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Original Investigation

Peer Influence and Selection Processes in Adolescent Smoking Behavior: A Comparative Study

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Abstract

Introduction: Adolescent smoking studies find evidence of active peer influence and selection processes. However, studies have shown that these processes operate differently depending on context. This study uses SIENA to model coevolutionary processes between smoking and changes in friendship ties, comparing two high schools in which data were collected in identical fashion to explore influence and selection mechanisms with respect to current smoking, and smoking levels.

Methods: This is a longitudinal survey with 2 waves of data. In-home surveys were conducted with students from 2 large high schools in the United States: a West Coast school, and a Midwestern school. Participants were consented students in 10th and 11th grades at the first wave of data collection. The primary measures were self-reported smoking behavior and friendship nominations.

Results: There is evidence of influence and selection in both schools for adolescents' smoking status (1 = any smoking) and for level of smoking.

Conclusions: These models reflect great similarities in influence and selection processes across schools for different smoking behaviors. However, smoking prevalence may impact the exact mechanisms by which influence and selection operate. Researchers should consider smoking interventions with independent modules addressing different selection and influence processes, implemented based on contextual factors such as the prevalence of smoking.

Introduction

To enhance the effectiveness of youth substance use prevention programs, most of which have a strong focus on peers (see for example, Campbell et al., 2008 and D'Amico & Edelen, 2007), it is imperative to understand the nexus of substance use-related peer influence. Cross-sectional and prospective studies have shown that exposure to prosmoking peer behaviors and attitudes is associated with the initiation and escalation of smoking use during adolescence (Flay, Hu, & Richardson, 1998; Griffin, Botvin, Doyle, Diaz, & Epstein, 1999; Peterson et al., 2006; Tucker, Ellickson, & Klein, 2002, 2003; Wang et al., 1999). Studies reporting a correlation between the smoking behavior of adolescents and their peers typically conclude that this association is due to adolescents being influenced by their friends. However, there is growing evidence that adolescents also seek out friends who are similar to them in terms of smoking (Alexander, Piazza, Mekos, & Valente, 2001; Fisher & Bauman, 1988; Go, Green Jr., Kennedy, Pollard, & Tucker, 2010; Iannotti, Bush, & Weinfurt, 1996; Kobus, 2003). Although one early study of peer smoking behavior found evidence for the equal contribution of influence and selection processes (Ennett & Bauman, 1994), other studies of the coevolution of smoking behavior and friendship networks tend to find more evidence for smoking-based selection. Fisher and Bauman (1988) find that selection effects account for more smoking-related similarity among friends than do influence effects. Hall and Valente (2007) find direct evidence of selection processes and only indirect evidence of influence mechanisms among a cohort of 6–8th graders. Mercken, Snijders, Steglich, Vartiainen, and de Vries (2010b) find that selection processes are stronger than influence processes among European adolescents (Mercken, Snijders, Steglich, Vartiainen, & de Vries, 2010a), though influence processes are evident in some countries (Mercken, Snijders, Steglich, & de Vries, 2009) and among girls in one study (Mercken et al., 2010a).

This study uses recently developed statistical models, which model coevolutionary processes between behaviors and changes in friendship ties, to compare two large high schools in which friendship and behavioral data were collected in an identical

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fashion to explore influence and selection mechanisms with respect to smoking status (smoker/nonsmoker), and the current level of smoking. This study is innovative in three ways. First, the study models current smoking status and smoking level as different facets of smoking behavior worthy of investigation in their own right. Second, the study uses data from students at two large schools taken from a sample of high schools chosen at random from among all high schools in the United States to be part of a nationally representative longitudinal study of adolescent health. The data were collected in the same manner at both schools. Random selection of schools allows us to make qualitative comparisons that other studies have been unable to make. Third, the study applies new models for coevolution of school-based friendship networks and substance use behaviors to investigate influence and selection processes. We hypothesized that influence and selection effects on youth smoking would operate differently at different schools, which we assume have very different social and behavioral contexts.

