

A Longitudinal Assessment of the Impact of Smoke-Free Worksite Policies on Tobacco Use

Joseph E. Bauer, PhD, Andrew Hyland, PhD, Qiang Li, MD, Craig Steger, MA, and K. Michael Cummings, PhD, MPH

Worksite smoking policies are intended to protect nonsmoking employees by decreasing their exposure to environmental tobacco smoke.¹ However, many cross-sectional studies have revealed that smoking employees are affected as well. Smoke-free policies have been shown to discourage smoking,² reduce cigarette consumption,³ increase people's desire to quit,⁴ and increase their likelihood of cessation.⁵ In a recent literature review, Fichtenberg and Glantz⁶ examined 26 studies that addressed the relationship between smoke-free worksite policies and various smoking cessation outcomes. They noted that only 5 of the studies were population based and that although longitudinal studies have been conducted, those studies involved limited follow-up periods or small sample sizes.

As more states and communities adopt smoke-free indoor air regulations, it becomes increasingly important to assess the effects these policies have on smoking behaviors. Communities across the country have enacted a variety of smoke-free policies. As of early 2005, 7 states (California, Delaware, New York, Connecticut, Maine, Massachusetts, and Rhode Island), representing about 24% of the US population, had enacted statewide smoke-free worksite legislation, including bans on smoking in restaurants and bars.⁷

In our study, we used data from the Community Intervention Trial for Smoking Cessation (COMMIT), a large, population-based, prospective cohort of smokers funded by the National Cancer Institute from 1988 to 1993, to examine the effects of worksite smoking policies. COMMIT's participants were followed up in 2001 with National Cancer Institute funding, allowing us to examine how changes in worksite policies influenced smoking behaviors.

Objectives. In this cohort study, we assessed the impact of smoke-free worksite policies on smoking cessation behaviors.

Methods. Smokers were tracked as part of the Community Intervention Trial for Smoking Cessation. Telephone surveys were administered to 1967 employed smokers in 1993 and 2001. Data were gathered on personal and demographic characteristics, tobacco use behaviors, and restrictiveness of worksite smoking policies.

Results. People who worked in environments that changed to or maintained smoke-free policies between 1993 and 2001 were 1.9 times more likely (odds ratio [OR]=1.92; 95% confidence interval [CI]=1.11, 3.32) than people whose worksites did not do so to have stopped smoking by 2001. Continuing smokers decreased their average daily consumption by 2.57 cigarettes. People working in environments that had smoke-free policies in place in both 1993 and 2001 were 2.3 times more likely (OR=2.29; 95% CI=1.08, 4.45) than people not working in such environments to have quit by 2001, and continuing smokers reported a decline in average daily consumption of 3.85 cigarettes.

Conclusions. Smoke-free worksite policies help employees reduce their cigarette consumption and stop smoking. (*Am J Public Health.* 2005;95:1024–1029. doi:10.2105/AJPH.2004.048678)

METHODS

Data Source

Data were derived from a cohort investigation of adult smokers and former smokers tracked as part of COMMIT. At its inception in 1988, COMMIT recruited approximately 1000 smokers aged 25 to 64 years in each of 20 US communities and 2 Canadian communities. In 1993, more than 13 000 members of this cohort were reinterviewed. In 2001, the cohort was followed-up and administered telephone surveys, with more than 7000 people successfully reinterviewed. This article focuses on 1967 participants who indicated that they smoked and were employed in both the 1993 and 2001 survey waves. Details regarding the original COMMIT smoking cessation intervention study design can be found elsewhere.^{8,9}

In the summer of 2001, we attempted to resurvey all of the US participants who had completed the 1993 interview at the conclusion of the original COMMIT study. Among the 12 435 baseline smokers followed up on

in 2001, 6603 (53%) were successfully reinterviewed, 904 (7%) had died, 1505 (12%) refused to complete the survey, and 2641 (21%) could not be traced; in addition, data for 782 (6%) of these individuals were lost for other reasons. Thus, the gross response rate was 53.1% (6603/12 435). When annualized, the attrition rate from 1993 to 2001 was slightly lower than the attrition rate observed during the original COMMIT cohort follow-up period from 1988 to 1993 (7.6% vs 8.0%) but was consistent with what one would expect from a study of this length.

