Published in final edited form as:

Prev Med. 2007 June ; 44(6): 490–495. doi:10.1016/j.ypmed.2007.02.014.

Passive Smoke Exposure Trends and Workplace Policy in the Coronary Artery Risk Development in Young Adults (CARDIA) study (1985–2001)

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Abstract

Objective—There has been reduced active smoking, decreased societal acceptance for smoking indoors, and changing smoking policy since the mid-1980s. We quantified passive smoke exposure trends and their relationship with workplace policy.

Method—We studied 2,504 CARDIA participants (blacks and whites, 18–30 years old when recruited in 1985–86 from four US cities, reexamination 2, 5, 7, 10, and 15 years later) who never reported smoking and attended exams at 10 or 15 years.

Results—In non-smokers with a college degree (n = 1,581), total passive smoke exposure declined from 16.3 hr/wk in 1985/86 to 2.3 hr/wk in 2000/01. Less education tended to be associated with more exposure at all timepoints for example, in high school or less (n = 349) 22.2 hours/wk in 1985/86 to 8.5 hr/wk in 2000/01. Those who experienced an increase in the restrictiveness of self-reported workplace smoking policy from 1995/96 to 2000/01 were exposed to almost 3 hours per week less passive smoke than those whose workplace policies became less restrictive in this time period.

Conclusions—The increasing presence of restrictive workplace policies seemed to be a component of the substantial decline in self-reported passive smoke exposure since 1985.

Keywords

Environmental Tobacco Smoke Pollution; Occupational Health; Passive Smoking; Socioeconomic factors

Introduction

Passive smoke exposure is a cause of cardiovascular disease, cancer, and respiratory disease (Law et al., 1997, Kaur et al., 2004, US Environmental Protection Agency (EPA), 1993,

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Lubin, 1999, Wang et al., 2000, Hozawa et al., 2006, U.S. Department of Health and Human Services, 2006b). Research suggests that it may also be associated with cognitive deficits in children (Yolton et al., 2005) and increased fetal mortality (Kharrazi et al., 2004).

Cigarette smoking, the main source of passive smoke, has declined in prevalence in the United States since 1985 (National Center For Chronic Disease Prevention and Health Promotion, 2006a). According to a 1994 MMWR Surveillance Summary, representative of the United States population, the 1985 per capita cigarette consumption (which includes smokers and non-smokers) was 3,370; it declined each year through 1994 to 2,493 cigarettes (Giovino et al., 1994). Kiefe et al. (Kiefe et al., 2001) found a decrease in smoking prevalence during the first ten years of study (1985/86 – 1995/96) in 3 of 4 race-sex groups in the Coronary Artery Risk Development in Young Adults (CARDIA) cohort analyzed in this paper (black women 30.4% at baseline to 27.7% at year 10; white women 25.2% to 18.9%; black men 35.4% to 37.4%; and white men 24.3% to 20.6%). The reduction in active smoking alone would suggest that there is now less passive smoke exposure. Indeed, a recent study found that serum cotinine levels in non-smokers declined through the 1990s in the United States (Pirkle et al., 2006).

Policies banning or restricting smoking at work have become more common since the mid-1980s and there is evidence that these policies reduce passive smoke exposure. In 1986 only 3% of adult workers reported working in a workplace that banned smoking (Centers for Disease Control and Prevention, 1988). By 1999 approximately 70% of workers reported that their workplace had a smoke-free policy; however this proportion varied by education level with less educated workers being less likely to work in an environment with such a policy (Centers for Disease Control and Prevention, 2000, Centers for Disease Control and Prevention, 1988, Shopland et al., 2001). In New York City, three months after the city smoke-free workplace policy was instituted, hospitality workers were experiencing significantly less passive smoke exposure (Farrelly et al., 2005).