Methods

Participants

The National Longitudinal Study of Adolescent Health (Add Health) is a nationally representative study of adolescents in grades 7 through 12 in the United States, which began in 1995. The initial sampling frame included all high schools in the United States. More than 90,000 participants from 145 schools were given a basic interview at school. Data from this interview were used to sample 20,745 adolescents aged 12–19 for interviews conducted in their homes between April and December 1995. They were reinterviewed between April and August 1996.

In addition to its longitudinal design, another key element of Add Health is its social network design in which 16 schools were "saturated" (all students in the schools were interviewed) and all respondents were asked to select up to 10 friends. Friends who were members of the same school were identified from a school roster. Respondents completed this friendship nomination process in two follow-up, in-home interviews. The data collection design allows researchers to match individuals in the Add Health study to investigate peer influences on behavior based on direct reports of friends' behaviors. This study continues to be the best and largest source of network and behavior data for investigation of influence and selection processes.

In this study, we focus on the two largest "saturated" schools. The remaining saturated schools were small and saturated as a result of sampling constraints, not by design, and not large enough to be amenable to our modeling approach. For ease of discussion we differentiate these schools based on the prevalence of current smoking in the student body: one has a low prevalence, and the other a high prevalence. These analyses focus exclusively on students entering 10th and 11th grades at Wave I of the data collection. We excluded 12th graders because they were not interviewed at Wave II, and excluded 7–9th graders because of the low prevalence and lower likelihood of current smoking. This led to a sample of 419 students in the school with a high prevalence of smoking, and a sample of 1193 in the school with a low prevalence of smoking.

Measures

For this study we incorporated important demographic variables: grade, gender, race/ethnicity, and parental education as reported in their in-home survey responses. Grade is coded as the specific grade level each student was in at Wave I. Gender is coded as male or female. Race/ethnicity was categorical, based on survey responses. Parental education is based on the highest level of education attained by either parent (parent report) and is coded as 1 = less than high school, 2 = graduate of high school, 3 = some college or trade school, and 4 = graduate of college or university.

Friendship nominations were obtained by asking participants to nominate their five best male and five best female friends. Nominations of students outside of the school were dropped because these students were not consented into the study and therefore were not included in any survey activities. We also flagged students who were, by design, only allowed to nominate one friend (approximately 5% of the sample) and controlled for this in our models.

We investigate changes in smoking behavior based on two variables derived from measures collected at Wave I and Wave II. "Current smoking status" is coded as a dichotomous variable marking any past-month smoking reported at Wave I and Wave II. We use the current smoking variable to determine whether students become current smokers, quit smoking, or maintain their (non)smoker status. The second variable is "current level of smoking." To conform to best practices for SIENA (Simulation Investigation for Empirical Network Analysis) coevolutionary modeling (Ripley & Snijders, 2010), we compute smoking amount as a log transformation of the average number of cigarette smoked per day: 1 – ln ([number of smoking occasions during past 30 days] × [number of cigarettes per occasion] / 30). The frequency is based on a linear interpolation of the seven-category frequency scale presented in the survey, so that smoking amounts were comparable across categories. The transformed values are then rounded to the nearest integer. The transformation and rounding are done to keep the scale between 0 and 10, to smooth the distribution, and to allow for more transitions at the lower end of the scale, where we believe the most important changes are occurring in these data (Miles & Shevlin, 2000). To capture changes in the amount of smoking we calculated this measure at Wave I and Wave II.

