The influence of the social environment on youth smoking status

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ABSTRACT

Objective. Youth smoking is complex with multilevel influences. While much is known about certain levels of influence on youth smoking, the lack of focus on institutional influences is notable. This study evaluated the effects of ambient smoking attitudes and behaviors in schools on individual youth smoking.

Method. Data from the 2012 Florida Youth Tobacco Survey ($n = 67,460$) were analyzed. Multinomial logistic regression was used to investigate individual and aggregated school-level factors that were associated with a youth being classified as a "susceptible nonsmoker" (SN) or "current smoker" (CS) relative to a "non-susceptible nonsmoker" (NN).

Results. The aggregated percentage of regular smokers at a school, ambient school level positive smoking perceptions, and the standardized difference between individual and school-level positive smoking perceptions were statistically significant in the fully adjusted model. We also found an increased risk of being a SN relative to a NN for Hispanic youth. Moreover, our approach to modeling institutional-level factors raised the pseudo r-squared from 0.05 to 0.14.

Conclusion. These findings suggest the importance of ambient smoking attitudes and behaviors on youth smoking. Prevention efforts affecting ambient smoking attitudes may be beneficial.

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Introduction

Youth cigarette smoking continues to be an important public health concern in the United States (Centers for Disease Control and Prevention, 2010; U.S. Department of Health and Human Services, 2014). Youth smoking is complex with multilevel influences impacting the likelihood that an individual youth will smoke. An extensive literature exists for many of the levels of influence identified by the ecological model of health behavior (Glanz et al., 2002) and youth smoking status. For example, intrapersonal attitudes and behaviors (Carvajal et al., 2000; Conrad et al., 1992; Flay et al., 1998; Lopez et al., 2010), peer and family influence as a function of interpersonal processes and primary groups (Bauman et al., 2001; Clark et al., 1999; Gritz et al., 2003; Kegler et al., 2002; Landrine et al., 1994), neighborhood and built environment influences as community factors (Goldade et al., 2012; Pickett and Pearl, 2001), and public policy initiatives to increase taxes on tobacco products (Lando et al., 2005), ban indoor smoking (Siegel et al., 2008), and restrict advertising and point of sale purchases of tobacco products to minors (DiFranza et al., 2006; Gostin et al., 1997; Kessler et al., 1996; Willemsen and de Zwart, 1999) have all shown direct influence on youth smoking. However, the lack of focus on institutional influences, particularly the influence of the school environment on

youth smoking, is a notable exception to this otherwise extensive body of work.

The institutional influence of the school environment on susceptibility to youth risk behaviors, like smoking, is particularly important given the proportion of waking hours adolescents spend at school (Flannery et al., 1999; Fuller and Clarke, 1994; Stewart, 2008). Although studies have examined the effect of perceived peer attitudes and behaviors on youth smoking (Maxwell, 2002; Prinstein et al., 2001; Urberg et al., 1990), we found no studies exploring the effect of the school environment via the aggregate attitudes and behaviors of students who may or may not be friends with a focal respondent.

The school environment can influence smoking through passive exposure social attitudes and behaviors regarding smoking. Positive social attitudes regarding smoking can be expressed in two main ways by either direct or indirect endorsements of smoking behavior (Nosek, 2007; Petty and Brinol, 2006). Direct endorsement of smoking behavior could be captured by engaging in smoking with or without expressing pro-smoking attitudes (i.e. the act of smoking provides advertisement of the behavior). Conversely, indirect endorsement of smoking behavior would be captured by expressing pro-smoking attitudes with or without engaging in smoking behaviors (Huijding et al., 2005). It is possible that one or both mechanisms affect youth smoking status.

This study addresses the relative dearth of knowledge about how the school environment affects youth smoking. Specifically, we examined the following research questions: (1) Does exposure to explicit peer

smoking influence youth smoking status? We predict that youth smoking status will vary by the percentage of smokers in the focal respondent's school net of individual demographic characteristics. Second, does exposure to peer attitudes regarding social benefits of smoking influence youth smoking status? We predict that youth smoking status will vary as a function of differences in exposure to positive social perceptions regarding smoking in the school environment. Further, we predict that this effect will increase after adjusting for the difference between individual and aggregate implicit positive social perceptions regarding smoking in the school environment.

Materials and methods

Data from the 2012 Florida Youth Tobacco Survey (FYTS) were analyzed. The Florida Youth Tobacco Survey is a school-based survey administered annually by the Florida Department of Health. The sample includes students across the state of Florida in middle (38,989 students) and high schools (36,439 students), using a two-stage cluster probability design. The complex sampling design included a random sampling of public middle and high schools across the state and random sampling of classrooms selected within each selected school. All students clustered in the selected classrooms were invited to participate in the survey. Data were collected from 66 counties in Florida, with two counties excluded due to unrepresentative sampling or abstention. The overall survey response rate for middle schools was 77 percent, and the overall survey response rate for high schools was 73 percent (accessed March 5, 2015 http://www.floridahealth.gov/statistics-and-data/survey-data/fl-youth-tobacco-survey/index.html).

