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The Relationship Between School Policies and Youth Tobacco Use*

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Abstract

BACKGROUND—The school setting is frequently used both to educate youth about risks involved in tobacco use and to implement tobacco prevention and cessation programs. Given that school-based programs have resulted in limited success, it is necessary to identify other setting-level intervention strategies. School tobacco policies represent a type of universal intervention that might have some promise for preventing or reducing tobacco use.

METHODS—Hierarchical linear modeling was used to assess whether school tobacco policies were related to observations of tobacco use and current smoking among 16,561 seventh through twelfth graders attending 40 middle and high schools in Illinois.

RESULTS—Results indicated that the enforcement of school tobacco policies, but not the comprehensiveness of those policies, was associated with fewer observations of tobacco use by minors on school grounds as well as lower rates of current smoking among students.

CONCLUSIONS—The school setting is a key system to impact youth tobacco use. Findings underscore the need to train school personnel to enforce school tobacco policy.

Keywords

smoking and tobacco; policy; health policy

Tobacco use is the leading cause of preventable death in the United States,¹ and it is estimated to cause 10% of deaths globally.² Typically, smoking begins during adolescence and more severe consequences are associated with earlier ages of initiation. In a nationally representative survey of youth in 2007, 22% of 8th graders reported having smoked cigarettes in their lifetime,

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14% of 10th graders reported being current smokers, and 12% of 12th graders reported daily smoking.³ Youth-oriented settings such as schools need to adopt and assess policies that promote antitobacco messages and role modeling, as well as to protect children from secondhand smoke.

Well-controlled, evidence-based school interventions have failed to show positive long-term outcomes.^{4–6} School-based education programs alone have been shown to be largely ineffective.⁷ Furthermore, a qualitative study⁸ indicated that high school students believe that tobacco use occurs mostly everywhere, including locations on school property. Exploration of other universal programs is necessary. Due to the impact of social factors on adolescents, school-based tobacco prevention should include reinforcing environmental supports.⁹ One such environmental feature is the school's tobacco policy, which can be a marker for acceptance of tobacco prevention within the school context.¹⁰ A school's policy can reflect community expectations, identify consequences for violating norms, and reinforce compliance.¹¹ Such policies may also decrease smoking-related fires, improve compliance with smoking ordinances, and assist in the maintenance of school grounds.¹²

The Pro-Children's Act of 1994 required all schools receiving federal funding to prohibit indoor smoking.¹³ Nonetheless, 1 study found that only 63.6% of schools had comprehensive tobacco-free environment policies.¹⁴ The Centers for Disease Control and Prevention^{12(pp7–14)} provides best practices for implementing school-based tobacco policies. This model provides a framework for schools to develop and enforce their policies and can be used to evaluate their comprehensiveness and enforcement.

Although policy offers an inexpensive universal approach to reducing youth tobacco use, the impact of these policies has been mixed. The mere presence of a policy does not significantly reduce the prevalence of youth tobacco use.^{15,16} In addition, given the mandate of 100% tobacco-free schools in the United States, it is essential to know whether certain aspects of school tobacco policies (ie, comprehensiveness) relate to reductions in tobacco use. A few studies found that policy comprehensiveness related to daily¹⁷ and weekly smoking.¹⁸ Although the intention of the school tobacco policy did not predict school smoking prevalence, it did moderately predict students' tobacco use at school.¹⁹ However, it is important to understand the impact of these tobacco policies on and off school grounds.

Comprehensive policies that lack enforcement may be unable to reach their goal of protecting children.²⁰ Accumulating evidence points to the role that enforcement of tobacco policies plays in reducing tobacco use by youth. Consistent enforcement related to lower prevalence of daily and weekly smoking in secondary schools in Wales^{21(p120)} and lower levels of perceived smoking among Scottish students.^{15(p36)} In the United States, monitoring of student tobacco use within schools also predicted daily cigarette use among middle but not among high school students.²² However, no relationship was found between monitoring and past-month tobacco use, indicating that school monitoring may be more effective among younger students who are in earlier stages of smoking uptake.