Analysis Approach

Stochastic, Actor-Oriented Models

Stochastic, actor-oriented models of the sort estimated with the SIENA package (Snijders, Steglich, Schweinberger, & Huisman, 2007) allow researchers to model relationships between changes in social network structure and individuals' attitudes and behaviors. Technical specifications and general introductions to these models can be found elsewhere (Snijders, 2005, 2006, 2009; Snijders et al., 2007; Steglich, Snijders, & Pearson, 2010). In brief, two conditional models, estimated simultaneously, use structural and behavioral network characteristics to predict whether an adolescent will form or maintain a friendship tie (network model) or change their smoking behavior (behavior model). The network model includes parameters that evaluate the effect of network structure at Wave I on network structure

at Wave II and the effect of individual attributes and behaviors on structure (social selection mechanisms). The behavior model includes parameters that evaluate the effect of behavior (or other individual attributes) at Wave I on behavior at Wave II and the effect of structure on behavior (social influence mechanisms). We apply these coevolutionary models to investigate the relationship between high school friendship networks and two smoking behaviors. The network component of the coevolutionary model estimates the impact of friendship on smoking behavior (influence), whereas the behavior component estimates the impact of smoking behavior on friendship choices (selection). Missing values are replaced by the sample mean, but are not used for parameter estimation (Huisman & Snijders, 2003).

Influence Processes

The influence part of the model allows us to investigate how an adolescent's friends impact their smoking behaviors. Parameters included as controls for behavior change are the tendency for the number of lifetime smokers, current smokers, and the amount of smoking to increase or decrease (current smoking status tendency, and current smoking level tendency), and, for the smoking amount models, the effect of the behavior on itself (smoking level tendency squared) (Ripley & Snijders, 2010). These parameters represent overall, group-level trends toward changes in smoking behaviors. Our interest is in parameters that focus on the direct influence of friends behaviors on adolescents' behavior. To that end, we included two influence parameters in our final models, as applicable, based on established score-test practices for forward model selection (Schweinberger, 2011). The first measures the similarity of an adolescent to their friends, weighted by the total number of friends on current smoking or smoking level (total similarity). The second expresses that an adolescent whose friends have a higher average value on current smoking or smoking level will themselves tend toward higher values for that behavior (average alter). For current smoking and smoking level, the relevant influence parameters varied by school. In the low prevalence school, average alter effects were significant. In the high prevalence school total similarity effects were significant. Only the significant parameters were retained in final models based on both score tests and convergence issues.

Selection Processes

The selection part of the model allows us to investigate how an adolescent's smoking behavior, whether they are a smoker or how much they smoke, affects their choice of friends. The structural parameters outdegree, reciprocity, transitive triplets, direct and indirect ties, and dense triads were included to control for the impact of network structure at Wave I to predict network structure at Wave II. We included nonsmoking behavioral selection parameters to control for role of demographic characteristics in selection of friends (gender, race, grade, and parental education ego, alter, and "same" parameters were included as relevant). We included four smoking-related selection parameters in our models. The first measures whether there is a tendency for those with a given smoking characteristic to make more friendship nominations (the "ego" parameter). The second measures whether those with a given smoking characteristic tend to receive more friendship nominations (the "alter" parameter). The third measures whether there is a tendency for those with similar smoking behaviors to become or remain friends ("same" or "similar" parameters; same for dichotomous measures and similar generally for continuous measures, though confirmed and chosen finally based on score tests and model convergence (Ripley & Snijders, 2010; Schweinberger, 2011). The fourth measures whether there is a tendency for adolescents to reciprocate friendships with others who are similar (or the same) on smoking behavior (similarity/same by reciprocity).

General Data Analysis Plan

For each school, coevolutionary actor-oriented models for each of the smoking-dependent variables (current smoking and smoking amount) were estimated using SIENA software in R (Snijders et al., 2007). Effects were tested for significance by dividing the estimate by the standard error, forming an approximate t ratio (Snijders et al., 2007). Once the final models were estimated, we compared them qualitatively as a basis for discussion of possible reasons for difference in influence and selection processes for current smoking and smoking level.

