Diffusion of Smoking Initiation Among Diverse, Urban American Adolescents Over The High School Period

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BACKGROUND

Acknowledgement

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Social Networks

journal homepage: www.elsevier.com/locate/socnet

Variations in network boundary and type: A study of adolescent peer influences

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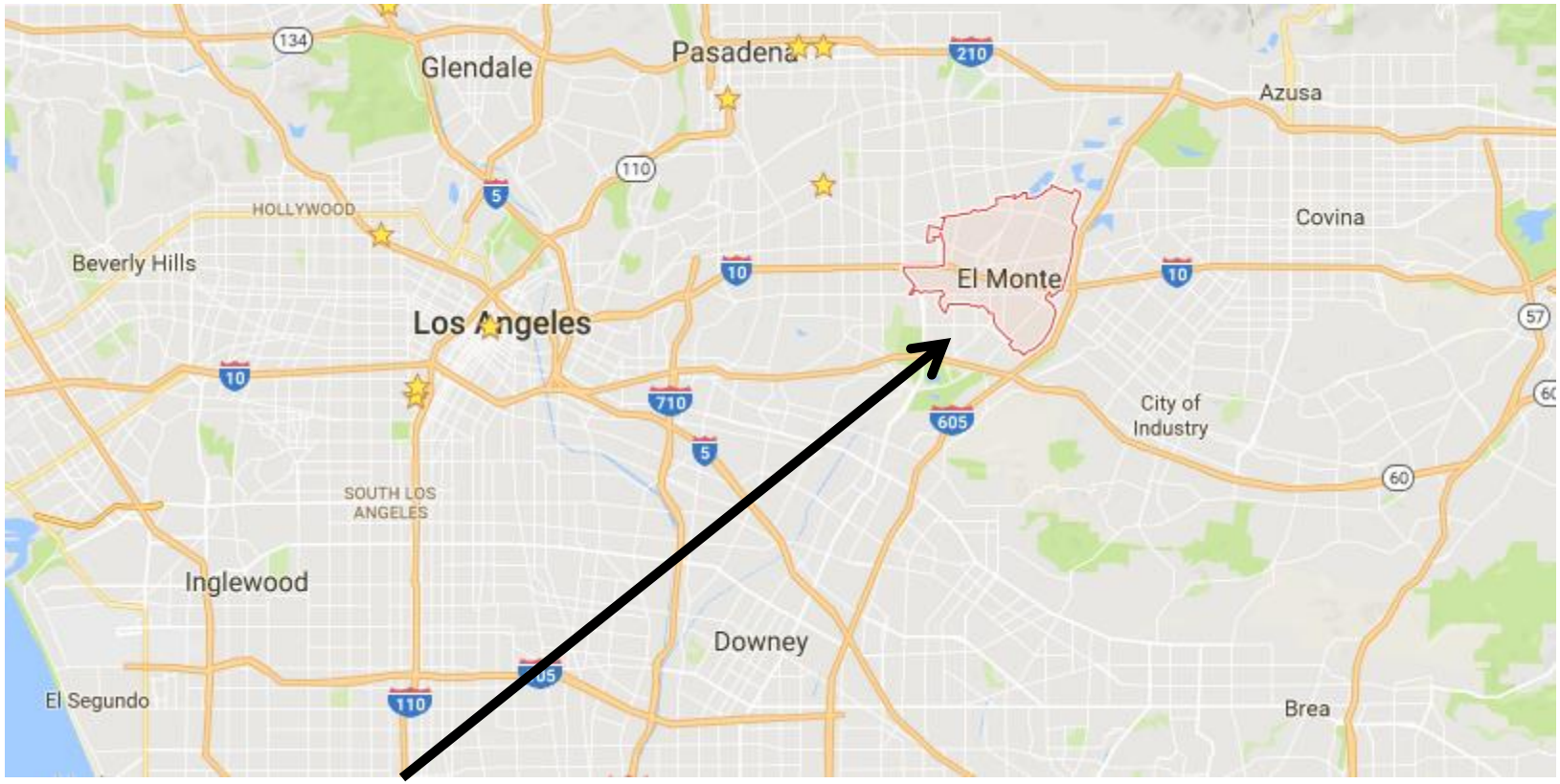
Social Networking Survey

Goal of the SNS Project

- Understand the network effects on risk behaviors such as smoking initiation and substance use.

Los Angeles, California



Study Site
El Monte

HS Boundaries

Grade-level friendship nominations

C. 10th Grade Friends

Now we want to know about your friends **in 10th grade**. Remember, only the researchers at USC will see this information. We won't tell other students, teachers, or anyone who you named.

