Ties that Work: The Interaction between Group Assignment Method and a Culturally-relevant Curriculum in the Context of Middle School Anti-tobacco Program

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Abstract

Peer-led programs that employ classroom-based group exercises have been shown to be the most effective in preventing adolescent tobacco use. In addition, health promotion programs that include cultural referents have also been shown to be advantageous. The purpose of this study was to test the interaction between the method by which leaders and peers are assigned to cooperative groups and the cultural relevance of the curricular materials. Sixth-grade students were randomly assigned to one of three group assignment conditions (random, teacher and network) and one of two anti-tobacco curricular programs (universal and culturally-specific). Follow-up data on 1235 7th grade students in 14 schools were used to evaluate the program's effectiveness. Results indicate that the interaction between the network condition and culturally-relevant curriculum most significantly reduced the likelihood of 7th grade smoking (OR = 0.32, p < .01). The primary conclusion is that peer-led health promotion programs not only have to consider the selection of peer leaders and the assignment of students to those leaders, but also the cultural relevance of the curricular materials. This study supports the view that social networks influence behavior and that network-based information along with culturally relevant curricular materials can be used to increase program effectiveness.

Key words: *Health Promotion, Smoking, Adolescents, Social Networks, and Group Dynamics*

Introduction

Tobacco use is the leading preventable cause of death in the United States with an estimated 430,000 deaths attributed to smoking each year.[1] Over the past two decades, many states have responded and mandated that schools implement anti-tobacco programs to reduce this massive health burden. Studies have shown that these programs, typically delivered in middle-school (approximately ages 10-13) when students are most susceptible to smoking initiation, can reduce tobacco use by 25% to 50%.[2] Despite reports of reduced adolescent smoking due, in part, to these programs, few school-based programs fully take advantage of a point made by John Dewey nearly 70 years ago: students learn best when they are connected to the processes and goals of learning.[3]

Many anti-tobacco programs have attempted to partially leverage this principle by using peer leaders in small-group settings to play pivotal roles in their classroom delivery.[4-6] These peer led, interactive programs seem to be more effective than teacher led programs and more effective compared to controls.[7] Current guidelines go as far as to recommend that peer leaders be an integral component of school-based tobacco-prevention programs.[8] There is, however, variation in both how peer leaders are selected and how classmates are, in turn, allocated to peer leaders. If one purpose of these programs is to create classroom-based groups in which students feel connected to those with whom they are working, then the process by which leaders are identified and assigned to groups needs greater attention. Clearly, randomly assigning students to leaders fails to result in groups where the feeling of "connectedness" is shared among all group members.

Moreover, many school-based anti-tobacco programs are similar in both content and form, neglecting the cultural variations present in contemporary middle-school classrooms.[9, 10] These cultural variations shape how curricular materials are received and interpreted. By not attending to ways in which cultural groups are oriented to tobacco use, these curricular materials connect with some better than others. For curricula in any subject area to be effective, it must be tailored in ways that make the material relevant. Connectedness to the curriculum materials also matters.[11]

Although a number of studies have examined the effects of various school-based anti-tobacco programs,[12] relatively few studies have examined the effects of various group assignment strategies under controlled conditions. This applies not only to the literature on anti-tobacco programs, but to the larger literature on the effects of cooperative learning. Though various components of cooperative learning have been extensively studied,[13] there appears to be little empirical work that directly measures the effects of group assignment strategy on desired outcomes. In addition, there have been many studies that have examined the effects of culturally-specific curricular programs, which generally report favorable results.[14] However, there are few that have examined the effects of these programs in the area of health promotion and anti-tobacco programs, in particular. Even fewer have examined the complex interaction between group assignment strategy and culturally-specific programs.

The rationale for this study is informed by two strands of literature: the first, drawing from both sociology and social-psychology, deals with the diffusion and aggregation of group norms; the second is from the field of curriculum theory, which has historically examined both the content and organization of curricular materials.

The use of small groups in classrooms, commonly referred to as cooperative learning, is increasingly accepted as a means through which students produce achievement gains, develop higher order thinking, acquire pro-social attitudes, and as a way for teachers to manage academic heterogeneity. The seminal works of Cohen[15] and Slavin[16] have bolstered this acceptance by demonstrating the positive effects of cooperative learning in various contexts. Bossert[17] in his review of research on cooperative learning went as far as to show that the benefits hold for all students at all age levels, for all subject areas, and for a wide range of tasks, including tasks associated with health promotion programs.