We used the CARDIA population-based bi-racial cohort in four US cities to: (1) describe and quantify the trends in passive smoke exposure during 1985–2001; and (2) explore any association between change in workplace smoking policy and passive smoke exposure. We hypothesized that passive smoke exposure decreased over time, and varied by demographic factors. We further hypothesized that passive smoke exposure levels would decline when workplace smoking policy became more restrictive.

Methods

CARDIA is an ongoing longitudinal study of the evolution of risk factors for cardiovascular disease. The baseline (year 0) examinations of 5,115 black and white men and women aged 18–30 in four cities (Birmingham, AL; Chicago, IL; Minneapolis, MN and Oakland, CA) were taken in 1985/86. A stratified recruitment was employed to obtain balanced numbers of participants in each category of ethnicity (black, white), education (high school or less, more than high school), age (18–24, 25–30), and sex. Participants were reexamined in year 2 (1987–88), year 5 (1990–91), year 7 (1992–93), year 10 (1995/96), and year 15 (2000/01), with follow-up rates 90%, 86%, 81%, 79%, and 74%, respectively. CARDIA has been described in depth elsewhere (Friedman et al., 1988, Cutter et al., 1991). The CARDIA study was approved by the Institutional Review Boards at all participating institutions.

Measures

All CARDIA questionnaires are publicly documented at the study website, www.cardia.dopm.uab.edu (Division of Preventive Medicine, University of Alabama at Birmingham, 2003). Using interviewer-administered questionnaires, passive smoke

exposure was determined by questions 1–3 in Figure 1. Total passive smoke exposure is the sum of these three items. Since only question 2 (home exposure) was ascertained at year 5 and year 7, total passive smoke exposure could not be estimated in those years. Using serum cotinine (Haley et al., 1983, Van Vunakis et al., 1987), assayed only at year 0 in the CARDIA dataset, self-reported passive smoke exposure was found to have reasonable validity (Wagenknecht et al., 1992, Wagenknecht et al., 1993).

For subjects who were currently employed indoors at the time of the exam, workplace policy was determined at years 5, 7, 10, and 15 by question 4 in Figure 1. We used hours exposed to smoke “in a small space other than your home” as a proxy measure for workplace smoke exposure because for those who work indoors, time at work is a substantial portion of time spent outside the home in small space. The association of smoke policy and exposure to smoke in a small space outside the home could only be examined at years 10 and 15 because this workplace exposure proxy measure was not asked at years 5 and 7 and the workplace policy question was not asked at years 0 and 2. Change in workplace smoking policy was categorized into three groups based on whether policy became stricter, more lax, or stayed the same.

The sociodemographic factors ethnicity, sex, and center were ascertained at baseline. Education was ascertained at every examination. Because many of the participants completed additional education after baseline, individuals were categorized by the highest maximum education that they had reported at any exam. This variable had three levels – high school graduation or less, some college or other post high school training, and college degree or greater.

Sample

The data came from all 6 CARDIA exams, restricted to self-identified never smokers and former smokers with serum cotinine ≤ 13 ng/ml at baseline who never reported being a smoker at any future exam and who reported their passive smoke exposure at the baseline exam and either the year 10 or the year 15 exam ($n = 2,504$ individuals). There were 1,546 individuals excluded from the original baseline CARDIA sample of 5,115 because they were smokers at baseline, 30 more were excluded because their serum cotinine was missing at baseline, 36 were excluded because their self-reported smoking status was missing at baseline, and 186 were excluded because while they reported not being current smokers at baseline their cotinine level was ≤ 13 ng/ml. An additional 325 individuals were excluded for reporting being a current smoker at any of the follow-up exams. Another 28 participants were excluded for having missing self-reported exposure information at baseline. Finally, 460 individuals had missing passive smoke exposure data at both year 10 and year 15 exam and were excluded from the analytical sample in order to have a more uniform cohort. The analytical sample for analyses where workplace policy was the main predictor was further restricted by first excluding individuals who did not attend both the year 10 or 15 exam ($n = 407$), second, subjects who reported not knowing their workplace policy at either year 10 or 15 ($n = 53$) were excluded, and finally we excluded individuals who reported that they did not work in an indoor space outside the home at either year 10 or 15 ($n = 460$). The final number of subjects for these analyses was 1,584.