Please think of your seven BEST FRIENDS in 10th grade. If you don't know their names you can refer to the GRADE ROSTER. Be sure to write your friends' real names and roster ID numbers.

	Friend 1	Friend 2	Friend 3	Friend 4	Friend 5	Friend 6	Friend 7
C1. His/her FIRST NAME AND LAST NAME is:	First Name: Last Name:	First Name: Last Name:	First Name: Last Name:	First Name: Last Name:	First Name: Last Name:	First Name: Last Name:	First Name: Last Name:
C2 Roster ID number	___ ___ ___	___ ___ ___	___ ___ ___	___ ___ ___	___ ___ ___	___ ___ ___	___ ___ ___
C3. How long have you known this friend?	____ years	____ years	____ years	____ years	____ years	___ years	___ years
C4. Does this person live within ½ mile of your house?	Yes 1 / No 2	Yes 1 / No 2	Yes 1 / No 2	Yes 1 / No 2	Yes 1 / No 2	Yes 1 / No 2	Yes 1 / No 2
C5. On a scale from one to five, How close do you feel to this person? (1=not close 5=very close)	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

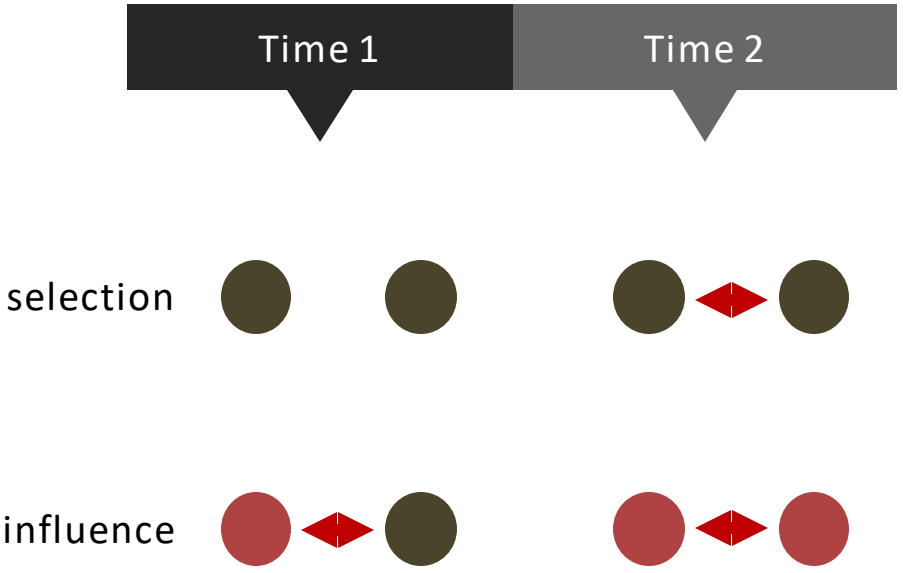
Background

Adolescent Smoking

- Cigarette smoking initiation: predictors and negative consequences
- Evidence of peer influence on smoking initiation and maintenance, but
  - over relatively short time periods
  - little research among at-risk, and diverse populations
- Need to understand how friends influence smoking initiation among **at-risk** and **diverse populations**, and **across risky developmental stages** (high school), to inform peer-based interventions to prevent the onset of smoking

Aims of this Study

- Determine if smoking initiation diffuses through friendship networks of diverse youth, over the high school period
  - selection: do students select friends based on a) friend's lifetime smoking, b) similarities in lifetime smoking and c) other correlated variables?
  - influence: do friend norms for lifetime smoking (average lifetime smoking) predict smoking initiation?



Methods

- Procedure:
  - 4 high schools from one LA County neighborhood
  - surveyed at 4 time points at ~1 year intervals from 2010 (Fall) to 2013 (Spring)
- Participants
  - Grade 10 students (N=1,425) from 4 high schools
- Measures
  - Lifetime smoking: 1= Has ever tried cigarette smoking
  - Past month smoking
  - Friendship networks: up to 19 best and close friend nominations in their school grade
- Covariates:
  - gender, race and ethnicity (Hispanic), school grades, socio-economic status (parents own their own home, receive free lunch)
- Analytic strategy:
  - RSiena (stochastic actor-oriented models)
  - Probit and IV Probit models