Respondents differed from nonrespondents in several ways. Nonresponders tended to be younger and less educated, to be of minority backgrounds, and to reside in communities located in California, New Jersey, and Massachusetts. However, important predictors of smoking cessation, such as desire to quit smoking and number of cigarettes smoked per day, were not associated with response status.¹⁰

In addition, among the 8271 participants who reported their worksite smoking policy

TABLE 1—Odds Ratio (OR) for Employment and Smoke-Free Worksite, by Demographic Characteristics: Community Intervention Trial for Smoking Cessation

	No.	Percentage Distribution	Employed at Smoke-Free Worksite, Raw %	OR (95% CI)
Gender (1988 data)				
Male	790	40.2	69.4	Reference
Female	1177	59.8	80.5	1.75 (1.37, 2.25)*
Race (1988 data)				
White (non-Hispanic)	1733	88.2	75.4	Reference
Black (non-Hispanic)	118	6.0	79.7	1.30 (0.75, 2.26)
Hispanic	80	4.1	85.0	1.83 (0.92, 3.64)
Other	34	1.7	76.4	1.20 (0.46, 3.01)
Missing	2	...	...	...
Age, y (2001 data)				
38-47	792	40.3	76.5	Reference
48-57	847	43.1	78.4	0.96 (0.74, 1.23)
58-67	292	14.8	68.2	0.82 (0.58, 1.15)
68-77	36	1.8	66.7	0.59 (0.25, 1.38)
Education, y (2001 data)				
<12	138	7.0	65.9	Reference
12	355	18.1	70.7	0.85 (0.53, 1.37)
13-15	945	48.1	75.2	1.12 (0.72, 1.74)
≥16	527	26.8	83.7	1.67 (1.01, 2.78)*
Missing	2	...	...	...
Occupation (2001 data)				
Professional/executive	929	47.3	81.4	Reference
Clerical/sales	499	25.4	82.0	1.20 (0.87, 1.66)
Factory/service/labor	511	26.0	60.7	0.54 (0.40, 0.93)*
Other	27	1.4	77.8	1.17 (0.42, 3.30)
Missing	1	...	...	...
Household income, \$ (2001 data)				
<15 000	26	1.4	50.0	Reference
15 000-37 500	332	17.8	71.7	2.44 (1.01, 5.86)*
37 501-60 000	640	34.2	76.7	3.27 (1.38, 7.79)*
>60 000	871	46.6	79.1	3.24 (1.36, 7.71)*
Missing	98	...	...	...
Cigarettes per day (1993 data)				
<5	142	7.2	75.5	Reference
5-14	375	19.1	82.1	0.71 (0.39, 1.32)
15-24	742	37.7	77.8	0.68 (0.38, 1.21)
≥25	708	36.0	69.2	0.48 (0.27, 0.85)*
Desire to quit (1988 data)				
Not at all	245	12.8	75.5	Reference
A little	316	16.4	71.5	0.73 (0.51, 1.22)
Somewhat	731	38.1	76.6	0.86 (0.58, 1.26)
A lot	629	32.7	77.6	0.90 (0.60, 1.34)
Missing	46	...	...	...
Quit attempts since 1993 (2001 data)				
None	457	23.9	74.4	Reference
≥1	1457	76.1	76.3	0.91 (0.69, 1.20)
Missing	53	...	...	...
Smoking status (2001 data)				
Smoker	1390	70.7	74.8	Reference
Former smoker	577	29.3	79.0	1.26 (0.97, 1.65)

Note. The odds ratios shown were adjusted for all of the covariates listed. OR = odds ratio; CI = confidence interval.

* $P < .05$.

in 1993, 7231 (87.4%) were successfully reinterviewed in 2001. Again, the percentages of participants from different worksite policy categories who responded to the survey were similarly distributed, varying between 86.6% and 89.2% across categories. Respondents who did not describe a worksite policy in 1993 were largely retired, unemployed, or homemakers. Although it is possible some of these individuals began working outside their homes between 1993 and 2001, the reality is that most did not, and thus their exclusion from the analysis actually does not result in any bias.