Statistical Analysis

For the passive smoke trends analysis we were interested in the period effect (the trend that is common to people of all ages) during 1985/86 to 2000/01. In order to separate the period effect from the age effect we used repeated measures linear regression to calculate mean hours per week exposed to passive smoke (Jacobs et al., 1999). Within each category, results were adjusted for current age of the subject, city, race, smoking status at baseline (former

smoker vs. never smoker), sex, and the statistically significant interactions of city, race, and sex with time. Since the adjusted mean hours per week exposed to passive smoke at each exam differed by ethnicity, education, and sex we also reported means for each level of these factors. We used multiple linear regression to examine whether there was an association between a change in self-reported workplace smoking policy and a change in exposure to passive smoke between exam years 10 and 15. All reported *p* values are two-tailed.

Results

In the pooled sample after multiple variable adjustment, overall passive smoke exposure decreased from 19.3 hr/wk in 1985–86 to 15.9 hr/wk in 1987–88, to 5.3 hr/wk in 1995–96, and finally to 4.5 hr/wk in 2000–2001. At all levels of maximum attained education exposure to passive smoke declined substantially since the mid 1980s, both overall and in each subcategory of exposure (Table 1). Those with greater education had less exposure to smoke than those with less education and this pattern persisted after regression adjustment for confounding (Figure 2, panel 1). The association between time and exposure differed by education level (*p* for time by education interaction < 0.0001). Figure 2, panel 2 displays that the adjusted passive smoke exposure was greater in Blacks than in Whites and the trend differed by race (*p* for time by race interaction = 0.049). It is noteworthy that the unadjusted passive smoke exposure differences between Blacks and Whites, representing actual exposure experience, were larger than the adjusted values (dashed vs. solid lines in Figure 2, panel 2) because Blacks tended to have lower education. Though there was a significant interaction between sex and passive smoke exposure (Figure 2, panel 3, *p* < .0001), its magnitude was minimal and not consistent across time. At years 2 and 10 there was no significant difference in passive smoke exposure between men and women. However, at year 0 women were exposed to 20.7 hours/week (95% CI = 19.6 – 21.7) and men were exposed to 17.5 hours/week (95% CI = 16.3 – 18.7) of passive smoke; at year 15 women were exposed to 3.9 hours/week (95% CI = 2.8 – 4.9) and men were exposed to 5.3 hours/week (95% CI = 4.1 – 6.6) of passive smoke. Increasing age was associated with a decrease in passive smoke exposure (2.16 hours per week reduction per decade of age, *p* for time by age interaction = 0.003).

We examined the relationship between change in workplace smoking policy and change in passive smoke exposure in a small space (not home) and in the home in employed non-smokers (Table 2). Those whose self-reported workplace policy was more restrictive in year 15 vs. year 10 reported a significantly greater decrease in exposure to smoke in our workplace proxy, small space (not home) than those individuals who reported no change in workplace policy. Individuals who reported working in a less restrictive workplace in year 15 vs. year 10 reported an increase in exposure to smoke in a small space (not home). Change in workplace smoking policy had no significant association with change in exposure to smoke in the home. Self-reported workplace policies that prohibit smoking indoors became increasingly common over time. Among CARDIA participants who answered the workplace policy question on the survey and worked indoors, 45.5% worked in places that prohibited smoking in 1990–1991 (the first year this item was asked), 56% in 1992–1993, 64.5% in 1995–1996, and 68% in 2000–2001.

