college education (interaction $p=0.0036$). Use of roll-your-own cigarettes was increasingly prevalent among both male and female smokers, but the increase was more substantial among female smokers (interaction $p=0.0114$). This strategy was also increasing common among White smokers than smokers of other racial/ethnic group (interaction $p=0.0301$). Use of coupons/promotions was reduced more substantially among smokers of other races/ethnicity than White smokers (interaction $p=0.0271$).

In addition, 69.8% smokers reported smoking fewer cigarettes, and 50.4% reported sharing fewer cigarettes with others to save money on cigarettes in 2014. Use of specific CEMS after the cigarette tax increase differed by demographics and smoking behaviors (Table 4). Compared to smokers 65 years or older, younger smokers were more likely to have used the following strategies to save money on cigarettes: used another form of tobacco, used coupons/promotions, bought from cheaper places, cut back on smoking, and shared fewer cigarettes with others ($p<0.05$). In contrast, younger smokers were less likely to have purchased cartons instead of packs to save money on cigarettes ($p<0.05$). Female smokers

were more likely than male smokers to have bought cheaper brands, purchased cartons instead of packs, bought from cheaper places, and share fewer cigarettes, but less likely to have used another form of tobacco ($p<0.05$). Smokers of races/ethnicities other than White were less likely than White smokers to have used coupons/promotion ($p<0.05$). Lower household income was associated with having bought a cheaper brand, rolled own cigarettes, used coupons/promotions, cut back on smoking, and shared fewer cigarettes with others. Lower education was associated with having bought a cheaper brand, rolled own cigarettes, used coupons/promotions, bought from cheaper places, cut back on smoking, and shared fewer cigarettes with others ($p<0.05$). Finally, smokers who smoked more than 10 cigarettes per day were more likely than those who smoked 10 or less cigarettes per day to have used coupons/promotions, purchased cartons instead of packs, and bought from cheaper places ($p<0.05$). Usually smoking menthol cigarettes was not associated with CEMS use ($p>0.05$).

DISCUSSION

In 2014, Minnesota implemented a substantial cigarette tax increase, which increased the proportion of cigarette per pack retail price attributed to cigarette taxes from 44.9% in 2013 to 56.9% in 2014. [10] We observed significant changes in CEMS use before and after the tax increase. Our previous work found that increases in cigarette prices exceeded the amount of the tax increase, and neighborhood characteristics were not associated with the magnitudes of the price increases, [11] suggesting that the tax increase was fully passed onto consumers. Therefore, we believe most, if not all, of the changes in CEMS use can be attributed to the state cigarette tax increase as there were no other significant statewide policy changes.

Our findings provide mixed information about the potential impact of a cigarette tax increase as a tobacco control strategy. On the one hand, substantial cigarette tax increases seem to promote self-reported reduction in cigarette consumption, although since the data were from two serial cross-sectional studies, we could not determine the magnitudes of such reduction within individual smokers. They also appear to reduce the availability of cigarettes through social sources in the population as smokers reported sharing fewer cigarettes with others to save money. This is important because social sources are a major source of cigarettes for smokers who are still developing their smoking behaviors. [12, 13] The reduction in discount coupons use does not seem to be due to availability of these coupons, since the tobacco industry spent US\$236 million in 2010 and US\$248 million in 2013 on this marketing strategy. [14] A potential explanation for the decreases in using some CEMS was that smokers realized these strategies were not very effective over time to save money, as reported by a previous qualitative study that interviewed smokers before and after a cigarette tax increase. [6] A previous US study also found that discount coupons only provide US \$0.50 savings on average, [15] which is less than a third of the amount of the tax increase (US\$1.75). On the other hand, cigarette tax increases may prompt uptakes in other CEMS (e.g., rolling own cigarettes, use another form of tobacco, finding less expensive places to buy cigarettes).