Eligibility for our analyses was restricted to individuals who in 1993 were current smokers and who, in both 1993 and 2001, (1) completed COMMIT surveys, (2) were employed and worked outside the home and primarily indoors, and (3) were able to describe the smoking policy at their workplace. A total of 1967 respondents met these criteria. Table 1 presents the characteristics of the respondents in this restricted data set and their relation to smoke-free worksites.

Study Measures

Dependent variables. Outcome variables measured by the 2001 follow-up interview were smoking status, cigarettes smoked per day, serious quit attempts made between 1993 and 2001, and use of smokeless tobacco. Respondents were considered to have made a serious quit attempt if they reported themselves as nonsmokers in 2001 or if they reported that they had made 1 or more quit attempts of at least 24 hours' duration between 1993 and 2001. Respondents were classified as having quit smoking if they reported not smoking in the 6 months preceding their follow-up interview.

Amount smoked was the weighted average number of cigarettes smoked per weekday and weekend day. Average number of cigarettes smoked per day was an aggregate of the answers to 2 questions: (1) On the average weekday, that is, Monday through Friday, how many cigarettes do you usually smoke? and (2) On the average weekend, how many cigarettes do you smoke a day? Responses were weighted in the proportions 5/7 and 2/7, respectively. Respondents were considered to have used smokeless tobacco if

TABLE 2—Results of Multiple Logistic (Odds Ratios) and Multiple Linear (β Weights) Regression Analyses of the Time-Ordered Impact of Worksite Smoking Policies (3 Levels) on Quitting, Quit Attempts, and Amount Smoked (Cigarettes per Day) in 2001: Community Intervention Trial for Smoking Cessation (COMMIT)

Worksite Smoking Policy 1993-2001	No. of Respondents	Quitting		Quit Attempts		Unadjusted Mean CPD	Amount Smoked	
		Quit, Raw %	OR (95% CI)	Made Quit Attempt, Raw %	OR (95% CI)		No. Respondents	β Weight (95% CI)
Level 1: maintained or changed to smoking allowed everywhere	93	20.0	Reference	71.8	Reference	21.8	88	Reference
Level 2: maintained or changed to smoking in designated areas	335	27.4	1.73 (0.96, 3.11)	76.7	1.08 (0.62, 1.89)	19.8	262	-0.82 (-0.96, 1.21)
Level 3: maintained or changed to smoking prohibited	1391	30.5	1.92* (1.11, 3.32)	75.8	0.97 (0.59, 1.61)	16.9	1038	-2.57 (-4.40, -0.59)*

Note. CI = confidence interval; CPD = cigarettes per day. Odds ratios (ORs) and β weights were adjusted for age (2001), education (2001), gender (1988), race (1988), income (2001), desire to quit (1988), previous quit attempts (1988), cigarettes smoked per day (1993), and occupation (2001). (COMMIT status [i.e., treatment or control community] was included in models as a covariate [data not shown]. However, because COMMIT status was not a predictor of quitting or quit attempts or amount smoked per day in 2001, it was subsequently removed from the analyses.) The referent (level 1) is the frame of reference for both level 2 and level 3.

* $P < .05$.

they reported using it at least 3 times per week in 2001.

Independent variables. The primary independent variable of interest was reported changes in worksite smoking policies between 1993 and 2001. In both 1993 and 2001, respondents were asked whether they were employed. In 2001, respondents were also asked whether they were working outside the home and whether they worked primarily indoors or outdoors. If they were employed in

both 1993 and 2001 and worked outside the home and indoors in 2001 and had provided information on the smoking policy at their worksites in both 1993 and 2001, they were included in the data set.

Worksite smoking policy data were used to create a composite 3-level independent variable (Table 2). Levels 1, 2, and 3 are based on self-reported worksite policy in 2001 only, including those who mentioned that they maintained or switched to that level. A dis-

gregated, 9-level independent variable also was created (Table 3) with which all of the possible combinations of worksite policy changes between 1993 and 2001 could be assessed separately.