Results

Descriptive Measures for Schools

Table 1 presents basic descriptive measures for the high and low prevalence schools used in these analyses including sample sizes, average age, racial breakdown, and prevalence of smoking and other risk behaviors. Schools differed markedly in race/ethnic composition and parental education, but varied only slightly on other demographic measures. Table 1 also presents measures associated with behavioral and structural change for the samples used in these analyses. Number of lifetime smokers increased in both schools over time (approximately 5.6% of students initiated between Wave I and Wave II in each school), as did the average number of cigarettes smoked. Average number of relationships reported and number of mutually confirmed friendships all decreased across both schools over time.

Summary of Influence and Selection Models for Initiation and Escalation

Results of the SIENA analyses for both schools, including parameter estimates and standard errors, are presented in Table 2 for current smoking and Table 3 for smoking level. There is evidence of influence and selection in both schools for current smoking and for amount of smoking. However, the specific mechanisms of selection are slightly different across schools (shown in Tables 3 and 4). In the current smoking model for both schools, current smokers tended to form or maintain friendships with other current smokers (positive "same" current smoking parameter). In the smoking level model for both schools, results indicate that adolescents tended to form or maintain friendships with others who smoked at the same level as they did (shown by positive "smoking level similarity" parameters). Results for the high prevalence school showed no evidence that mutual friendships were based on smoking level (shown by a nonsignificant similarity by reciprocity parameter), whereas results for the low prevalence school showed that adolescents were significantly *less likely* to reciprocate friendships based on similar smoking behavior (shown by a significant negative similarity by reciprocity parameter).

Table 1. Descriptive Statistics for Structural and Behavioral Change Variables Among Students in Schools With High Prevalence of Smoking and Low Prevalence of Smoking

Wave 1 variable	High prevalence school	Low prevalence school
Group size	419	1193
Average age	16	16
Male	57%	51%
Race/ethnicity		
White	99%	23%
Black	0%	25%
Hispanic	1%	40%
Asian	1%	33%
Some Other Race	0%	1%
Parent education		
Less than high school	4%	25%
High school	33%	21%
Some college/trade school	35%	29%
Graduate of college/university	29%	19%
Born in United States	99%	72%
Drank alcohol last year	94%	55%
Got drunk past year	52%	28%
Got drunk past month	17%	11%
Daily drinkers last month	2%	1%
Raced car or bike last year	54%	50%
Took a dangerous dare last year	48%	33%
Lied to parents last year	85%	86%
Skipped school last year	37%	46%

	High prevalence school		Low prevalence school	
Variable	Time 1	Time 2	Time 1	Time 2
Average cigarettes per day last month	3.94	4.81	0.66	0.79
Lifetime smoking	71%	77%	57%	63%
Current smoker	50%	48%	21%	23%
Missing nomination data	2%	13%	2%	20%
Average degree	3.4	3.2	2.0	1.8
Number of ties	1401	1038	2311	1409
Mutual dyads	305	240	400	283
Asymmetric dyads	791	558	1511	843

There was evidence for similarity via influence processes in the current smoking and smoking level models. However, as was the case for selection, the specific mechanisms differ slightly across schools (shown in Tables 2 and 3). For the low prevalence school, the likelihood of an adolescent becoming or remaining a current smoker increases if the average number of that adolescents' friends who are current smokers is greater than the average number of current smokers overall. Similarly, the likelihood of becoming or remaining a nonsmoker increases if the average number of an adolescents' friends who are smokers is less than the average number of current smokers overall. This may suggest that local smoking norms are more important in this school than the overall school norm. In the high prevalence school, the likelihood of becoming or remaining a current smoker increases relative to the total number of current smokers among an adolescent's friends and the likelihood of becoming or remaining a nonsmoker increases relative to the total number of friends who are current nonsmokers. This may suggest an additive influence effect in this school where popularity may play a stronger role in impacting smoking behavior.

Regarding smoking level, for the low prevalence school, smoking level increases if smokers among the adolescent's friends smoke more than the overall smoking level average. In the high prevalence school, smoking level increases relative to the level of smoking across all of an adolescent's friends (the number of heavy-smoking friends matters).