School-based anti-tobacco programs are an especially appropriate venue for small-group instruction as influential peers can serve as key levers in making sure the message "sticks".[18] The fundamental idea is for the message to diffuse across members of small groups and ultimately aggregate into a class-wide normative standard of behavior.[19] The question teachers have struggled with is how to create groups in which the influence of peer leaders is maximized so that their influence reaches their classmates and results in the adoption of desirable attitudes and behaviors.[20] For various reasons, convenience being one, teachers typically identify leaders based on imprecise observations and randomly assign students

to them. Peer leaders are obviously important components of health promotion programs, but the inability to carefully consider the composition of the group inhibits the impact of many curricular interventions.

It is not simply a matter of identifying leaders and relying on their influence to diffuse across the group. The leaders must be valued by those that have been assigned to them, and this value should ideally be consistent across the group. Diffusion is most likely to occur across homogenous groups that are bound together by similar feelings of affinity and admiration.[21] Prior research on diffusion and health behavior has shown a link between leaders and the behavior of the group they represent.[22, 23] In Rogers' early work on diffusion, opinion leaders were found to be early, but not the earliest, adopters of new behaviors.[24] Becker[25] showed that opinion leaders were earlier adopters of behaviors they expected to be widely embraced, but later adopters of behaviors they expected to be met with resistance by the group. Across this literature, leaders consistently adopt behaviors that they expect to be acceptable to the group, and subsequently their own modeling of these behaviors speeds the diffusion of those behaviors throughout the group.[26]

This principle, however, contrasts with conventional teacher wisdom that often prevents peer leaders from working with those who value, trust and/or admire them. Many teachers are understandably averse to creating groups where members get along too well, as this may encourage "off-task" behavior. Moreover, many cooperative learning tasks are intentionally designed to promote interaction across socially-constructed boundaries such as peer groups.[27] So, with this in mind, teachers often resort to either randomization or their own self-knowledge to identify peer leaders and create groups for cooperative tasks.

Attention must not only be given to the identification of peer leaders and student assignment to small groups, curricula must be developed in ways that enable students to relate to what is being taught. Often embedded in health curricula is a set of assumptions about who the students are in terms of their needs, interests and abilities. Though assumptions are necessary and present in curricula across subject areas, they are not necessarily true for all students.[28] Studies have been critical of the inability of curricular materials to consider the unique circumstances and orientations of different racial/ethnic groups. For example, theorists have been vocal about the negative effects of traditional curricula on historically marginalized groups.[29] These concerns, accelerated by the curriculum wars of the 1980s, resulted in schools adopting what came to be known as a multicultural curriculum.[30] A key component of multicultural curricula is that the perspectives of historically marginalized students be integrated with the curricular materials. Though still somewhat controversial, schools nationwide have made a deliberate effort to adopt curricular materials that attend to the increasing diversity in their classrooms. It is argued that these materials better enable students to connect with what is being taught.

Attending to these two conditions, the central research questions are 1) does the effectiveness of an anti-tobacco program vary by the way in which students were assigned to cooperative groups and; 2) is this effect consistent when using a culturally-specific curriculum?

Purpose of the Study

This study is a secondary analysis of data whose primary purpose is to attend to these shortcomings. The data come from 1235 middle school students from 66 classrooms nested in 14 schools who were randomly assigned to one of three group assignment conditions (random, teacher, and network) in 6th grade. The students received either a universal or culturally-specific anti-tobacco program. The interaction between the curriculum and delivery methods on smoking in 7th-grade, one-year after the intervention, was tested. The current study differs from previous analyses of these data by restricting the sample to only those students with complete data (1,235 versus 1,486 in the previous analysis). By focusing on a key period in an adolescent's life, when one is most susceptible to smoking initiation, this study isolates two key predictors that can provide school-based personnel with a set of concrete strategies that can be implemented to optimize the effects of anti-tobacco programs.

Methods

Participants

Sixteen southern California middle schools with at least 25% Hispanic/Latino and/or Asian/Pacific Islander students were recruited in 2001. Of the 1961 students who completed 6th-grade baseline surveys prior to the start of the curriculum, 63% had complete

data at one-year follow-up, leaving a final analytical sample of 1235 students from 14 schools.