Student perceptions of the schools' tobacco policy may additionally impact youth tobacco use. One study found that students' perceptions of the enforcement of the tobacco policy predicted smoking on school property as well as prevalence of school smoking.^{19(p790)} In addition, increased tobacco use was reported in schools where youth perceive that students do not comply with the policy.²² These perceptions may stem from observations of policy violations on campus and underscore the importance of reducing youth tobacco use at school.

The first aim of the present study was to determine whether comprehensive policies with consistent enforcement related to fewer observations of youth tobacco use on school grounds. It was expected that students at schools with higher levels of tobacco policy enforcement would

report fewer observations of student tobacco use at school than schools with less enforcement. In addition, it was predicted that students attending schools with policies in place that were both comprehensive and highly enforced would report the fewest observations of student tobacco use on school grounds. The second aim of this study was to determine whether comprehensive policies with consistent enforcement relate to lower reported tobacco use. It was hypothesized that schools with higher levels of tobacco policy enforcement would have a lower prevalence of current tobacco use and that schools with both comprehensive and highly enforced policies would have the lowest tobacco use prevalence.

METHOD

Participants

This study used data from the Youth Tobacco Access Project, a large 5-year intervention study of youth tobacco use funded by the National Cancer Institute. Data were collected from students in grades 7 through 12, attending 20 middle schools and 20 high schools in 24 towns in northern and central Illinois. Of 30,969 eligible students, parental consent was obtained for 20,379 students (66%). A total of 16,676 eligible participants completed the survey (54%), but 115 (0.7%) of these participants were excluded because of inconsistent or invalid responding. Regarding demographics (see Table 1), the sample consisted of 16,561 students (8270 females and 7625 males). The sample included 70.5% white, 12.8% Latino, 7.1% African American, and 8.7% other. Most of the students were in high school (63.8%), although 36.2% were in grades 7 and 8.

Instruments

Student Survey—Active parental consent was obtained through mailings to the parent, notices sent home from school, and interactions with the parents during registration, report card pickup, and other school activities. At the time of the survey administration, students were required to give written assent to participate in the study. Members of the research team administered the Student Survey²³ to students in classrooms or small groups. This scale contained 79 items adopted from other established measures of students' attitudes and behavior toward tobacco, alcohol, and other drugs. Questions were modified from the Youth Risk Behavior Survey,²⁴ as well as surveys developed by Rigotti et al,²⁵ Altman et al,²⁶ and the Teenage Attitudes and Practices Survey.²⁷ Initial questions on the Student Survey involved demographic variables, including date of birth, grade level, gender, racial group membership, and parents' education level. Students also reported whether they had used tobacco, the frequency of their use, and the number of days in the past week they had observed minors using tobacco on school grounds.

School Tobacco Policy Enforcement Questionnaire—A 34-item structured interview was developed by the research team to assess schools' enforcement of tobacco policies. Phone interviews were conducted with school administrators and staff who were identified as most knowledgeable about the enforcement of the school's tobacco policy. Forty school officials participated in the interview, resulting in a 100% participation rate. This included 11 principals, 14 assistant principals, 12 deans, 2 social workers, and 1 school resource officer. The measure assessed beliefs about the relative problem of youth tobacco use at the school, the level of active enforcement of the tobacco policy at the school, strategies employed by the school to enforce the policy, staff and student perceptions about the policy, and environmental factors that may be related to tobacco use at school (eg, assessment of closed vs open campus). Ten items were averaged to create an index of the enforcement of the school's tobacco policy (Cronbach's $\alpha = .67$).

School Tobacco Policy Comprehensiveness Ratings—A 46-item tool was developed by the research team to rate the comprehensiveness of schools' tobacco policies. The tool was developed using information from the National Association of State Boards of Education,²⁸ National Association of Secondary School Principals,²⁹ Cook County Department of Public Health,³⁰ the Bureau of Health in the State of Maine Department of Human Services,³¹ and Stephens and English's³² policy rubric. The measure assessed school tobacco policies, focusing on applicability, restrictions, repercussions, programs, notification, and evaluation. Policies were coded by evaluators as including or not including specific components (eg, whether tobacco policies applied to school-sponsored events, if schools prohibited students from wearing clothing with tobacco company logos). Components were only considered to be part of the policy if they were both explicit (eg, clearly stated in the handbook, not inferred), and if they applied to the whole student body (eg, components applying to a subsection of the population such as student athletes did not constitute inclusion). Two project staff members rated school policies using the measure, and interrater reliability was acceptable (Cohen's κ ranged from .90 to 1.00; mean = 0.98, SD = 7.73). All 40 of the participating schools submitted student handbooks and any other written school-level or district-level tobacco policies to the DePaul University researchers, resulting in a 100% participation rate.