Parameters that control for purely structural features of these coevolutionary models are similar across schools. The negative outdegree parameter in the model means that an adolescent is unlikely to form or maintain a tie in the absence of other structural or behavioral features. The positive reciprocity parameter means there is a tendency for an adolescent to form or maintain a tie when it creates a reciprocal relationship. The positive "transitive ties" parameter means there is a tendency for

Table 2. Coevolutionary Current Smoking Status Models

	Current smoking	Low prevalence school		High prevalence school	
	Parameter	Estimate	*SE*	Estimate	*SE*
Structural parameters	Network rate	**7.89**	**0.59**	**15.03**	**0.82**
	Friend flag effect on rate	**–0.74**	**0.28**	–0.29	0.57
	Outdegree	**–5.77**	**0.39**	**–3.63**	**0.07**
	Reciprocity	**2.35**	**0.10**	**2.05**	**0.09**
	Transitive triplets	0.12	0.07	**0.12**	**0.03**
	Transitive ties	**1.39**	**0.15**	**1.17**	**0.09**
Selection parameters	Gender alter	0.02	0.06	0.02	0.06
	Gender ego	0.12	0.06	0.04	0.06
	Same gender	**0.35**	**0.05**	**0.10**	**0.05**
	Same race	**1.18**	**0.06**	n.a.	n.a.
	Grade alter	**0.21**	**0.05**	**0.14**	**0.06**
	Grade ego	**–0.14**	**0.07**	–0.07	0.06
	Same grade	**0.42**	**0.05**	**0.36**	**0.06**
	Friend flag ego	0.22	0.17	**0.48**	**0.23**
	Parental education alter	**0.08**	**0.03**	0.05	0.04
	Parental education ego	**–0.07**	**0.03**	–0.01	0.04
	Parental education similarity	0.18	0.12	**0.42**	**0.14**
	Current smoking alter	0.25	0.21	0.04	0.06
	Current smoking ego	–0.12	0.22	–0.03	0.06
	Same current smoking	**0.82**	**0.39**	**0.17**	**0.05**
Influence parameters	Current smoking rate	**1.25**	**0.22**	**0.87**	**0.14**
	Current smoking tendency	**–1.40**	**0.18**	–0.19	0.20
	Current smoking average alter/total similarity	**4.63**	**1.89**	**0.53**	**0.25**

Note. Significant parameters are in bold.

an adolescent to form or maintain a tie if it increases the number of other adolescents to whom he or she is both directly and indirectly connected to. The positive "transitive triplets" parameter means there is a tendency for adolescents to form or maintain ties that create triads.

Parameters that control for the selection features model are also shown in Tables 2 and 3. The positive, but small, gender similarity effects suggest that there is a slight tendency for an adolescent to form or maintain a tie with another adolescent of the same gender. The positive racial similarity parameter in the more racially diverse (lower prevalence) school suggests that adolescents tend to form or maintain ties with others who have the same race. Because of the racial homogeneity in the higher prevalence school (the school is 99% White), this parameter was not included in final models for this school. The pattern of grade parameters suggests that adolescents in higher grades make fewer nominations and receive more nominations, but also tend to nominate primarily same-grade friends. The friend flag accounts for the accidental limitation on nominations placed on some adolescents in these schools (because of a computer error, some students were only allowed to nominate one male and one female friend). The parental education variables control for socioeconomic status (SES), and differed slightly between schools, with the low prevalence school showing significant ego and alter effects while the high prevalence school showed significant "similarity" effects. That is, in the low prevalence school adolescents with higher SES made fewer, but received more, friendship nominations. In the high prevalence school students with the same SES were likely to become or remain friends.