The role of a cigarette tax increase in reducing racial/ethnic and socio-economic disparities in cigarette smoking was not clarified in this study. On the one hand, a substantial cigarette

tax increase did not result in an increase in prevalence of purchasing a cheaper brand of cigarettes and rolling own cigarettes among racial/ethnic minority smokers (but increased among White smokers), despite previous studies showing that cheaper brands of cigarettes are prevalent in the US. [16, 17] It also discouraged racial/ethnic minority smokers from using discount coupons/promotion more than White smokers. Since previous research showed that redemption of cigarette discount coupons was associated with lower likelihood of smoking cessation, [18] a substantial cigarette tax increase could reduce racial/ethnic disparities in smoking through less use of CEMS. However, the tax increase did prompt more smokers with less than high school education to purchase cheaper brands of cigarettes. Additionally, after the tax increase, smokers of lower socioeconomic status were still more likely to engage in CEMS compared to higher socioeconomic smokers. Furthermore, while data showed that lower income (not education) was associated with CEMS use in response to the 2009 US\$0.61 cigarette tax increase, [5] lower income and lower education were both associated with CEMS use in response to the 2013 US\$1.75 cigarette tax increase. Previous studies found that CEMS use was associated with lower likelihood of smoking cessation; [5, 18] and therefore, if a substantial tax increase prompts increases in CEMS use among smokers of lower socio-economic status, it may increase socio-economic disparities among those who continue to smoke. [19, 20] Future longitudinal studies are needed to test this hypothesis. It is unclear why the increase in the prevalence of roll-your-own cigarettes was higher among both female and male smokers, particularly given the historically lower prevalence of roll-your-own cigarettes use among women. [21] Given female smokers were also more likely than male smokers to use a few other CEMS after the tax increase, this may be reflective of the higher price sensitivity among female than male smokers. [22]

While cigarette tax increases are effective in reducing the prevalence of smoking, a recent study found that only 14 US states and the District of Columbia raised their cigarette excise taxes between 2010 and 2014, compared to 46 US states and the District of Columbia during the period 2000–2009. [23] The increase was much more modest in the latter period (US \$0.20) than the former period (US\$0.92). Cigarette tax increases remain an important public policy goal because they help smokers to commit to smoking cessation; [20, 24] however, policies that impact CEMS use are also important as complementary policies to uphold the effect of cigarette tax increases. For example, the WHO Framework Convention on Tobacco Control Article 13 stated that prohibiting price promotions (e.g., discount coupons) is part of the comprehensive marketing restrictions. [25] Cities in the US (e.g., New York, NY, and Providence, RI) have successfully implemented regulations to prohibit the redemptions of tobacco discount coupons. Additionally, increasing taxes for other tobacco products in conjunction with cigarette tax increases may prevent smokers from using roll-your-own cigarettes and other tobacco products to mitigate the effect of cigarette tax increases. The Children's Health Insurance Program Reauthorization Act of 2009, for example, increased taxes on all tobacco products, including cigarettes, cigars, pipe tobacco, and roll-your-own tobacco. [26]

Our study findings have limited generalizability to US states with higher racial/ethnic diversity or to other countries because the samples came from a single US Midwest state (Minnesota). However, we believe the implications of our findings are still applicable to other US states and even other countries since many WHO member countries still allow

tobacco price promotions, and have cigarettes at different price tiers. [25] Also, respondents may not be able to accurately recall their use of CEMS in the past 12 months. We did not collect information on two CEMS (i.e., smoke fewer cigarettes and share fewer cigarettes with others) in 2010, and therefore cannot assess how a cigarette tax increase influenced these CEMS.

In conclusion, the use of CEMS among smokers differed before and after a substantial cigarette tax increase in 2013. We also observed reductions in use of some CEMS and increases in use of some other CEMS after the tax increase. Changes in CEMS before and after the tax increase also varied somewhat by demographics. A combination of tax and non-tax policies to maintain high cigarette prices may be useful in upholding the effectiveness of cigarette tax increases on reducing the prevalence of smoking and its disparities.