Analysis

Chi-square tests were used in examining associations between reported changes in worksite smoking policies between 1993 and 2001 and several dependent smoking

TABLE 3—Results of Multiple Logistic (Odds Ratios) and Multiple Linear (β Weights) Regression Analyses of the Time-Ordered Impact of Worksite Smoking Policies (9 Levels) on Quitting, Quit Attempts, and Amount Smoked in 2001: Community Intervention Trial for Smoking Cessation (COMMIT)

Worksite Smoking Policy 1993-2001	No. of Respondents	Quitting		Quit Attempts		Unadjusted Mean CPD	Amount Smoked	
		Quit, Raw %	OR (95% CI)	Made Quit Attempt, Raw %	OR (95% CI)		No. Respondents	β Weight (95% CI)
Level 1: smoking allowed (no change)	47	21.8	Reference	69.1	Reference	24.1	43	Reference
Level 2: smoking designated to smoking allowed	29	15.8	0.70 (0.19, 2.55)	73.7	1.80 (0.59, 5.55)	20.0	32	-2.15 (-9.84, 0.72)*
Level 3: smoking prohibited to smoking allowed	17	23.5	1.59 (0.41, 6.15)	76.5	1.74 (0.45, 6.76)	18.7	13	-1.69 (-9.84, 0.72)
Level 4: smoking allowed to smoking designated	56	18.3	0.93 (0.34, 2.53)	65.0	0.68 (0.28, 1.64)	20.8	49	-1.26 (-5.74, 1.25)
Level 5: smoking designated (no change)	232	28.8	1.86 (0.85, 4.05)	80.0	1.77 (0.85, 3.70)	20.1	177	-2.22 (-6.10, -0.38)*
Level 6: smoking prohibited to smoking designated	47	31.4	1.61 (0.43, 6.38)	74.5	1.43 (0.55, 3.70)	16.9	35	-1.91 (-7.56, 0.11)
Level 7: smoking allowed to smoking prohibited	217	33.1	2.16 (0.99, 4.73)	74.9	1.28 (0.62, 2.66)	17.8	160	-2.29 (-6.30, -0.48)*
Level 8: smoking designated to smoking prohibited	734	27.6	1.67 (0.79, 3.51)	74.5	1.14 (0.58, 2.25)	17.2	570	-3.51 (-7.47, -2.11)*
Level 9: smoking prohibited (no change)	440	34.0	2.29 (1.08, 4.45)*	78.4	1.65 (0.82, 3.33)	15.8	309	-3.85 (-8.19, -2.67)*

Note. CI = confidence interval; CPD = cigarettes per day. Odds ratios (ORs) and β weights were adjusted for age (2001), education (2001), gender (1988), race (1988), income (2001), desire to quit (1988), previous quit attempts (1988), cigarettes smoked per day (1993), and occupation (2001). (COMMIT status [i.e., treatment or control community] was included in models as a covariate [data not shown]. However, because COMMIT status was not a predictor of quitting or quit attempts or amount smoked per day in 2001, it was subsequently removed from the analyses.)

* $P < .05$.

behavior variables (data not shown). These associations were significant for each of the outcomes. To adjust for possible confounding factors, we performed multivariate analyses using standard logistic and multiple regression models. The control variables included in the analyses were gender, race/ethnicity, age in 2001, education in 2001, annual household income in 2001, desire to quit in 1988, number of previous quit attempts in 1993, amount smoked in 1993, and type of occupation in 2001. Respondents' group status in the original COMMIT study (i.e., intervention or control) was included in the analyses (data not shown); however, because this variable had no impact on either analyses or models, and because it was not part of the study design between 1993 and 2001, it was not included in the present study. Multivariate models were constructed to examine the role of changes in worksite smoking policies over time and other factors in determining smoking behavior. These analyses were performed with SPSS version 11.0 (SPSS Inc, Chicago, Ill).