Descriptive Statistics

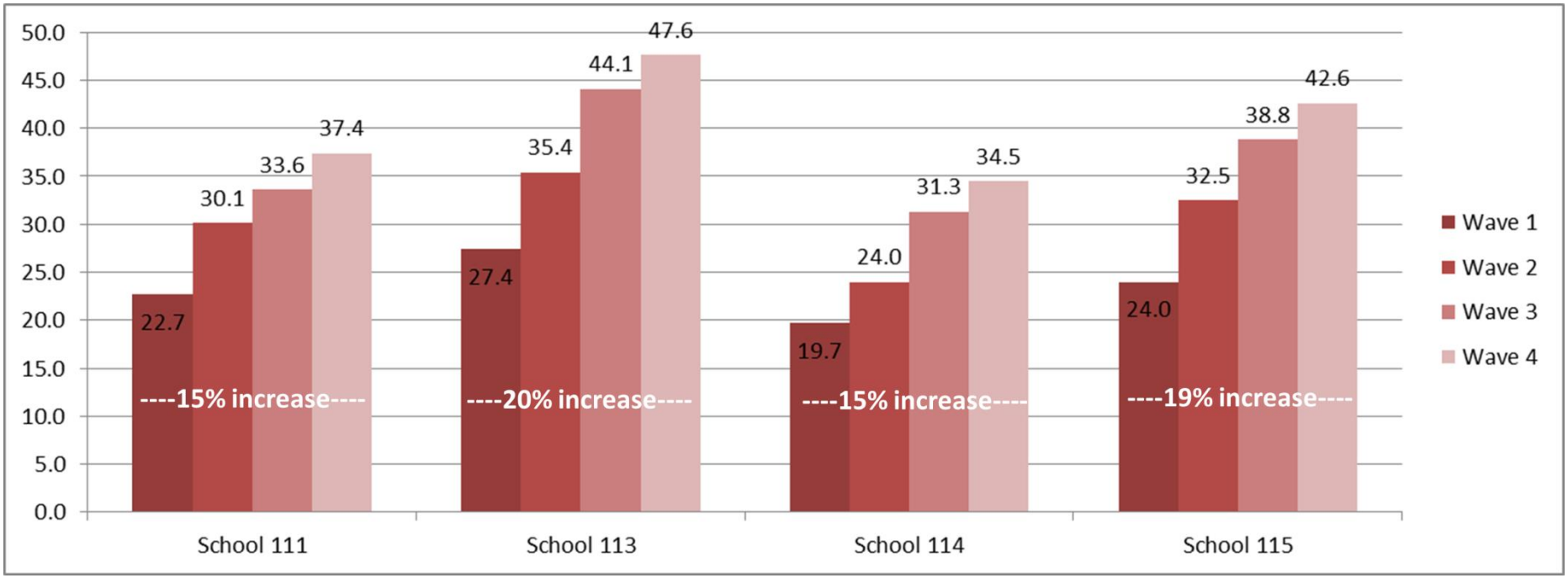
Baseline descriptive statistics

	School 111	School 113	School 114	School 115
	(N = 449)	(N = 288)	(N = 371)	(N = 317)
Characteristics	Mean (SD)/n (%)	Mean (SD)/n (%)	Mean (SD)/n (%)	Mean (SD)/n (%)
Age	15.1 (0.4)	15.0 (0.3)	15.1 (0.5)	15.0 (0.4)
Female	235 (52.3%)	158 (54.9%)	173 (46.6%)	163 (51.4%)
Race/ethnicity (%)				
Hispanic	318 (70.8%)	269 (93.4%)	198 (53.4%)	304 (95.6%)
Socio-Economic Status				
Own Home	226 (50.4%)	76 (26.4%)	195 (52.6%)	141 (44.5%)
Mean Academic Grades[a]	3.7 (1.0)	3.5 (0.9)	3.7 (1.0)	3.6 (1.0)

[a]Academic Grades: 5=A, 4=B, 3=C, 2=D & 1=F

Descriptive Statistics

% Lifetime cigarette use



N = 449 N = 228 N = 371 N = 317

Descriptive Statistics

Social Networks

	School 111 (n=449)				School 113 (n=288)				School 114 (n=371)				School 115 (n=317)			
Characteristic	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4
% Missing	1.7%	2.2%	33.3%	0.0%	2.8%	3.6%	26.2%	0.0%	0.3%	5.2%	15.8%	0.0%	2.1%	5.5%	18.1%	0.0%
M friends	5.7	4.9	3.4	2.3	4.3	4.0	5.3	3.9	5.5	5.6	5.6	3.2	6.4	6.1	5.2	2.2
Max outdegree	19	18	16	17	18	19	19	19	19	19	19	18	18	18	17	10
Reciprocity index	0.4	0.3	0.3	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.4	0.5