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WHAT THIS PAPER ADDS

- Tobacco taxes are the most effective tobacco control strategy. However, previous studies showed that smokers engaged in cigarette expenditure minimizing strategies (CEMS) to save money on cigarettes and continue smoking. Previous studies also found that engaging in CEMS were also associated with lower likelihood of smoking cessation.
- However, data were not previously available to examine how CEMS use changes before and after cigarette tax increases.
- We found that, concurrent with a 2013 cigarette tax increase of US\$1.75 in Minnesota, US, more smokers tried to save money on cigarettes by rolling their own cigarettes, using other tobacco products, and buying cigarettes from cheaper places. Meanwhile, fewer smokers used coupons/promotions and bought cigarettes by the carton. Changes in CEMS use varied somewhat by demographics.

Table 1

Weighted characteristics of the 2010 and 2014 samples of past 30-day smokers, Minnesota Adult Tobacco Survey.

Characteristics	2010		2014	
	Unweight N	Weighted %	Unweight N	Weighted %
Age (year)				
18–24	133	21.1%	139	15.4%
25–29	93	13.9%	113	13.8%
30–34	82	11.0%	130	13.2%
35–44	135	17.9%	174	17.8%
45–54	236	21.6%	249	18.8%
55–64	161	9.8%	267	15.1%
65 or older	108	4.7%	157	5.9%
Gender				
Male	473	55.9%	633	56.3%
Female	475	44.1%	596	43.7%
Race/ethnicity				
White	830	84.0%	1050	82.7%
Other	109	16.0%	179	17.3%
Annual household income				
<\$25,000	284	32.6%	368	28.7%
\$25,000–\$49,999	267	29.6%	302	26.5%
\$50,000–\$74,999	157	18.4%	207	21.1%
\$75,000	165	19.4%	234	23.7%
Education attainment				
<High school	76	11.1%	112	12.4%
High school/GED	287	37.0%	419	36.7%
Some college	424	42.3%	478	39.1%
College and beyond	158	9.6%	217	11.8%
Cigarettes per day				
1–10 cigarettes	546	59.5%	699	60.8%
11–20 cigarettes	330	34.4%	431	33.9%
>20 cigarettes	68	6.2%	83	5.3%
Usually smoke menthol cigarettes				
Yes	192	22.5%	297	25.2%
No	753	77.5%	926	74.8%

Table 2

Changes in the prevalence of cigarette expenditure minimizing strategies between 2010 (before the cigarette tax increase) and 2014 (after the cigarette tax increase) among past 30-day smokers, Minnesota Adult Tobacco Survey.

Cigarette expenditure minimizing strategies	2010 Weighted %	2014 Weighted %	Differences	AOR (95% CI)
Used another form of tobacco	12.6%	24.5%	+11.9%	3.00 (2.13, 4.23)
Rolled own cigarettes	18.7%	28.9%	+10.2%	2.15 (1.59, 2.91)
Found less expensive places to buy cigarettes	48.0%	55.1%	+7.1%	1.34 (1.05, 1.70)
Bought a cheaper brand of cigarettes	31.8%	36.8%	+5.0%	1.28 (0.99, 1.65)
Purchased cartons instead of packs	38.5%	31.5%	−7.0%	0.73 (0.57, 0.94)
Used coupons/promotions	65.9%	50.0%	−12.9%	0.57 (0.45, 0.73)

AOR=Adjusted odds ratios, CI=confidence interval. Bolded estimates are statistically significant ($p<0.05$). For each strategy, the model included year, age, gender, race/ethnicity, annual household income, education attainment, cigarettes per day, and usually smoke menthol cigarettes.

Table 3

Changes in prevalence of cigarette expenditure minimizing strategies between 2010 (before the cigarette tax increase) and 2014 (after the cigarette tax increase) among past 30-day smokers by demographics, Minnesota Adult Tobacco Survey.

