Are school environmental and individual factors independently associated with smoking behavior and susceptibility to initiate smoking among never smokers? Evidence from the Global Tobacco Surveillance System

Nathan R. Jones
Charles W. Warren

Global Tobacco Control Program
Office on Smoking and Health
Coordinating Center for Health Promotion
Centers for Disease Control and Prevention

Introduction

Tobacco use is one of the world's leading causes of preventable death (1). If current trends continue, tobacco-related mortality could double in the next decade and more than 10 million people per year will die as a result of tobacco consumption by 2020 (2,3). As with many other risk behaviors, initiation of tobacco use occurs primarily in adolescence (4) and most research on smoking uptake focuses on pre-teen and teen age groups. Throughout the world, a large proportion of children in these age groups attend school on a regular basis. The role that school environment and peer influences play in an individual's decision to start smoking is a relatively new area of inquiry and has not been explored in many developing countries. This paper uses information collected from students, teachers, and administrators to examine how characteristics of students and their school environments are associated with current smoking rates and susceptibility to smoking initiation among those who do not smoke.

Adolescent cigarette smoking and susceptibility to initiate smoking have been associated with a range of covariates including age, gender, and parental smoking, knowledge and attitudes regarding health, and participation in associated risky behaviors (5,6). Recent research has shown the importance of structural influences such as school and neighborhood characteristics on smoking prevalence, although the range of potential covariates explored is narrow in many studies (7,8). For the most part, this research has been conducted in more developed countries due to scarcity of appropriate data sources in resource constrained settings. Extrapolating findings from wealthier countries to less developed countries is hazardous because of significant differences in social norms and beliefs regarding health, quality of school health curricula, existence and enforcement of youth tobacco access policies, and a variety of other influences that may be inherently different in less developed contexts. Instead, existing research would benefit greatly from a comparative investigation into the importance of school environments for adolescent risk behavior in poorer settings. Given the recent increases in tobacco use among adolescents in the developing world, research on the mechanisms associated with this behavior is in high demand. Findings in this report will improve the evidence base for health interventions in the future.

Data

This study will use rich data collected as part of an ongoing collaboration between the U.S. Centers for Disease Control and Prevention (CDC), the World Health Organization (WHO), national ministries of health, and other partners in the tobacco control community (9). The Global Youth Tobacco Survey (GYTS) collects information about tobacco use, knowledge and attitudes regarding tobacco, exposure to secondhand smoke, school curricula, interest in cessation, and exposure to tobacco-related media from students in adolescence. Between 1999 and 2006, the GYTS was conducted in 143 countries. The Global School Personnel Survey (GSPS) is a complementary survey that collects tobacco-related information from teachers and administrators in schools selected to participate in the GYTS. Between 2002 and 2006, over 50 countries have completed the GSPS. Both surveys follow a standard protocol for sample selection, questionnaire development, and data management. Descriptive statistics included in this report show variation in current smoking and susceptibility to initiate smoking among students and

current smoking prevalence among teachers in three countries in which both the GYTS and GSPS surveys were completed in the past year: Ghana, Lebanon, and Thailand. The final study will include analyses from other countries that have completed GYTS and GSPS such as: Indonesia (2006), Czech Republic (2002), and Dominica (2004).

Although there are many definitions used to define current smoking status in tobacco research, the consistency of the GYTS questionnaire allows calculation of directly comparable measures of current smoking prevalence across countries. For example, current smokers are defined as students who answered a value of greater than zero to the question "During the past 30 days, on how many days did you smoke cigarette?" Non-smoking students susceptible to initiate smoking are defined as students who answered any response other than "Definitely Not" to the question "At any time during the next 12 months, do you think you will smoke a cigarette?" and "If your best friend offered you a cigarette, would you smoke it?" We use this specification because of previous findings that students who express ambiguity about initiating smoking are more likely to experiment in the near future than students who report a firm resolve not to smoke (10). These two measures, current smoking behavior and susceptibility to smoking initiation, will be the outcome measures focused on in this analysis.