The behavioral control parameters are shown in Tables 2 and 3 and provide information on smoking behaviors independent of friendship network effects. The negative tendency parameters in the current smoking and smoking amount models suggest movement toward the lower ends of the range of values. That is, adolescents are unlikely to become current smokers or escalate their smoking over time, absent changes in smoking behavior attributable to influence processes in these models. The positive squared tendency effect suggests that in these schools, smoking is self-reinforcing, to be expected with addictive behaviors (Ripley & Snijders, 2010).

Discussion

Overall, these models can be summarized as follows: For current smoking, there is evidence of influence and selection in both schools. There is also evidence of influence and selection in both schools for the level of smoking. There are very small demographic selection effects. Parameters common to all of these coevolutionary models (structural and behavioral features, particularly) share the same sign and magnitude, suggesting general similarity across models. Within schools, structural features are nearly the same, which is expected.

Results from this study indicate that there are a great many similarities across schools and models. We found that influence and selection processes operate for both current smoking and amount of smoking in both schools though there are some slight differences in the exact mechanisms by which influence and

Table 3. Coevolutionary Smoking Frequency Models

	Smoking frequency	Low prevalence school		High prevalence school	
	Parameter	Estimate	*SE*	Estimate	*SE*
Structural parameters	Network rate	**7.91**	**0.44**	**14.76**	**1.38**
	Friend flag effect on rate	**−0.76**	**0.30**	−0.26	0.48
	Outdegree	**−5.30**	**0.13**	**−3.64**	**0.08**
	Reciprocity	**2.62**	**0.20**	**2.18**	**0.15**
	Transitive triplets	**0.14**	**0.07**	**0.12**	**0.04**
	Transitive ties	**1.37**	**0.13**	**1.16**	**0.09**
Selection Parameters	Gender alter	0.02	0.08	0.02	0.06
	Gender ego	**0.12**	**0.06**	0.04	0.06
	Same gender	**0.34**	**0.05**	**0.11**	**0.05**
	Same race	**1.17**	**0.07**	n.a.	n.a.
	Grade alter	**0.21**	**0.06**	**0.13**	**0.06**
	Grade ego	**−0.15**	**0.07**	−0.07	0.07
	Same grade	**0.41**	**0.06**	**0.36**	**0.06**
	Friend flag ego	0.21	0.18	**0.50**	**0.21**
	Parental education alter	**0.08**	**0.04**	0.05	0.04
	Parental education ego	**−0.06**	**0.03**	−0.005	0.04
	Parental education similarity	0.20	0.11	**0.42**	**0.16**
	Smoking level alter	0.12	0.08	**0.14**	**0.05**
	Smoking level ego	−0.06	0.11	0.005	0.05
	Smoking level similarity	**2.63**	**0.82**	**1.54**	**0.34**
	Smoking level similarity × recip.	**−3.90**	**1.84**	−1.29	1.00
Influence parameters	Smoking level rate	**13.86**	**2.21**	**2.81**	**0.34**
	Smoking level tendency	**−1.21**	**0.05**	**−0.53**	**0.08**
	Smoking level tendency squared	**0.14**	**0.01**	**0.23**	**0.04**
	Smoking level average alter/total similarity	**0.21**	**0.06**	**0.96**	**0.30**

Note. Significant parameters are in bold.

selection operate. Our initial ideas regarding the equal contribution of influence and selection mechanisms as the primary factor associated with the propagation of smoking behaviors have been supported, similar to researchers that point out the role of selection (Alexander et al., 2001; Fisher & Bauman, 1988; Go et al., 2010; Iannotti et al., 1996; Kobus, 2003), and slightly counter to those who argue that selection may be more important as a cause of similarities in smoking behavior (Fisher & Bauman, 1988; Hall & Valente, 2007; Mercken et al., 2009; Mercken et al., 2010a, 2010b).