Among all CARDIA participants who reported working indoors in 2000/2001, 26% of whites vs. 38% of blacks worked in an environment that did not ban smoking (*p* < 0.0001). Among those with a maximum attained education of college or greater, 25% worked without a smoking ban, compared to 37% of those with some college and 45% of those with less than a high school education (both comparisons, *p* < 0.0001).

Discussion

As hypothesized, we observed a substantial reduction in passive smoke exposure between 1985 and 2001, although those with less educational attainment continued to have more passive smoke exposure than those with a college degree. Furthermore, Blacks tended to have more exposure to passive smoking than Whites partly because Blacks tended to have less attained education than Whites and partly because, for whatever further reasons, Blacks tended to work in places without restrictive workplace policies. We believe the reduction in smoking prevalence between 1985 and 2001 (30.1% vs. 22.8%) (National Center For Chronic Disease Prevention and Health Promotion, 2006a) cannot entirely explain what we have seen. Even in 2001 smoking was prevalent enough that most workplaces without smoke-free policies would still harbor passive smoke. We believe that the increase of workplace policies that prohibit smoking indoors observed in this study and by others (Centers for Disease Control and Prevention, 1988, Shopland et al., 2001, Centers for Disease Control and Prevention, 2000) can be seen both as an expression of a change in societal norms around indoor smoking and as a force changing these norms. It is likely this cycle of mutually reinforcing norms and policy that operate hand in hand with other effective tobacco control developments, such as taxation, targeted media messages and education, underlie the reductions in passive smoke exposure that we reported.

We observed that a change in self-reported workplace smoking policy was related to a statistically significant change in hours exposed to smoke in a small space (not home), our workplace exposure proxy. As expected there was no significant association between changing workplace policy and exposure to the smoke of others in the home. The specificity of our finding adds evidence that a workplace policy can reduce passive smoke exposure.

There are other factors that could explain the overall passive smoke exposure time trend. People experience less passive smoke exposure when they are older. Residual age confounding could be present as the cohort aged, although we used a method that separates the age from the period effect, assuming no birth cohort effect. Another alternative explanation is that as time passed people may have underreported their actual passive smoke exposure since by the 1990s it was commonly accepted to be unhealthy.

A potential limitation in this analysis is the validity of our outcome measure, self-reported exposure to passive smoke. Poor recollection of hours/week exposed (which varies day to day) and difficulty in mentally synthesizing an estimate from a variety of exposure venues could cause either under or overestimation of passive smoke exposure. However the trends we observed in this study have been documented in research that used serum cotinine as the outcome marker (Pirkle et al., 2006). Another limitation is that the outcome variable "hours per week exposed to smoke in a small space (not home)" is an imprecise proxy since the workplace is not the only space that meets this criterion.

Conclusions

It is encouraging that workplace smoking policies which prohibit smoking are both becoming increasingly common and appear to be related to less exposure to passive smoke. It is disturbing that the disparity in passive smoke exposure between less educated and highly educated individuals and between Blacks and Whites did not lessen during this time period. A further point of concern is that, even in 2000/01, Blacks and those with less education were more likely to be working in an environment that did not ban smoking than those with more education. The public health challenge remains to continue to advance these trends towards less passive smoke exposure in all population groups.

Acknowledgments

This research was supported by contracts N01-HC-95095, N01-HC-48047, N01-HC-48048, and N01-HC-48049 from the National Heart, Lung, and Blood Institute, National Institutes of Health. We also thank Dr. Gina Wei for her editorial comments.