Variables

To account for both student- and school-level factors of tobacco use, variables were entered into the model as either level 1 or level 2 predictors. Individual self-reported items from the Student Survey were modeled at level 1. In contrast, school-level variables derived from the School Tobacco Policy Enforcement Questionnaire or the School Tobacco Policy Comprehensiveness Ratings were modeled at level 2.

Level 1 Variables

Smoking Status: Current smoking status was coded as a dichotomous variable determined from the following question: "During the past 30 days, on how many days did you smoke cigarettes? (1 or 2 days, 3 to 5 days, 6 to 9 days, 10 to 19 days, 20 to 29 days, All 30 days, None)." Students who reported no cigarette use in the past 30 days were considered noncurrent smokers, and all others were considered current smokers.

Gender: Gender was coded as a dichotomous variable determined from the response to the question: "What is your gender? (Female or Male)."

Grade: Students were asked the question: "What grade are you in? (7th grade, 8th grade, 9th grade (freshmen), 10th grade (sophomore), 11th grade (junior), 12th grade (senior))."

Race: Race was determined from responses to 2 questions: "Are you of Latino or Hispanic origin? (Yes or No)" and "How do you describe yourself? Mark all that apply (Asian, Black/African American, Middle Eastern, Native Hawaiian/Other Pacific Islander, Native American/Alaskan Native, White/Caucasian, Other)." Because the majority of students were white/Caucasian, black/African American, or of Latino or Hispanic origin, this variable was reduced to 4 categories (ie, white/Caucasian, black/African American, Latino or Hispanic origin, and other). For the present analyses, this variable was indicator (ie, dummy) coded by creating dichotomous variables indicating African American, Latino, and other. Therefore, in all analyses, Caucasian youth were the reference group for each of the 3 dummy coded variables.

Observations of Tobacco use on School grounds: Observations of tobacco use on school grounds was a dependent variable and coded dichotomously based on the responses to the question: "During the past 7 days, on how many days did you see minors using tobacco on

your school's grounds?" (0 days, 1 day, 2 days, 3 days, 4 days, 5 days, 6 days, All 7 days). Given the bimodal distribution of these data, the variable was further dichotomized such that students who reported seeing minors use tobacco on at least 1 day were considered observers of tobacco use on school grounds, whereas youth who reported 0 days were considered nonobservers.

Level 2 Variables

Enforcement of the School Tobacco Policy: Ten items (on a 7-point scale) from the School Tobacco Policy Enforcement Questionnaire answered by school staff members were averaged to create an index of the enforcement of the school's tobacco policy (Cronbach's $\alpha = .67$). This variable was further split into thirds to represent high, medium, and low enforcement of school tobacco policies.

Comprehensiveness: Comprehensiveness was determined from the applicability, restrictions, and repercussions of tobacco policies. Fifteen items were combined to create an index of the comprehensiveness of the school's tobacco policy (Cronbach's $\alpha = .74$). Responses were dichotomous and averaged over the 15 items; the range for this variable was from .13 to 1.00.

Data Analysis

A random effects regression analysis was performed using hierarchical linear modeling 6.03³³ to examine the correlates of observations of minors using tobacco on school grounds and youth smoking status. This analytic approach was selected due to the nested design of sampling students within schools and the multilevel data. In this study, level 1 variables were grade, race, gender, observations of tobacco use by minors on the school grounds, and smoking status. Level 2 variables included school tobacco policy enforcement, school tobacco policy comprehensiveness, and an interaction between school policy comprehensiveness and enforcement. All variables were treated as fixed effects. Because outcomes were dichotomous (eg, whether or not someone had ever smoked), a Bernoulli model was selected.