RESULTS

Figure 1 depicts the change in percentages of various worksite smoking policies in the COMMIT cohort between 1993 and 2001. Of particular interest were "smoke-free" worksites, where smoking was totally prohibited. In 1993, 27% of respondents indicated that they worked in a smoke-free environment. By 2001, the percentage of respondents who reported working in a smoke-free worksite had increased to 76%.

The characteristics of employees who worked in smoke-free environments are detailed in Table 1. Compared with those who worked in places where smoking was permitted without restrictions, employees in smoke-free environments were more likely to be female, to earn high wages, and to have 16 or more years of formal education. Conversely, employees who worked in places where smoking was permitted without restriction were more likely to smoke 25 or more cigarettes per day, have little desire to quit, and work in factory, service, or labor occupations.

Table 2 shows the results of 3-level logistic and multiple linear regression analyses of the

relationship between smoking policy level and quitting, quit attempts, and amount smoked in 2001. Generally speaking, the more restrictive the smoking policy, the greater the likelihood that individuals were successful in quitting smoking or in lowering their daily cigarette consumption if they continued to smoke. People whose workplaces restricted smoking were 1.9 times more likely to have quit smoking by 2001 than people whose workplaces did not restrict smoking. Those who worked in smoke-free environments but continued to smoke reported reducing their average daily consumption by about 2.5 cigarettes per day. Worksite smoking policies were not related to reported number of quit attempts.

Results from the disaggregated 9-level model of worksite policy measures are presented in Table 3. These results show the same strong, time-ordered relationship observed for the 3-level model depicted in Table 2. Among respondents who in both 1993 and 2001 reported working in an environment that prohibited smoking (Table 3, level 9), a more pronounced effect can be seen than for the aggregated level 3 (in Table 2). These workers were 2.3 times

more likely to have quit by 2001 than those who were employed in environments that did not restrict smoking at all. People who continued to smoke reported reducing their average daily consumption by nearly 4 cigarettes.

We also considered whether smokers might switch jobs or switch to using smokeless tobacco as a way of coping with the implementation of smoke-free worksite policies (data not shown). In the 2001 survey, we asked participants whether they had ever switched jobs because of smoking rules where they worked; only 0.3% (6 employees) reported that they had switched to a workplace with a less-restrictive smoking policy between 1993 and 2001. In addition, only about 1% of the sample reported current use of smokeless tobacco.

Finally, because states with higher cigarette excise taxes might have greater proportions of worksites with smoke-free policies, we considered whether cigarette excise taxes could account for the observed effects of worksite smoking policies. Logistic regression analyses that included respondent's state of residence as of 1993 as a proxy measure of taxes were conducted to determine whether the associa-

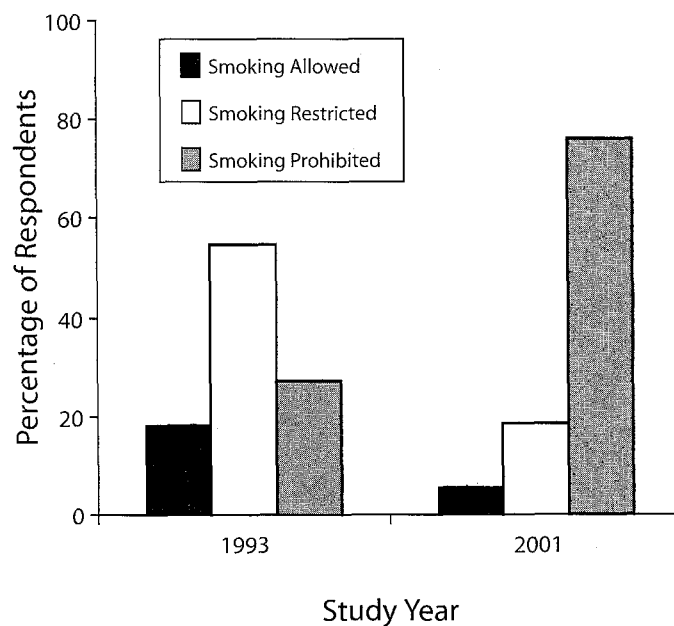


FIGURE 1—Changes over time in worksite smoking policies: Community Intervention Trial for Smoking Cessation cohort, 1993 and 2001.

tion between worksite smoking policies and smoking behavior outcomes would change. In addition, we repeated these analyses using respondent's state of residence in 2001. In both sets of analyses, there was no change in any of the interpretations of the relationships between worksite smoking policies and cessation, quit attempts, or number of cigarettes smoked per day.