References

- Centers for Disease Control and Prevention, National Center For Chronic Disease Prevention and Health Promotion. 2006a Smoking Prevalence Among US Adults. Place Published. http://www.cdc.gov/tobacco/research_data/adults_prev/prevali.htm
- Centers for Disease Control and Prevention. Passive smoking: beliefs, attitudes, and exposures--United States, 1986. MMWR Morb Mortal Wkly Rep. 1988; 37:239-41. [PubMed: 3127676]
- Centers for Disease Control and Prevention. State-Specific Prevalence of Current Cigarette Smoking Among Adults and the Proportion of Adults Who Work in a Smoke-Free Environment --- United States, 1999. MMWR. 2000; 49:978-982. [PubMed: 11098860]
- Cutter GR, Burke GL, Dyer AR, Friedman GD, Hilner JE, Hughes GH, Hulley SB, Jacobs DR Jr, Liu K, Manolio TA, Et Al. Cardiovascular risk factors in young adults: The CARDIA baseline monograph. Control Clin Trials. 1991; 12:1S-77S. [PubMed: 1851696]
- Division of Preventive Medicine, University of Alabama at Birmingham. 2003CARDIA: Coronary Artery Risk Development in Young Adults. Place Published. <http://www.cardia.dopm.uab.edu/>
- Farrelly MC, Nonnemaker JM, Chou R, Hyland A, Peterson KK, Bauer UE. Changes in hospitality workers' exposure to secondhand smoke following the implementation of New York's smoke-free law. Tob Control. 2005; 14:236-41. [PubMed: 16046685]
- Friedman GD, Cutter GR, Donahue RP, Hughes GH, Hulley SB, Jacobs DR Jr, Liu K, Savage PJ. CARDIA: study design, recruitment, and some characteristics of the examined subjects. J Clin Epidemiol. 1988; 41:1105-16. [PubMed: 3204420]
- Giovino GA, Schooley MW, Zhu BP, Chrismon JH, Tomar SL, Peddicord JP, Merritt RK, Husten CG, Eriksen MP. Surveillance for selected tobacco-use behaviors--United States, 1900-1994. MMWR CDC Surveill Summ. 1994; 43:1-43.
- Haley NJ, Axelrad CM, Tilton KA. Validation of self-reported smoking behavior: biochemical analyses of cotinine and thiocyanate. Am J Public Health. 1983; 73:1204-7. [PubMed: 6614277]
- Hozawa A, Houston T, Steffes MW, Widome R, Williams OD, Iribarren C, Pletcher MJ, Daviglus ML, Carr JJ, Jacobs DR Jr. The association of cigarette smoking with self-reported disease before middle age: the Coronary Artery Risk Development in Young Adults (CARDIA) study. Prev Med. 2006; 42:193-9. [PubMed: 16480762]
- Jacobs DR Jr, Hannan PJ, Wallace D, Liu K, Williams OD, Lewis CE. Interpreting age, period and cohort effects in plasma lipids and serum insulin using repeated measures regression analysis: the CARDIA Study. Stat Med. 1999; 18:655-79. [PubMed: 10204196]
- Kaur S, Cohen A, Dolor R, Coffman CJ, Bastian LA. The impact of environmental tobacco smoke on women's risk of dying from heart disease: a meta-analysis. J Womens Health (Larchmt). 2004; 13:888-97. [PubMed: 15671704]
- Kharrazi M, Delorenze GN, Kaufman FL, Eskenazi B, Bernert JT Jr, Graham S, Pearl M, Pirkle J. Environmental tobacco smoke and pregnancy outcome. Epidemiology. 2004; 15:660-70. [PubMed: 15475714]
- Kiefe CI, Williams OD, Lewis CE, Allison JJ, Sekar P, Wagenknecht LE. Ten-year changes in smoking among young adults: are racial differences explained by socioeconomic factors in the CARDIA study? Am J Public Health. 2001; 91:213-8. [PubMed: 11211629]
- Law MR, Morris JK, Wald NJ. Environmental tobacco smoke exposure and ischaemic heart disease: an evaluation of the evidence. Bmj. 1997; 315:973-80. [PubMed: 9365294]
- Lubin JH. Estimating lung cancer risk with exposure to environmental tobacco smoke. Environ Health Perspect. 1999; 107(Suppl 6):879-83. [PubMed: 10592146]
- Pirkle JL, Bernert JT, Caudill SP, Sosnoff CS, Pechacek TF. Trends in the exposure of nonsmokers in the U.S. population to secondhand smoke: 1988-2002. Environ Health Perspect. 2006; 114:853-8. [PubMed: 16759984]