FINDINGS

Observations of Tobacco Use by Minors on School Grounds

A 2-level hierarchical model assessed the effects of the comprehensiveness and enforcement of school tobacco policies on the observations of tobacco use by minors on school grounds. It was expected that high enforcement, as well as the interaction of high enforcement and high comprehensiveness, would relate to fewer observations of underage tobacco use on school grounds. An unconditional means model revealed significant between-school variation, $\chi^2(39, N = 16,414) = 4700.01, p < .00$, which suggests clustering and confirms the need for a multilevel analytic strategy.

The comprehensiveness of school tobacco policies was not significantly related to observations of tobacco on school grounds nor was the interaction between comprehensiveness of school tobacco policies and enforcement. Therefore, comprehensiveness and the interaction between comprehensiveness and enforcement were not included in the final model. In the final model (see Table 2), the level 2 enforcement variable was significantly associated with observations of tobacco use on school grounds (OR = 0.49; $t[38] = -3.35, p < .01$). School tobacco policy enforcement was significantly related to observations of tobacco use on school grounds, such that schools with higher enforcement of tobacco policies had fewer observations of tobacco use on school grounds. For each additional unit of enforcement of the school's tobacco policy, the odds that youth will see minors using tobacco on the school grounds decreases by a factor of about 0.5.

A few individual (level 1) variables were also related to decreased likelihood of seeing minors use tobacco on school grounds, such as if the adolescent was in an earlier grade (OR = 1.23; t [16,330] = 10.51, p = .00) and if the student's racial classification was black (OR = 0.68; t [16,330] = -4.35, p = .00) or other (OR = 0.81; t [16,330] = -2.75, p < .01) as opposed to Caucasian. In addition, more observations of tobacco use were reported by minors who were current smokers (OR = 2.30; t [16,330] = 14.79, p = .00).

Current Smoking

It was expected that high enforcement, as well as the interaction of high enforcement and high comprehensiveness, would negatively relate to current smoking. As in the previous model, results from an unconditional model revealed significant between-school variation in youth current smoking; $\chi^2(39, N = 16,473) = 937.06$, p < .01, confirming the need for a multilevel analytic strategy. Neither the comprehensiveness of school tobacco policies nor the interaction between the comprehensiveness and the enforcement of school tobacco policies was significantly related to current tobacco use by students. Therefore, comprehensiveness and the interaction between comprehensiveness and enforcement were not included in the final model. In the final model (see Table 3), the level 2 enforcement variable was significantly associated with current tobacco use by minors (OR = 0.83; t [38] = -2.17, p < .05). In addition, several individual (level 1) variables were also related to decreased likelihood of current smoking, such as if the adolescent was in an earlier grade (OR = 1.43; t [16,466] = 15.89, p = .00), if the student's racial classification was black (OR = 0.43; t [16,466] = -6.38, p = .00) or other (OR = 0.54; t [16,466] = -5.31, p = .00) in comparison to Caucasian students, and if students were females (OR = 0.88; t [16,466] = -2.68, p < .01).

DISCUSSION

Antitobacco policies are salient organizational features that can reinforce schools' attempts to provide prohealth messages³⁴ and give school officials the authority to provide a smoke-free environment. Although the Pro-Children's Act of 1994¹³ mandated school tobacco policies, there is much variation in their design and implementation.³⁵ Importantly, lifetime cigarette use and current smoking are higher within schools that have a greater perceived acceptability of cigarettes.³⁶

The results of this study showed that staff reports of school tobacco policy enforcement related to fewer observations of minors smoking on school grounds by youth. This is an encouraging finding for school systems working to provide students and staff with a healthy environment consistent with their antitobacco educational messages. Youth who do not witness their peers breaking school tobacco policies may themselves be less likely to adopt that risky behavior. Perceived peer tobacco use is a commonly cited predictor of underage smoking,³⁷ and tobacco use is believed to occur more when youth feel it is common and acceptable. The perception of prevalent peer tobacco use is associated with stage of smoking uptake, and children who have smoked report more exposure to smoking friends, as well as perceptions of higher levels of smoking.³⁸ Additionally, youth who witness adolescents or adults smoking in various public locations are more likely to perceive smoking as a socially acceptable behavior,³⁹ and youth who increase their smoking have more initial peer models of smoking.⁴⁰ Therefore, decreases in observations of youth tobacco use on the school campus may reduce youth perceptions of the acceptance of tobacco use by their peers and school officials and in turn reduce their smoking behaviors.