DISCUSSION

The present data support the conclusion that smoke-free worksite policies help employees reduce their daily cigarette consumption and stop smoking. In fact, the longer smoke-free policies are in place, the more pronounced their effects on smoking behavior. It also is apparent from our data that a strong dose-dependent relationship exists between worksite smoking policies and smoking behaviors: the more restrictive the rules, the greater their impact on employees' smoking behavior.

There was no discernible impact of smoke-free worksite policies on the likelihood of making a quit attempt, which seems a bit counterintuitive given that rates of cessation increased dramatically. However, one explanation might be that a greater proportion of workers succeeded in their quit attempts. The percentage of cohort participants in our study who reported working in a smoke-free environment increased dramatically between 1993 and 2001, which is consistent with national trends.^{11,12} Workers employed in factory or service jobs were less likely to report working in a smoke-free worksite, a finding that is also consistent with recent national data showing that food service and blue-collar workers are significantly less likely than white-collar workers to be employed at smoke-free worksites.¹³ We found no evidence to suggest that smokers are leaving or changing employment as a reaction to worksite smoking policies. Nor did we find evidence to suggest that workers are switching to smokeless tobacco as a response to worksite smoke-free policies.

In a 1992 internal report that became publicly available as a result of the 1998 Master Settlement Agreement, the Philip Morris Tobacco Company assessed, on the basis of data

from its own large tracking cohort, the impact of worksite smoking bans on cigarette consumption.¹⁴ The greatest impact occurred in workplaces that completely prohibited smoking; in workplaces with milder restrictions, fewer effects on cessation rates were observed and very few effects on consumption. The report generated estimates of the negative market impact of workplace smoking restrictions on the tobacco industry and projected losses into the future, given that restrictions were rapidly becoming more common. Finally, the report recommended that Phillip Morris continue to support accommodations (i.e., allowance of smoking in designated areas) for smokers in the workplace to dampen the anticipated adverse effects on cigarette sales. Our findings confirm those of Phillip Morris and help explain why the tobacco industry has always fiercely opposed smoke-free air laws.¹⁵ Strong worksite smoking policies help smokers to reduce their consumption and stop smoking.

Our analyses do show a positive benefit in terms of effects on smoking behavior of a worksite policy allowing smoking in designated areas. However, designated smoking areas are not completely effective in removing smoke pollution from the indoor environment—which, after all, is the primary purpose of an indoor smoking policy. Moreover, our results show that a 100% smoke-free policy is more effective than a partial ban in influencing the number of cigarettes consumed daily and enhances the chances of someone quitting successfully.¹⁶ Therefore, we believe that the arguments in favor of a policy of smoking prohibition are clear. Prohibition in workplaces is the worksite policy that creates the best environment for both public and individual health.

We can use the data from this study to estimate the public health benefit of all US worksites becoming smoke free. In 2001, there were approximately 128 million adult workers in the United States,¹⁷ and an estimated 81% of these individuals (approximately 104 million workers) worked indoors.¹⁸ According to national survey data from 1999, roughly 31% of the 24 million smokers in the workforce were employed in an indoor facility that still allowed smoking either in all areas or in a designated area. In other words, approxi-

mately 7.2 million additional adult smokers would be affected by a universal smoke-free worksite ban. The average annual quit rate among smokers followed in our study was about 3%.¹⁰ Our findings show that this rate would be increased by 1.92 as a result of a smoke-free policy, yielding an expected quit rate of 5.8% ($3.0\% \times 1.92$). Increasing the annual quit rate from 3% to 5.8% would translate into an additional 199,001 former smokers who successfully quit as a result of a national smoke-free worksite policy.