In 6th grade, students were randomly assigned to one of three group conditions for the purpose of delivering an anti-tobacco curriculum. Table 1 provides a schematic of the baseline design. Participating schools (comparisons between participating schools and those who refused to participate showed no differences on socio-economic status or academic performance) were matched on ethnic composition and randomly assigned to 1 of 3 curricular conditions: control (no curriculum), a universal curriculum, and a culturally-tailored curriculum. Because control schools did not implement either curriculum (and therefore did not create groups), they were dropped from the analysis.

Instruments and Measures

In 6th and 7th grade participating students were given a survey that captured basic demographic variables, as well as information on other variables such as academic performance, parent's highest level of education, and whether a parent is foreign born.

"Lifetime ever smoking" was used as the outcome variable and was derived from a set of questions on the 7th-grade survey (March 2002). Students who indicated that they have ever tried cigarettes, even a few puffs, and/or reported smoking in the past month were coded as smoking. This measure was chosen because it is linked to progression to regular smoking.[31] This variable is also used as a control based on students' responses to the same set of questions on the baseline survey in grade 6 (March 2001). Table 2 reports the descriptive statistics for all variables used in this analysis.

Complementing these survey data are two key implementation conditions that shaped the way in which students received the program. First is the group assignment condition that was used to create the classroom-based groups in 6th grade. Three methods were compared: 1) random-class leaders defined as those who received the most nominations by students, and groups created by randomly assigning students to leaders; 2) teacher-leaders and groups created by teachers; and 3) network-leaders defined as those who received the most nominations by students, and groups created by assigning students to the leaders they nominated. Peer leader data were collected by asking students, "Think about the 5 people in this class who would make the best leaders for working on group projects. Write up to 5 names on the lines below starting with the best leader on the first line."

As a manipulation check, the average distance between students and their assigned leaders was compared. As expected, classroom-based groups created under the network condition had less steps, hence shorter social distances, (1.83 steps [SD = 1.78]) among group members than did the teacher and random conditions (2.49 steps [SD = 1.78] and 2.55 steps [SD = 2.04] respectively). Specifically, one step means they directly nominated the leader, two steps means the student is assigned to a leader who was nominated by one of his/her nominees, and so on. In this manner, students were assigned to the leaders they nominated, thus recognizing that opinion leadership is a localized phenomenon; opinion leaders are not leaders for all students, but rather are leaders for those who nominate them as leaders. These three conditions resulted in mixed-gendered groups that were distinctly different in terms of their degree of connectedness. There was no other systemic variation in the composition of groups.

The second implementation condition was the type of anti-tobacco curriculum students received. Two programs, a universal program ("Chips") and a culturally-tailored program ("Flavor") were implemented. Both programs used a social influence-based smoking prevention curriculum that consisted of 8, 50-minute sessions, and included an initial session for peer leader training. Before the start of the programs, peer leaders were taught how to organize their groups, how to communicate with students, how to provide positive feedback, and how to encourage cooperation. In addition, the programs used Socratic discussions, role-playing, and games, and the classroom sessions took place once a week for 8 weeks. Also, in both programs students worked with their groups and completed a group project outside of class. The group project - students performed skits with their assigned groups during the last session - was the culminating event for both programs. Because many activities took place in cooperative groups, the composition of groups and the selection of leaders were considered critical elements in determining program effectiveness.

The programs did differ, however, on the degree to which multicultural references were part of the curriculum. The multicultural curriculum, Flavor (Fun Learning About Vitality, Origins and Respect), included cultural referents such as a Wheel of Life collage about health using the Asian yin-yang concept of health as a balanced body, mind and spirit.

In another activity, students acted out a telenovela (soap opera) about the effects of a son's smoking on a Mexican-American family. The comparison curriculum, Chips, presented the same information without these cultural referents.

Both programs were taught by college-aged health educators, usually with the regular classroom teacher in attendance. These health educators received the same university-based preparation and interacted with the students to which they were assigned for the same amount of time. By relying on similarly-trained, college-aged health educators to administer the program, this design limits the varying effects of the regular classroom teacher.