Even more encouraging is the finding that the enforcement of school tobacco policies related to less current smoking by students. Although it is critical for schools to provide a tobacco-free environment, ultimately, the prevention and reduction of tobacco use by students is the primary goal. For school tobacco policies to have the largest impact, their protection must

extend beyond the school grounds. These results support the idea that school officials can use policy to affect student tobacco use both inside and outside the school walls.

These results also suggest that the specific content of school tobacco policies is less relevant to their effectiveness than the consistent enforcement of those policies. The finding that current smoking among students was unrelated to the comprehensiveness of the policy is consistent with past research on policy intention.¹⁹(p789) It is possible that as long as a school has a policy that is enforceable, minor improvements do not result in additional tobacco use reductions.

One strength of the current study is the triangulation of student data, staff reports, and archival records. However, several limitations of the present study should be discussed. Utilization of a cross-sectional design limits the ability to understand the causal relationship between school tobacco policies and student behavior. It is possible that students are less likely to use tobacco in schools that enforce their policy for reasons not included in the model. Longitudinal studies are needed to understand how enforcement affects smoking over time and to determine the causal pathways of these variables. A second limitation is the self-report nature of the staff enforcement measures. Although self-report data are generally considered reliable, asking administrators to report on the enforcement actions of others may introduce a confound. Specifically, administrators in schools with less tobacco use might be more likely to perceive their staff as responsive to the few isolated cases of youth tobacco use on campus. To eliminate this bias, researchers should gather information regarding policy implementation from students as well as from staff.³⁴(p234) Finally, although over 16,000 students completed the survey, the actual number of schools investigated was much smaller, limiting the number of variables that could be investigated. Larger studies that include more school units are needed to support multilevel analytical approaches to assessing the effects of school tobacco policies.

In summary, school settings are key systems to impact youth tobacco use. School tobacco policies provide an example of a universal prevention strategy that requires minimal funding and staff commitment¹⁷(p122) and can be carried out in the regular staff duties. Policy should form one component of the overall school plan to reduce youth tobacco use.¹⁷(p122) The present study adds to the current literature by highlighting the importance of the enforcement of school tobacco policies for youth tobacco use both on and off the school campus. Efforts to support school staff in their role as providers of a tobacco-free environment through training and awareness of the benefits of their efforts are warranted. Future studies should evaluate multiple youth settings, as well as measure youth perceptions of tobacco policies and the norms about tobacco in their environments.

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Table 1

Demographic Characteristics of the Sample

Variable	Total	
	N	%
Total	16,561	100
Grade		
7	2815	17.0
8	3173	19.2
9	2934	17.7
10	3038	18.3
11	2794	16.9
12	1803	10.9
Race		
Latino	2117	12.8
African American	1184	7.1
Other	1445	8.7
White	11,676	70.5
Gender		
Male	7625	46.0
Female	8270	49.9

Table 2

Relation of Predictor Variables to Observations of Smoking on School Grounds

Variable/Effect	Odds Ratio	95% Confidence Interval		df	t
		Lower	Upper		
Intercept	0.27	0.19	0.39	38	-7.52***
Enforcement	0.49	0.32	0.75	38	-3.35**
Current smoker	2.30	2.06	2.57	16,330	14.79***
Grade	1.23	1.18	1.28	16,330	10.51***
Latino	1.01	0.90	1.14	16,330	0.14
African American	0.68	0.57	0.81	16,330	-4.35***
Other race	0.81	0.70	0.94	16,330	-2.75**
Gender	1.03	0.95	1.11	16,330	0.70

**
p < .01;***
p < .001.

Table 3

Relation of Predictor Variables to Current Smoking

Variable/Effect	Odds Ratio	95% Confidence Interval		df	t
		Lower	Upper		
Intercept	0.06	0.05	0.07	38	-33.29***
Enforcement	0.83	0.70	0.99	38	-2.14*
Grade	1.43	1.37	1.49	16,466	15.89***
Latino	1.05	0.91	1.22	16,466	0.71
African American	0.43	0.34	0.56	16,466	-6.38***
Other race	0.54	0.43	0.68	16,466	-5.31***
Gender	0.88	0.80	0.97	16,466	-2.68**

*
p < .05;**
p < .01;***
p < .001.