Cigarette expenditure minimizing strategies	2010 Weighted %	2014 Weighted %	Differences	AOR (95% CI)
Bought a cheaper brand of cigarettes				
White	30.4%	36.6%	+6.2%	1.39 (1.05, 1.82)
Other	41.1%	38.0%	−3.1%	0.94 (0.44, 2.01)
<High school	26.8%	54.3%	+27.5%	5.00 (2.09, 11.94)
High school/GED	41.5%	38.5%	−3.0%	0.92 (0.60, 1.41)
Some college	28.8%	33.3%	+4.5%	1.20 (0.81, 1.77)
College and beyond	12.4%	23.8%	+11.3%	2.53 (1.18, 5.44)
Rolled own cigarettes				
Male	22.0%	30.4%	+8.5%	1.62 (1.10, 2.38)
Female	14.7%	27.0%	+12.3%	3.63 (2.24, 5.89)
White	16.6%	29.6%	13.0%	2.73 (1.97, 3.79)
Other	28.9%	25.7%	−3.3%	0.72 (0.32, 1.61)
Used coupons/promotions				
White	63.2%	52.2%	−11.0%	0.64 (0.49, 0.82)
Other	62.3%	39.3%	−23.00%	0.35 (0.16, 0.75)

AOR=Adjusted odds ratios, CI=confidence interval. Bolded estimates are statistically significant ($p<0.05$). For each strategy, the model included year, age, gender, race/ethnicity, annual household income, education attainment, cigarettes per day, and usually smoke menthol cigarettes.

Table 4

Adjusted odds ratios and 95% confidence intervals for characteristics associated with use of each cigarette expenditure minimizing strategies among past 30-day smokers, Minnesota Adult Tobacco Survey 2014.

Reported in the past year doing the following things to try and save money on cigarettes:								
Characteristics	Bought a cheaper brand	Rolled own cigarettes	Used another form of tobacco	Used coupons/promotions	Purchased cartons	Bought form cheaper places	Cut back on smoking	Shared fewer cigarettes with others
Age (year)								
18–24	1.15 (0.53, 2.49)	1.63 (0.68, 3.88)	7.03 (2.49, 19.87)	1.87 (0.89, 3.94)	0.19 (0.09, 0.42)	1.96 (0.94, 4.05)	1.43 (0.56, 3.65)	7.28 (2.80, 18.91)
25–29	1.13 (0.52, 2.46)	1.62 (0.66, 3.97)	4.53 (1.56, 13.20)	5.23 (2.45, 11.19)	0.27 (0.13, 0.56)	1.70 (0.83, 3.49)	1.08 (0.44, 2.65)	4.95 (2.07, 11.82)
30–34	0.73 (0.33, 1.60)	1.48 (0.62, 3.51)	1.83 (0.60, 5.58)	3.29 (1.59, 6.80)	0.20 (0.10, 0.41)	1.45 (0.73, 2.88)	2.04 (0.80, 5.20)	3.54 (1.51, 8.30)
35–44	1.34 (0.65, 2.76)	1.26 (0.55, 2.89)	2.81 (0.99, 7.98)	5.04 (2.47, 10.30)	0.41 (0.21, 0.80)	2.63 (1.32, 5.22)	1.53 (0.63, 3.70)	4.56 (1.90, 10.92)
45–54	1.49 (0.75, 2.99)	1.72 (0.79, 3.74)	2.04 (0.73, 5.65)	3.69 (1.88, 7.26)	0.34 (0.19, 0.63)	1.37 (0.72, 2.62)	1.32 (0.58, 3.01)	2.04 (0.91, 4.60)
55–64	1.10 (0.53, 2.30)	1.22 (0.53, 2.77)	1.96 (0.67, 5.74)	2.85 (1.45, 5.61)	0.49 (0.26, 0.93)	2.17 (1.13, 4.17)	3.20 (1.34, 7.62)	3.19 (1.38, 7.37)
65 or older	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Gender								
Female	1.45 (1.02, 2.08)	0.93 (0.64, 1.37)	0.44 (0.28, 0.67)	1.30 (0.93, 1.82)	1.57 (1.09, 2.27)	1.72 (1.23, 2.41)	1.49 (0.96, 2.31)	1.68 (1.10, 2.56)
Male	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Race/ethnicity								
Other	0.78 (0.47, 1.29)	0.63 (0.36, 1.11)	0.61 (0.34, 1.11)	0.52 (0.32, 0.85)	1.06 (0.59, 1.88)	1.25 (0.75, 2.07)	1.13 (0.57, 2.24)	0.83 (0.45, 1.54)
White	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Annual household Income								
<\$25,000	2.74 (1.62, 4.65)	2.67 (1.49, 4.78)	1.08 (0.61, 1.95)	1.85 (1.13, 2.04)	1.01 (0.59, 1.71)	1.49 (0.91, 2.44)	2.83 (1.41, 5.70)	2.07 (1.12, 3.83)
\$25,000–49,999	1.45 (0.86, 2.46)	1.02 (0.57, 1.84)	1.03 (0.58, 1.81)	1.18 (0.74, 1.87)	0.87 (0.52, 1.47)	1.04 (0.65, 1.67)	1.38 (0.77, 2.47)	1.11 (0.63, 1.94)
\$50,000–74,999	0.89 (0.49, 1.62)	0.96 (0.50, 1.84)	0.81 (0.44, 1.50)	1.23 (0.74, 2.03)	1.15 (0.66, 2.02)	0.93 (0.55, 1.55)	0.92 (0.51, 1.67)	0.67 (0.37, 1.21)
\$75,000	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Education attainment								
<High school	2.63 (1.28, 5.42)	3.56 (1.60, 7.89)	1.62 (0.72, 3.64)	1.18 (0.59, 2.34)	1.06 (0.51, 2.21)	1.89 (0.96, 3.72)	2.13 (0.90, 5.07)	1.97 (0.85, 4.57)
High school/GED	1.84 (1.04, 3.27)	2.16 (1.12, 4.17)	1.16 (0.64, 2.13)	1.75 (1.06, 2.91)	1.26 (0.73, 2.16)	1.75 (1.05, 2.92)	1.86 (1.03, 3.37)	2.26 (1.23, 4.15)
Some college	1.35 (0.78, 2.33)	1.74 (0.91, 3.32)	1.03 (0.57, 1.85)	1.14 (0.70, 1.85)	1.20 (0.73, 1.97)	1.81 (1.12, 2.91)	2.32 (1.32, 4.07)	1.85 (1.05, 3.28)
College and beyond	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Cigarettes per day								