Data Analysis

A two-level hierarchical logistic regression was used to test for group assignment condition and curriculum effects on smoking at 1-year follow-up. Because students are randomly assigned to classes within schools, students are considered to be level-1, and schools are level-2. This approach was used to analyze these effects for three reasons: 1) to account for within-school clustering effects; 2) to allow a multilevel analysis where student and school-level variables could be included in the same model and; 3) to be able to test an interaction that students within certain schools responded to the program differently than students in other schools, regardless of either group assignment condition or curricular type. One of the unique aspects of research on students is that many analyses violate the critical assumption of independence of observations. For example, one student is not independent of other students in the same school. That is, it is likely that students from one school act more like each other when compared to students in another school. Unlike traditional approaches, hierarchical methods can handle this type of clustered data.[32] Analyses were performed using the HGLM procedure for binary data in HLM for Windows, version 6.0.[33]

These analyses include dummy variables for the Flavor curriculum and dummy variables for the network and teacher conditions (Chips and the random condition were referents). Included as controls at level-1 are several demographic variables that have been shown to be associated with smoking including sex, age, race/ethnicity, one or both parent foreign born, having one or both parents as college graduates, and academic performance (self-report).[34] In addition, interaction terms for curriculum (Flavor) and group assignment condition (teacher and network) were constructed to determine if group assignment condition varied by curriculum. All level-1 variables were centered around the grand mean. School-level variables at level-2 include the mean academic performance and percentage of students who reported smoking in 7th grade. Co-variates were estimated using penalized quasi-likelihood (PQL) and include only one random effect, the variability of 7th-grade smoking across schools.

Results

Socio-demographic characteristics are reported in Table 2. At one-year follow-up, most students were 10-11 years old, with 31% being 12 or older. Slightly more girls than boys were included in the study (52% versus 48%). Because the initial sampling frame of schools had been selected to include schools with large numbers of Hispanic/Latino and Asian-American students, the sample was ethnically diverse. Most students were Hispanic/Latino (56%), and the second largest group was Asian-Americans (25%). Most had had at least one parent foreign-born (78%) and less than half (40%) had a parent who was a college graduate. On a 5-point scale, with 5 being the highest, the average academic performance was 4.15. Finally, 9% of students reported smoking in the 6th grade, while 15% reported smoking in the 7th grade.

The school-level variables show that across the 14 schools, the average school reports that 14% of its 7th graders smoked. One school reported a low of 7%, while the school with the highest percentage of smokers reported that close to 1/3 (29%) of its 7th graders smoked. There was little variation reported in the schools' mean grades (mean = 4.17, sd = .21), likely the result of relying on a self-report measure of achievement.

There were some differences in participant characteristics between those with complete data and those lost to follow-up. For example, in 6th grade 53% were males and 56% were Hispanic/Latino. This is slightly different from the 7th grade data reported in Table 2. However, and most importantly, the integrity of the baseline design was preserved as the percentages of students assigned to 1 of 6 conditions (Table 1, bottom row) remained consistent from grades 6 to 7. Therefore, the attrition has a negligible effect on the estimates of the relative effectiveness of the interventions.

Table 3 reports the results of three hierarchical logistic regression models. The first column reports

an unconditional (null) model that serves as a comparative baseline for the subsequent two models. This model shows that the average value of 7th grade smoking across all students is 14%. Note that this typical probability, associated with a school-level random effect of 0, is slightly less than the population-wide estimate of 7th grade smoking, 15% (Table 2). This slight difference is attributable to the nonlinear relationship between the log-odds of 7th grade smoking and the probability of 7th grade smoking.

Table 3, column 2, reports on a model that tests the interaction between curriculum (Chips/Flavor) and the group assignment condition (random/teacher/network) while controlling for variation in socio-demographic characteristics and school-level clustering. In this model, control variables co-varied with the outcome as expected, with those who smoked in 6th grade being over 16 times more likely to smoke in 7th grade (OR = 16.54, $p < .01$). In addition, males and Hispanic/Latinos were more likely to smoke (OR = 1.33 and 1.30, respectively), though both values were just shy of statistical significance. Conversely, Asian-Americans were 41% (OR = 0.59, $p < .05$) less likely to smoke, as were those students with good grades who were 16% less likely to smoke (OR = 0.84, $p < .01$).

Of particular interest are the co-variates that deal with group assignment condition and curriculum type. As hypothesized, the interaction between the network condition and flavor curriculum reduced the likelihood of 7th grade smoking by 69% (OR = 0.31, $p < .01$). Surprisingly, the interaction between the teacher condition and flavor curriculum also significantly reduced the likelihood of smoking by nearly 60% (OR = 0.41, $p < .01$). When entered into the model individually, neither flavor, nor the teacher and network conditions reduced the odds of 7th grade smoking. Though not significant, the positive coefficients indicate that all three variables are associated with an increase in likelihood of 7th grade smoking.