- Shopland DR, Gerlach KK, Burns DM, Hartman AM, Gibson JT. State-specific trends in smoke-free workplace policy coverage: the current population survey tobacco use supplement, 1993 to 1999. *J Occup Environ Med*. 2001; 43:680–6. [PubMed: 11515250]
- U.S. Department of Health and Human Services. The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General. Rockville, MD: U.S. Department of health and Human Services, Centers for Disease Control and Prevention, Coordinating Center for Health Promotion, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2006b.
- US Environmental Protection Agency. Fact Sheet: Respiratory Health Effects of Passive Smoking: Lung Cancer and Other Disorders. 1993
- Van Vunakis, H.; Gjika, HB.; Langone, JJ. Radioimmunoassay for nicotine and cotinine. *IARC Sci Publ*; 1987. p. 317-30.
- Wagenknecht LE, Burke GL, Perkins LL, Haley NJ, Friedman GD. Misclassification of smoking status in the CARDIA study: a comparison of self-report with serum cotinine levels. *Am J Public Health*. 1992; 82:33–6. [PubMed: 1536331]
- Wagenknecht LE, Manolio TA, Sidney S, Burke GL, Haley NJ. Environmental tobacco smoke exposure as determined by cotinine in black and white young adults: the CARDIA Study. *Environ Res*. 1993; 63:39–46. [PubMed: 8404773]
- Wang L, Lubin JH, Zhang SR, Metayer C, Xia Y, Brenner A, Shang B, Wang Z, Kleinerman RA. Lung cancer and environmental tobacco smoke in a non-industrial area of China. *Int J Cancer*. 2000; 88:139–45. [PubMed: 10962452]
- Yolton K, Dietrich K, Auinger P, Lanphear BP, Hornung R. Exposure to environmental tobacco smoke and cognitive abilities among U.S. children and adolescents. *Environ Health Perspect*. 2005; 113:98–103. [PubMed: 15626655]

- 1) On the average, how many hours per week are you exposed to cigarette, cigar or pipe smoke in a small space other than your home?
- 2) On the average, how many hours per week are you exposed to cigarette, cigar or pipe smoke in your home because of smoking by others?
- 3) On the average, how many hours per week are you exposed to cigarette, cigar or pipe smoke in a large indoor area (such as a restaurant, hotel lobby, lecture hall, etc.) because of smoking by others?
- 4) Is there a smoking policy which limits smoking or does not allow smoking at your workplace?

Figure 1.
CARDIA survey questions.

Figure 2.

Passive smoke exposure time trend by education, ethnic, and sex subgroup. The model used in this figure includes current age of the subject, center, race, smoking status at baseline (former smoker vs. never smoker), sex, and the interactions of center, race, and sex with time. n = 2504. CARDIA 1985/86 (year 0) – 2000/01 (year 15).

^aAt baseline this sample had a mean age of 25, the sample was 45% Black, 43% male, 12% had a high school education or less, 30% had some college and 59% had a college education or greater, 87% were never smokers (13% were former smokers).

Passive smoke exposure (estimated mean hours/week) in different venues by maximum attained education level. n = 2504. CARDIA, 1985/86 (year 0) to 2000/01 (year 15.)