Data from the National Health Interview Survey show that the average adult smoker consumes 16.8 cigarettes per day.¹⁹ With the assumption that, as observed in this study, a smoke-free worksite policy reduces average daily cigarette consumption by 2.57 per day among those who continue to smoke, we estimate that total US cigarette consumption would be reduced by 6.6 billion cigarettes annually if all of the country's worksites were required to be smoke free. Adding in the reduction in cigarette consumption resulting from those who quit smoking completely would result in an overall decrease in cigarettes smoked of 7.8 billion per year. This represents approximately 2% of the total national consumption in 2001, or about 380 million packs of cigarettes that would not be purchased and smoked.²⁰ It is clear that a smoke-free worksite policy is not only good for the health of nonsmokers but also good for the health of smokers, because it has a potent effect on reducing smoking among continuing smokers and, more important, on helping them stop smoking altogether.

Our study involved both methodological strengths and limitations. The primary strength was the large, population-based, prospective study design. While the cohort was not representative of the country as a whole or of any state, it did consist of a heterogeneous population of employees and worksites located throughout the United States. The results described here confirm those of past cross-sectional studies and even suggest a stronger relationship between worksite policy and quitting than has previously been shown.⁶

Nonresponse bias is always a concern in a long-term cohort investigation, and this study was no exception. However, important predic-

tors of cessation, such as desire to quit and number of cigarettes smoked per day, were not associated with cohort attrition and thus were unlikely to have influenced the results observed. It is also possible that the relationship shown between worksite smoking policies and smoking behavior was the result of an unmeasured confounder variable. However, we believe that this is unlikely, because we were able to control for a wide range of individual-level variables that might have been expected to correlate with smoking behavior. In addition, we examined state of residence as a proxy measure for macro-level environmental influences such as cigarette excise taxes and antitobacco programming and found that the associations observed between worksite smoking policies and smoking behavior remained unchanged.

Finally, we relied on participants' self-reports to determine smoking behaviors. Three factors affect the accuracy of self-reported information: (1) type of population, (2) type of intervention, and (3) demand characteristics.²¹ Self-report accuracy is affected primarily by implicit or explicit demand characteristics. However, this was an observational study with little incentive for subjects to give false reports of their smoking status. Thus, it is unlikely that our reliance on self-reported data was responsible for the observed findings. The falsity of self-reported smoking cessation among members of the COMMIT cohort was examined in an earlier study and shown to be less than 7% by biochemical validation tests for salivary cotinine.⁸

Moreover, we think it unlikely that misclassification of smoking behavior would differ systematically between respondents who work in an environment where smoking is allowed and those who do not work in such an environment. Thus, if anything, measurement bias was likely small and not different by worksite smoking policy in this study. This might result in a slight underestimation of the effects of worksite policies on quitting behavior. In summary, we are confident in our conclusions that smoke-free worksite policies help employees to reduce their cigarette consumption and stop smoking and that such effects increase the longer policies are in place. ■

About the Authors

The authors are with the Department of Health Behavior, Division of Cancer Prevention and Population Sciences, Roswell Park Cancer Institute, Buffalo, NY.

Requests for reprints should be sent to K. Michael Cummings, PhD, MPH, Department of Health Behavior, Division of Cancer Prevention and Population Sciences, Roswell Park Cancer Institute, Elm and Carlton Streets, Buffalo, NY 14263 (e-mail: michael.cummings@roswellpark.org).

This article was accepted July 27, 2004.

Contributors

All of the authors assisted in the writing of the article. J.E. Bauer coordinated the study and led the analyses. A. Hyland and Q. Li assisted with analyses. C. Steger provided editorial comments and assisted in revisions of the article. K.M. Cummings provided editorial comments and advice on analyses.

Acknowledgments

The Community Intervention Trial for Smoking Cessation study was funded by the National Cancer Institute. The 2001 follow-up study was also funded by the National Cancer Institute through the State and Community Tobacco Control Interventions Research Initiative. Data analysis was partially supported by the Roswell Park Cancer Institute and the Biomathematics/Biostatistics Core Resource.