The third model includes two level-2 variables, mean grades and mean 7th grade smoking. The non-significant results suggest an absence of a school-level contextual effect. The interaction terms that were significant in model 2 retained their significance in model 3.

Discussion

Though limitations demand cautious interpretation, the results are promising for health programs in particular, and cooperative learning in general. By attending to both the cultural relevance of curricular materials and the way in which classroom-based groups are constituted, teachers can greatly influence the success of a curricular intervention. The data demonstrate the value of using network information to design a health promotion program. There were no changes made to either curriculum; the only modification was to ask students who they thought would make the best leader and assign them to groups accordingly. Importantly, this condition was compared to the standard in school-based health promotion program, namely, choosing leaders and randomly assigning students to these leaders. These data suggest that randomization may be a less than optimal way to implement health promotion programs. When interacting with a culturally-relevant curriculum, these results also suggest that network data can be used to great advantage. Future interventions may need to investigate whether other network data (e.g., friendship choices) should be included to optimize group assignment.

The interaction between the teacher condition and flavor curriculum was also an effective method. This may have been due, in part, to the study itself. Teachers in the teacher condition were given worksheets to indicate leaders and their groups. This may have prompted teachers to be more deliberate in their selection of leaders and formation of groups. Teacher selection of leaders and groups in general might not always be the most efficacious, but it is more likely to be so when combined with tools that prompt teachers to use their knowledge of who works well with whom in groups. In this study, teachers were not asked what decision rules they used to assign students to groups. Some may have assigned students to leaders whom they knew worked well together, which mimicked the network condition. Others may have constructed groups with the goal of separating more problem-prone students from one another, encouraging students to work with classmates outside their usual peer groups, or distributing high-performing and low-performing students evenly to groups. Further research is needed to understand the nature of teacher-formed groups.

Despite these promising results, there are several limitations that must be considered. First, the outcome of 7th grade smoking was a composite of self-report measures that may not reflect students'

actual behavior. Along these lines, results on self-report data alone may indicate that certain combinations of curriculum and group assignment condition are better than others for "teaching to the test" (i.e., cultivating responses most consistent with the program's aims). Also, the loss of students from two schools in the original 6th grade design limits the variability of level-2 units and may partially explain the lack of significance of the level-2 variables tested in model 3.

The results presented here complement previous findings using data from the same study.[35] Slight differences can be attributed to 1) parsimonious models that include different combinations of co-variates and; 2) the exclusion of certain students who were missing values on these co-variates. Regardless of these differences, the primary conclusion is consistent: the interaction among the selection of peer leaders, the assignment of students to those leaders, and the relevance of curricular materials makes a significant difference in program effectiveness. These are conditions that health educators can readily manipulate in the context of their own classrooms.

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Human Subjects Participation Protection

This study was approved by the institutional review board of the University of Southern California (USC 993037).

References

1. Lynch B, Bonnie R: Growing Up Tobacco Free: Preventing Nicotine Addiction in Children and Youths. Washington D.C.: *National Academy Press*, 1999.

2. Hansen W, Graham J: Preventing alcohol, marijuana, and cigarette use among adolescents: peer pressure resistance training versus establishing conservative norms. *Prev Med* 1991; 20: 414-30.

3. Dewey J: Experience and Education. New York: Kappa Delta Pi, 1938.

4. Wiist W, Snider G: Peer education in friendship cliques: prevention of adolescent smoking. *Health Educ Res* 1991; 6: 101-108.

5. Valente T, Unger J, Ritt-Olson A, Cen S, Johnson C: The interaction of curriculum type and implementation method on 1-year smoking outcomes in a school-based prevention program. *Health Educ Res* 2006; 21(3): 315-24.

6. Valente T, Hoffman B, Ritt-Olson A, Lichtman K, Johnson C: Effects of social-network method for group assignment strategies on peer-led tobacco prevention programs in schools. *Adolesc Health* 2003; 93(11): 1837-1843.

7. Tobler N: Meta-analysis of adolescent drug prevention programs: Results of the 1993 meta-analysis. *NIDA Research Monograph* 1997; 170: 5-69.

8. Centers for Disease Control & Prevention: Guidelines for School Health Programs to Prevent Tobacco Use and Addiction. MMWR Recommendations and Reports: CDC, 1994; 1-18.