Table 1

Education level	Total			Large space			Small space (not home)			Home			
	Hours per week	95% confidence interval	Hours per week	95% confidence interval	Hours per week	95% confidence interval	Hours per week	95% confidence interval	Hours per week	95% confidence interval	Hours per week	95% confidence interval	
Year of Exam													
College or greater n = 1467	0	16.3	15.3	17.4	5.3	4.9	5.7	6.0	5.6	6.5	5.0	4.5	5.5
	2	12.1	11.1	13.1	3.8	3.4	4.2	4.7	4.3	5.2	3.6	3.0	4.1
	5										2.2	1.6	2.7
	7										1.6	1.1	2.2
	10	3.5	2.5	4.6	1.4	1.0	1.8	0.9	0.5	1.4	1.2	0.7	1.7
	15	2.3	1.2	3.4	1.0	0.6	1.4	0.5	0.0	1.0	0.7	0.2	1.3
	0	24.0	22.6	25.5	7.9	7.3	8.4	8.5	7.9	9.2	7.6	6.9	8.3
Some college n = 745	2	21.1	19.6	22.6	6.1	5.5	6.7	7.7	7.0	8.4	7.2	6.5	8.0
	5										4.9	4.2	5.7
	7										3.5	2.7	4.2
	10	7.2	5.7	8.7	2.5	1.9	3.1	2.6	1.9	3.3	2.1	1.3	2.8
	15	7.3	5.7	8.8	2.3	1.7	2.9	2.6	1.9	3.3	2.4	1.6	3.2
	0	22.2	19.9	24.4	7.0	6.1	7.9	7.1	6.0	8.1	8.1	6.9	9.2
	2	21.8	19.5	24.1	6.0	5.0	6.9	7.2	6.1	8.2	8.7	7.5	9.9
High school or less n = 292	5										5.6	4.5	6.8
	7										3.6	2.3	4.8
	10	8.9	6.6	11.3	2.2	1.3	3.1	2.5	1.4	3.6	4.3	3.1	5.5
	15	8.5	6.1	10.9	2.9	2.0	3.9	2.5	1.4	3.7	2.9	1.7	4.1

^aAll values are adjusted for current age of the subject, center, race, smoking status at baseline (former smoker vs. never smoker), sex, and the interactions of center, race, and sex with time.

^bNo information was obtained at years 5 and 7 about passive smoke exposure in large spaces and small spaces other than home.

^cAt baseline this sample had a mean age of 25, the sample was 45% Black, 43% male, 12% had a high school education or less, 30% had some college and 59% had a college education or greater, 87% were never smokers (13% were former smokers).

Change between years 10 and 15 in passive smoke exposure in a small space (not home) according to concurrent workplace policy change, n = 1584. All values are adjusted for current age of the subject, exam center, race, sex, and smoking status at baseline (former smoker vs. never smoker). CARDIA, 1995/6 (year 10) and 2000/01 (year 15).

Table 2

	Exposure in a small space (not home)		Exposure in home (hours/week)	
	Change (hours per week)	95% confidence interval	Change (hours per week)	95% confidence interval
1. Smoking policy became less restrictive, n = 219	0.69	-0.16 1.54	-0.83	-1.70 0.05
2. Smoking policy stayed the same, n = 1099	-0.46	-0.84 -0.08	-0.39	-0.78 0.00
3. Smoking policy became more restrictive, n = 266	-2.27	-3.04 -1.50	-0.77	-1.56 0.02

1. “Smoking policy became less restrictive” included people who reported a total ban on smoking at year 10 and then either a partial ban or no policy on smoking in their workplace at year 15 or people who reported a partial ban at year 10 and no policy on smoking at year 15.
2. “Smoking policy stayed the same” meant individuals’ reported workplace smoking policy was unchanged between years 10 and 15.
3. “Smoking policy became more restrictive” was composed of people who reported no smoking policy at year 10 and then either a partial or total ban at year 15 or people who reported a partial ban at year 10 and a total ban at year 15.

^aFor the exposure in a small space (not home) p = 0.016 for the comparison of rows 1 vs. 2, p < 0.0001 for the comparison of rows 1 vs. 3 and 2 vs 3.

^bAt baseline this sample had a mean age of 25, the sample was 44% Black, 48% male, 10% had a high school education or less, 30% had some college and 60% had a college education or greater, 89% were never smokers (11% were former smokers).