The countries included in this analysis cover a broad spectrum of socioeconomic, cultural, and political settings. Perhaps not surprisingly, descriptive analyses of data from the three countries also reveals a wide range of smoking rates among students and teachers, as well as susceptibility to initiate smoking among students who have never smoked (Table 1). For example, students Ghana have a low smoking prevalence which does not differ by gender. Susceptibility to initiate smoking, however, is about 6 times higher than current prevalence, also with no difference by gender. Although relatively low overall, current smoking prevalence among students in Ghana is about as high as smoking prevalence among teachers. In Lebanon, males are significantly more likely to smoke than females. A large proportion of students (2 in 10) are susceptible to initiating smoking and current smoking rates among teachers is considerably higher than current smoking rates among students. In Thailand, males are more likely than females to be current smokers. Susceptibility in Thailand, however, is about the same or lower than current smoking levels. Smoking prevalence among male teachers is slightly higher than current smoking among male students, but statistically similar among female teachers and students.

Planned Analyses

The proposed analyses will take advantage the multileveled nature of the GTSS data. Specifically, aspects of adolescents' school environments can be measured in a number of ways, and allows evaluation of whether this environment is related to the prevalence of current tobacco use among students and the likelihood of uptake of tobacco use among non-smoking students.

Previous research suggests that several individual-level characteristics have a strong association with tobacco use among teens. For this reason, a number of student-level independent characteristics will be included in regressions, such as age, gender, smoking behavior of peers and parents, exposure to secondhand smoke, and exposure to direct and indirect tobacco-related advertising.

Because a main area of interest is the potential school environment influences on adolescent behavior above and beyond individual characteristics, a number of school-level measures will be included in the same analyses. These will include measures of teachers' current smoking prevalence, teachers' attitudes toward smoke-free initiatives, teachers' perception of existence and enforcement of tobacco restrictions at the school, as well as the existence of tobacco-related curriculum elements. An additional source of information about the school will be derived from the responses of the school headmaster or administrator. As an individual capable of setting and enforcing school policies, the responses of the administrator may be associated with student tobacco behavior in a way that is independent from the responses of both teachers and students.

To provide results that can be compared to previous studies of tobacco use, the analysis will be performed in multiple steps. First, school- and student-level variance in these two outcomes will be estimated without covariates. Next, coefficients will be estimated for a range of student-level covariates. A third model will be show associations with the outcome variables among school-level characteristics in the presence of student-level characteristics. The two models will then be compared for mediating effects on the coefficients of the individual characteristics after the inclusion of school-level variables.

This combination of analyses will provide insight into several questions. First, are findings regarding the association of individual- and school-level characteristics with smoking behavior from more developed countries consistent with the findings of this study? Second, do characteristics of the school environment in less developed countries provide information that explains variance in student smoking behavior beyond what can be explained by individual-level characteristics? Third, does inclusion of school-level structural characteristics alter coefficients estimated with a model that includes only individual-level characteristics? These findings will shed light not only on the applicability of existing school-focused research to the developing world, but will also inform future interventions aimed at reducing the tobacco use of adolescents.

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Table 1 Prevalence of tobacco current cigarette smoking and susceptibility to initiate smoking among students, and prevalence of current cigarette smoking among teachers, GYTS and GSPS, 2005-2006.

Country	Prevalence of current cigarette smoking among students (GYTS)*		Susceptibility to initiate smoking among students who have never smoked (GYTS)**		Prevalence of current cigarette smoking among teachers (GSPS)*	
	Boys	Girls	Boys	Girls	Male	Female
Ghana	2.8 (1.7)	2.3 (1.4-3.5)	13.8 (10.5-17.9)	14.1 (11.1-17.8)	3.3 (1.3-8.1)	0.3 (0.0-2.4)
Lebanon	11.8 (8.5-16.3)	5.6 (4.2-7.5)	21.8 (17.3-27.1)	19.7 (16.9-22.9)	25.1 (15.4-38.0)	22.2 (15.5-30.8)
Thailand	17.0 (15.1-19.1)	3.9 (3.3-4.7)	9.0 (8.0-10.2)	5.2 (4.4-6.1)	23.3 (20.6-26.4)	2.7 (1.7-4.1)

* Current cigarette smoking is defined as smoking more than one cigarette in the previous month.

** Students who answered anything but "Definitely Not" to either of the two following questions were considered susceptible to start smoking: "At any time during the next 12 months, do you think you will smoke a cigarette?" and "If your best friend offered you a cigarette, would you smoke it?"