9. National Center for Education Statistics: Projections of Education Statistics to 2010. *Educ Stat Quart* 2000; 2(3).

10. Unger J, Chou C-P, Palmer P, et al.: Project FLAVOR: 1-year outcomes of a multicultural, school-based smoking prevention curriculum for adolescents. *Am J Public Health* 2004; 94(2): 263–265.

11. Banks J, McGee-Banks C: *Multicultural Education: Issues and Perspectives*. 5th ed. Hoboken, NJ: John Wiley & Sons, 2005.

12. Dusenbury L, Falco M, Lake A: A review of the evaluation of 47 drug abuse prevention curricula nationally. *J Sch Health* 1997; 67: 127-32.

13. Slavin R: Synthesis of research on cooperative learning. *Educ Leadership* 1991; 48: 71-82.

14. Banks J, McGee-Banks C: *Handbook of Research on Multicultural Education*. Jossey-Bass: San Francisco, 2003.

15. Cohen E: Designing Group Work: Strategies for the Heterogeneous Classroom, 2nd ed. New York: Teachers College Press, 1994.

16. Slavin R: Cooperative Learning: Theory, Research, and Practice, 2nd ed. Boston: Allyn & Bacon, 1995.

17. Bossert S: Cooperative activities in the classroom. *Rev Res in Education* 1988-89; 15: 225-50.

18. Black D, Tobler N, Sciacca J: Peer helping/involvement: an efficacious way to meet the challenge of reducing alcohol, tobacco, and other drug use among youth? *J Sch Health* 1998; 68: 87-93.

19. Valente T: *Network Models of the Diffusion of Innovations*. Cresskill, NJ: Hampton Press, 1995.

20. Gillies R: *Cooperative Learning: Integrating Theory and Practice*. Thousand Oaks, CA: Sage Publications, Inc, 2007.

21. Rogers E, Bhowmik D: Homophily-Heterophily: Relational concepts for communication research. *Public Opinion Quar* 1970; 34(4): 523-38.

22. Valente T, Unger J, Johnson A: Do popular students smoke? The association between popularity and smoking among middle school students. *J Adolesc Health* 2005; 37: 323-329.

23. Valente T, Pumpuang P: Identifying opinion leaders to promote behavior change. *Health Educ Behav* Forthcoming.

24. Rogers E: *Diffusion of Innovations*. New York: The Free Press, 1962.

25. Becker M: Sociometric location and innovativeness: reformulation and extension of the diffusion model. *Amer Soc Rev* 1970; 35: 267-82.

26. Valente T, Davis R: Accelerating the diffusion of innovations using opinion leaders. AAPSS 1999; Vol. 566, The social diffusion of ideas and things: 55-67.

27. Cohen E: Making cooperative learning equitable. *Educ Leadership* 1998; 56(1): 18-21.

28. Beauchamp G: Curriculum theory: meaning, development, and use. *Theory into Practice* 1982; 21(1): 23-27.

29. hooks b: Teaching to Transgress: Education as the Practice of Freedom. London: Routledge, 1994.

30. Cornbleth C, Waugh D: *The Great Speckled Bird: Multicultural and education Policymaking*. New York: St. Martin's/Erlbaum., 1995.

31. Choi W, Pierce J, Gilpin E, Farkas A, Berry C: Which adolescent experimenters progress to established smoking in the United States. *Am J Prev Med* 1997; 13: 385-91.

32. Guo G, Zhao H: Multilevel modeling for binary data. *Ann Rev Soc* 2000; 26: 441-62.

33. Bryk A, Raudenbush S: HLM. 6.0 ed. Lincolnwood, IL: Scientific Software International, 2006.

34. Derzon J, Lipsey M: Predicting tobacco use to age 18: a synthesis of longitudinal research. *Addiction* 1999; 94(7): 295-305.

35. Johnson C, Unger J, Ritt-Olson A, et al.: Smoking prevention for ethnically diverse adolescents: 2-year outcomes of a multicultural, school-based smoking prevention curriculum in Southern California. *Prev Med* 2005; 40(6): 842-852.

Table 1 Data on Schools, Classes and Students Group Assignment*

	Chips Curriculum			Flavor Curriculum			Total
Schools, no.	8			6			14
Group assignment condition	Random	Teacher	Network	Random	Teacher	Network	
Classes, no.	9	10	10	13	12	12	66
Students, no.	234	181	182	220	223	195	1235

* Classes were randomly assigned to the Random, Teacher and Network Group Assignment conditions in the 6th grade. Only those students with complete 6th and 7th grade data are reported.