The selection parameters in the smoking amount models suggest that smoking behaviors do have an impact on friendship formation, but perhaps not an overly strong impact as has been reported in other studies (Fisher & Bauman, 1988; Hall & Valente, 2007; Mercken et al., 2009; Mercken et al., 2010a, 2010b). We showed that smokers and nonsmokers tended to stick together, but that in some cases smoking was not a feature on which adolescents based their stronger, mutual ties. In these schools, smoking may, therefore, be a feature that adolescents consider when making friends, but not a feature that they value heavily when developing stronger friendships. There may be other features, such as common interests and activities, which are more important for mutual friendship formation and maintenance. With respect to influence, having friends that are current smokers does influence the probability that a student will become or remain a current smoker (or that a student may become or remain a nonsmoker). Further, the more an adolescent's friends smoke or the more friends they have that smoke, the more they are likely to smoke (or the less they smoke, or the more friends they have that smoke, the more likely they are *not* to smoke). Associating with heavy smokers has a significant influence on an adolescent's smoking behavior. Likewise, associating with nonsmokers has a significant influence on an adolescent's smoking behavior. The addictive properties of tobacco may also contribute to the influence parameters we see in our models and should not be overlooked.

There are three limitations of this study that must be considered in interpreting these results. First, although we controlled for the limit on friendship nominations, the cap on friendship nominations may have affected the models, particularly with respect to levels of mutuality and transitivity, since students may not have had the opportunity to reciprocate all nominations they would have in a free-nomination task. Some adolescents named friends outside of school or friends who did not consent to participate, which also may have affected the models. We do not, however, believe that this limitation affected our overall findings. Second, school joiners and leavers between Wave I and Wave II and missing behavioral data for adolescents may also affect the models, although parameters are estimated with consideration given to missing data and with current imputation techniques (Huisman & Snijders, 2003; Huisman & Steglich, 2008). Third, our study focused only on two schools. Thus, we have little ability to compare the effects of school-level differences in these models other than to report that our final models differed slightly across behavioral outcome and across schools. The design of the study confounded other school differences such as racial composition (although we control for this), geographic region, size, SES, and other community factors.

That said, we believe that the most proximal factor associated with smoking behavior in these schools is the prevalence of the behavior among an adolescent's peers. The differences between influence mechanisms in the school (total similarity vs. average alter parameters) may speak to the importance of the observability of smoking behavior in influence and selection processes. Smoking prevalence, which is a macro-level feature of each school, impacts the likelihood that a child will observe smoking behavior (at the individual, or micro, level) and this may impact the way that influence and selection mechanisms operate in each school. School norms, perceived prevalence, and other "ambient" or "neighborhood" effects may influence the prevalence of smoking in a school (Alexander et al., 2001; Ennett, Flewelling, Lindrooth, & Norton, 1997) and level of smoking within a school environment (among other possible environmental factors) may play an important role in the salience of smoking to peer relationships, and the ways that selection and/or influence are operating. We argue that for selection and influence processes to operate, smoking behaviors must be observable. Blau argues that all other features held equal, there is a higher probability of observing a behavior when that behavior is more prevalent in the population (Blau, 1960). An adolescent cannot choose friends based on whether or not they smoke if there is only the rare opportunity to observe the others' behavior. Friends cannot influence each other to smoke or smoke more unless they can be seen as smokers themselves.

The findings of our study, which may be the first to tease apart the effects of influence and selection across different facets of smoking behavior, suggest that interventions should consider the context-dependent roles of influence and selection processes with respect to current smoking and amount of smoking. For example, interventions might be augmented with modular content specifically formulated to address influence and selection processes separately that could be emphasized differently depending on the features that impact the observability of smoking in a school. Our results suggest, however, that the social context surrounding smoking behaviors is very complex. Further research with more schools will allow us to make stronger, quantitative comparisons to more fully understand the degree to which smoking prevalence (or other possible school-based differences such as substance use policy) affects the social context of substance use and may lead to interventions with higher success rates than those that have been evaluated previously.

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Declaration of Interests

None declared.

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