Individual level variables

Individual level variables included both demographic variables and a measure for in-home smoking. Demographic variables included participant age in years, race/ethnicity, sex (male = 1; female = 0), type of housing (single family home = 0; apartment/trailer/etc. = 1), and a measure of attending a school located in non-metro/rural area according to the U.S. Department of Agriculture Economic Research Service Rural–urban Continuum Code (rural = 1; urban = 0). The options for race/ethnicity included non-Hispanic White, non-Hispanic Black, Hispanic, Asian or Pacific Islander, and American Indian or other race. We also included a dichotomous measure of in-home smoking to assess smoking by at least one other individual in the respondent's home (yes = 1, no = 0).

Focal independent variables: scaled individual and school-level characteristics

The key independent variables in the full analysis were: (1) the percentage of students in the focal respondent's school who reported ever smoking regularly and (2) the standardized difference between individual and school-level positive smoking attitudes. The two focal independent variables included the percentage of students in the respondent's school who indicated ever smoking regularly and the average aggregate positive smoking attitudes in the respondent's school. The positive smoking attitude questions included three measures assessing whether youth believed that young people who smoke: "have more friends," "look cool or fit in," and "feel more comfortable at parties." These questions were asked on a 4-point scale with higher values indicating more positive agreement with these statements ($\alpha = 0.68$).

Given the variation in the difference between individual and school level positive smoking attitudes (Equation (1)), we standardized these scores to have a mean of zero and a standard deviation of one to compare across youths and schools (Equation (2)). The resulting score from Equation (2) is used in the fully adjusted model analysis (Model 3).

Equation 1: Difference between individual and school level positive smoking perceptions

$$diff_{ij} = \left(attitudes_{Student_i} - \overline{x}_{attitudes_{school_j}} \right)$$

Equation 2: Standardized difference between individual and school level positive smoking perceptions

$$\delta_z = \frac{diff_{ij} - \overline{x}_{diff_{ij}}}{se_{diff_{ij}}}$$

This measurement strategy builds upon the method used by Hatzenbuehler and colleagues (2014) and scales for the relative difference between individual attitudes and the ambient level of attitudes surrounding the focal individual. This strategy enables analyses across two levels without necessitating nested models while also scaling for the relative effects of personal implicit attitudes to aggregate values.

Our other focal independent variable is the school-level average of the percentage of students in the respondent's school who reported ever smoking regularly (i.e. responding "yes" to "Have you ever smoked cigarettes daily, that is, at least one cigarette every day for 30 days?"). Using this measurement, a one-unit increase is equivalent to a 1% increase in the percentage of students in the focal respondent's school who have ever smoked regularly.

Two school-level control variables were also created and include the percentage of students who had been exposed to anti-smoking ads for at least 10 days in the past month and the percentage of students who reported getting mostly A's in school.

Dependent variable

Youth smoking status was the main outcome of this study. Youth smoking status was measured as a three-level categorical variable. Each respondent was categorized as a current smoker (CS, $n = 6,108$), a susceptible nonsmoker (SN, $n = 17,607$), or a non-susceptible nonsmoker (NN, $n = 43,745$). Current smokers were defined as individuals who had smoked in the past month. Susceptible nonsmokers were respondents who did not smoke in the past month and did not indicated "definitely not" on whether they would either be smoking within the next year, would be smoking within the next 5 years, or would smoke if given a cigarette by a friend. Non-susceptible nonsmokers included youth who responded "definitely not" to all three susceptibility questions and were not current smokers. Respondents who reported a prior history of smoking, but who were not currently smoking, were excluded from the present analysis ($n = 650$; 0.9%). These former smokers did not comprise a large enough group for comparative analyses.

Statistical analyses

Weighted multinomial logistic regression analyses were used to assess the relative likelihood of each level of smoking status given the same set of predictors. Due to the large sample size and relatively low amount of missing data (<5% per item), we limited our analyses to respondents with complete information through listwise deletion. The final analytic sample included 68,110 respondents. All analyses were weighted to account for the complex survey design.

Three models were examined. The outcome for each model was the individual smoking status variable. The first model included the individual demographic characteristics and in-home smoking variable (Model 1). The second model included the school-level variables only (Model 2). The final, fully adjusted, model (Model 3) combined the variables in Models 1 and 2, as well the standardized difference between individual and school level average positive social perceptions about smoking.

Results

Table 1 includes the weighted means for all variables in the full sample and by smoking status. Current smokers were significantly different from both non-susceptible nonsmokers and susceptible nonsmokers by age (slightly older), sex (more males), race (higher proportion non-Hispanic White, lower proportion non-Hispanic Black), housing type (fewer residing in single family homes), rural residency (more rural), and higher rates of in-home smoking. Current smokers were also more likely to come from schools with a higher percentage of ever smokers, higher average positive smoking perceptions, and higher values on the standardized difference in perceptions measure. Among the two groups of nonsmokers, susceptible nonsmokers were more likely to be Hispanic, less likely to be non-Hispanic Black, more likely to have a smoker in the home, and have higher values on the standardized difference in perceptions measure than non-susceptible nonsmokers.