Reported in the past year doing the following things to try and save money on cigarettes:								
Characteristics	Bought a cheaper brand	Rolled own cigarettes	Used another form of tobacco	Used coupons/promotions	Purchased cartons	Bought form cheaper places	Cut back on smoking	Shared fewer cigarettes with others
1–10 cigarettes	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
11–20 cigarettes	0.85 (0.58, 1.24)	1.24 (0.83, 1.84)	1.00 (0.63, 1.59)	1.45 (1.01, 2.08)	2.26 (1.55, 3.29)	1.84 (1.28, 2.65)	0.81 (0.50, 1.29)	1.12 (0.72, 1.76)
>20 cigarettes	0.95 (0.47, 1.91)	1.70 (0.76, 3.80)	0.77 (0.33, 1.79)	1.24 (0.64, 2.40)	3.44 (1.65, 7.14)	1.42 (0.70, 2.86)	0.46 (0.20, 1.06)	2.04 (0.81, 5.12)
Usually smoke menthol cigarettes								
Yes	0.82 (0.53, 1.25)	0.93 (0.59, 1.47)	0.62 (0.37, 1.04)	1.16 (0.77, 1.73)	0.87 (0.55, 1.37)	0.91 (0.62, 1.36)	0.90 (0.53, 1.53)	1.19 (0.73, 1.96)
No	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.

Bolded estimates are statistically significant ($p < 0.05$). For each strategy, the model included year, age, gender, race/ethnicity, annual household income, education attainment, cigarettes per day, and usually smoke menthol cigarettes.