Human Participant Protection

No protocol approval was needed for this study.

References

- Marcus BH, Emmons KM, Abrams DB, et al. Restrictive workplace smoking policies: impact on non-smokers' tobacco exposure. *J Public Health Policy*. 1992;13:42–51.
- Borland R, Pierce JP, Burns DM, Gilpin E, Johnson M, Bal D. Protection from environmental tobacco smoke in California: the case for a smoke-free workplace. *JAMA*. 1992;268:749–752.
- Borland R, Chapman S, Owen N, Hill D. Effects of workplace smoking bans on cigarette consumption. *Am J Public Health*. 1990;80:178–181.
- Wakefield MA, Wilson D, Owen N, et al. Workplace smoking restrictions, occupational status, and reduced cigarette consumption. *J Occup Med*. 1992;34:693–697.
- Glasgow RE, Cummings KM, Hyland A. Relationship of worksite smoking policy to changes in employee tobacco use: findings from COMMIT. *Tob Control*. 1997;6(suppl 2):S44–S48.
- Fichtenberg CM, Glantz SA. Effect of smoke-free workplaces on smoking behavior: systematic review. *BMJ*. 2002;325:188.
- US Census Bureau. Annual estimates of the population of the United States and states, and for Puerto Rico: April 1, 2000, to July 1, 2004. Available at: <http://www.census.gov/popest/states/tables/NST-EST2004-01.pdf>. Accessed March 14, 2005.
- The COMMIT Research Group. Community Intervention Trial for Smoking Cessation (COMMIT), I: cohort results from a 4-year community intervention. *Am J Public Health*. 1995;85:183–192.
- The COMMIT Research Group. Community Intervention Trial for Smoking Cessation (COMMIT), II: changes in adult cigarette smoking prevalence. *Am J Public Health*. 1995;85:193–200.
- Hyland A, Li Q, Bauer JE, Giovino G, Steger C, Cummings KM. Predictors of cessation in a cohort of current and former smokers followed over 13 years. *Nicotine Tob Res*. 2004;6(suppl 3):S363–S369.
- Gerlach KK, Shopland DR, Hartman AM, Gibson JT, Pechacek TF. Workplace smoking policies in the US: results from a national survey of over 100 000 workers. *Tob Control*. 1997;6:199–206.
- 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 1993–1999. *J Occup Environ Med*. 2001;43:680–686.
- Shopland DR, Anderson CM, Burns DM, Gerlach KK. Disparities in smoke-free workplace policies among food service workers. *J Occup Environ Med*. 2004;46:347–356.
- Heironimus J. Impact of workplace restrictions on consumption and incidence. Philip Morris. Bates No. 2045447779–7806. Available at: <http://tobacodocuments.org/pm/2045447779–7806.html>. Accessed June 16, 2004.
- Hong MK, Bero LA. How the tobacco industry responded to an influential study of the health effects of secondhand smoke. *BMJ*. 2002;325:1413–1416.
- Hyland A, Levy D, Rezaishiraz H, et al. Reduction in amount smoked predicts future cessation. *Psychol Addict Behav*. In press.
- US Bureau of Labor Statistics. National employment and wage estimates. Available at: <http://www.bls.gov/oes/2001/major.pdf>. Accessed June 16, 2004.
- Chapman S, Borland R, Scollo M, Brownson RC, Dominello A, Woodward S. The impact of smoke-free workplaces on declining cigarette consumption in Australia and the United States. *Am J Public Health*. 1999;89:1018–1023.
- Schoenborn CA, Vickerie JL, Barnes PM. Cigarette smoking behavior of adults: United States, 1997–98. *Adv Data Vital Health Stat*. February 7, 2003;331.
- Tobacco Outlook Report*. Washington, DC: Economic Research Service, US Dept of Agriculture; 2003.
- Velicer WF, Prochaska JO, Rossi JS, Snow MG. Assessing outcome in smoking cessation studies. *Psychol Bull*. 1992;111:23–41.