Table 2 Descriptive Statistics of Level-1 and Level-2 Variables in 7th Grade

Level-1 Descriptive Statistics

Variable Name	N	Mean	sd	Minimum	Maximum
Smoking 6th-grade	1235	0.09	0.29	0.00	1.00
Grades	1235	4.15	0.84	1.00	5.00
Male	1235	0.48	0.50	0.00	1.00
Age 12+	1235	0.31	0.46	0.00	1.00
Hispanic	1235	0.56	0.50	0.00	1.00
Asian	1235	0.25	0.44	0.00	1.00
Parent(s) foreign born	1235	0.78	0.42	0.00	1.00
Parent(s) graduated from college	1235	0.40	0.49	0.00	1.00
Teacher	1235	0.33	0.47	0.00	1.00
Network	1235	0.30	0.46	0.00	1.00
Flavor	1235	0.52	0.50	0.00	1.00
Teacher*Flavor	1235	0.18	0.39	0.00	1.00
Network*Flavor	1235	0.16	0.36	0.00	1.00
Lifetime ever smoked (7th grade)	1235	0.15	0.36	0.00	1.00

Level-2 Descriptive Statistics

Variable Name	J	Mean	sd	Minimum	Maximum
% smoking, 7th grade	14	0.14	0.06	0.07	0.29
Mean Grades, 7th grade	14	4.17	0.21	3.87	4.45

Table 3 Hierarchical Estimates of Level-1 and Level-2 Variables on "lifetime ever smoked."

	Model 1 Unconditional Model			Model 2 Level-1 Predictors			Model 3 Levels-1 & 2 Predictors		
Fixed Effects	Coef. (SE)	Odds Ratio	95% CI	Coef. (SE)	Odds Ratio	95% CI	Coef. (SE)	Odds Ratio	95% CI
Intercept	.139 (.016)			-1.801** (.549)	0.17	(0.05, 0.54)	-4.666 (4.881)	0.010	(0.00, 431.45)
Mean Grades							.556 (1.093)	1.74	(0.16, 19.30)
Mean 7th-grade smoking J							3.918 (3.901) 14	50.31	(0.10, 267628.04)
Smoking 6th-grade				2.806** (0.230)	16.54	(10.54, 25.97)	2.800** (0.231)	16.44	(10.46, 25.84)
Grades				-0.171** (0.103)	0.84	(0.69, 1.03)	-0.172* (0.103)	0.84	(0.69, 1.03)
Male				0.289 (0.182)	1.33	(0.93, 1.91)	0.286 (0.182)	1.33	(0.93, 1.90)
Age 12+				.142 (0.191)	1.15	(0.79, 1.67)	0.143 (0.191)	1.15	(0.79, 1.68)
Hispanic				.260 (0.232)	1.30	(0.82, 2.05)	0.234 (.236)	1.26	(0.80, 2.01)
Asian				-0.530* (0.306)	0.59	(0.32, 1.07)	-0.491 (0.313)	0.61	(0.33, 1.13)
Parent(s) foreign born				-0.190 (0.219)	0.83	(0.54, 1.27)	-0.192 (0.221)	0.82	(0.54, 1.27)
Parent(s) graduated from college				-0.183 (0.832)	0.83	(0.55, 1.25)	-0.163 (0.213)	0.85	(0.56, 1.29)
Teacher				0.517* (1.678)	1.68	(0.91, 3.08)	0.481 (0.313)	1.62	(0.876, 2.99)
Network				0.583* (1.791)	1.79	(0.98, 3.27)	0.559* (0.310)	1.75	(0.95, 3.21)
Flavor				0.478 (1.612)	1.61	(0.79, 3.28)	0.506 (0.370)	1.66	(0.80, 3.42)
Teacher*Flavor				-0.901** (0.406)	0.41	(0.17, 0.95)	-0.860** (0.438)	0.42	(0.18, 1.00)
Network*Flavor				-0.166** (0.311)	0.31	(0.13, 0.76)	-1.146** (0.459)	0.32	(0.13, 0.79)
N	1235			1235			1235		
Random Effects	Std Dev.	Var. Comp.	χ^2	Std Dev.	Var. Comp.	χ^2	Std Dev.	Var. Comp.	χ^2
Intercept	.038	.001	24.222**	.256	.654	12.631	.244	.060	9.650
Dispersion index	.125			.956			.959		

* = p < .05
** = p < .01