	School 111			School 113			School 114			School 115		
Characteristic	P1	P2	P3	P1	P2	P3	P1	P2	P3	P1	P2	P3
% Stable ties	27%	19%	19%	30%	25%	26%	33%	27%	26%	26%	21%	18%
% New ties	32%	44%	26%	33%	53%	27%	36%	39%	22%	37%	42%	25%
% Dissolved ties	41%	38%	55%	37%	22%	47%	32%	35%	53%	36%	37%	57%
Joiners	0	31	0	0	38	0	0	27	0	0	25	0
Leavers	0	80	106	0	21	64	0	23	85	0	41	105
Jaccard	0.27	0.19	0.19	0.30	0.25	0.26	0.33	0.27	0.26	0.26	0.21	0.18

PRELIMINARY FINDINGS

Preliminary Findings: SIENA

Friendship selection and influence effects for Lifetime Smoking

Model parameter	School 111 PE (SE)	School 113 PE (SE)	School 114 PE (SE)	School 115 PE (SE)
Friendship network dynamics				
Ego smoking	0.03 (0.03)	-0.01 (0.04)	-0.05 (0.06)	0.02 (0.04)
Alter smoking	0.14 (0.04)**	-0.10 (0.04)*	0.09 (0.04)*	0.08 (0.04)
Same smoking	0.07 (0.04)	0.02 (0.05)	0.09 (0.05)	0.04 (0.05)
Smoking initiation dynamics				
Average Exposure to friends' smoking	2.58 (1.23)*	0.52 (1.62)	2.75 (1.19)*	2.92 (1.35)*

** $p<.01$, * $p<.05$, + $p<.10$

Smokers become *more* popular in School 111, 114, and 115 and *less* popular in School 113

Students are more likely to initiate smoking if their friends have ever smoked in 3 of 4 schools (not School 113)

Model parameter	School 111	School 113	School 114	School 115
Friendship network dynamics				
Ego smoking				
Alter smoking	+	-	+	+
Same smoking				
Effects of covariates				
Female ego				
Female alter	-	-		-
Female same	+	+	+	+
Hispanic ego				
Hispanic alter		-	-	-
Hispanic same	+	+	+	+
Academic grades ego				
Academic grades alter	+	+	+	+
Academic grades similarity	+	+	+	+
Own home ego				
Own home alter				+
Own home same				+
Same class	+	+	+	+
Smoking initiation dynamics				
Average Exposure to friends' smoking	+		+	+
Covariates				
Female				-
Academic grades	-			

+ positive effect, where p < .05

- negative effect, where p < .05

'Smokers' become *more* popular in School 111, 114, 115
'Smokers' become *less* popular in School 113

Girls are less popular than boys in 3 of 4 schools

Students befriend same-sex students in all schools

Hispanic students are less popular in 3 of 4 schools

Hispanic students befriend each other in all schools

Students with higher grades become more popular in all schools

Students befriend peers with similar grades in all schools

Students with higher SES are more popular in 1 school

Students befriend peers with similar SES in 1 school

Students befriend peers who are in their class

Students are more likely to initiate smoking if their friends have ever smoked in 3 of 4 schools

Females are less likely than males to initiate smoking in S 115

Students with lower grades are more likely to initiate smoking in school 111

Preliminary Findings: Probit

Contemporaneous Exposure

VARIABLES	All schools	111	113	114	115
Exposure	0.548	0.0140	-0.0530	**1.583*** **	0.616
	(0.378)	(0.502)	(0.577)	(0.525)	(0.476)
free_lunch	0.214	0.466	4.038	-0.126	0.422
	(0.201)	(0.502)	(1,074)	(0.373)	(0.617)
own_home	0.0311	0.0192	-0.102	0.0357	0.138
	(0.0480)	(0.260)	(0.369)	(0.284)	(0.265)
female	-0.0219	-0.0353	-0.275	0.110	0.0319
	(0.0586)	(0.264)	(0.311)	(0.272)	(0.269)
grades	**-0.158*** **	-0.241	-0.226	-0.0326	-0.0625
	(0.0461)	(0.165)	(0.219)	(0.198)	(0.188)
Constant	-6.018***	-5.474	-8.938	-6.609	-6.258
	(0.237)	(218.0)	(1,105)	(199.5)	(249.6)
Observations	**1,496**	**449**	**284**	**412**	**351**

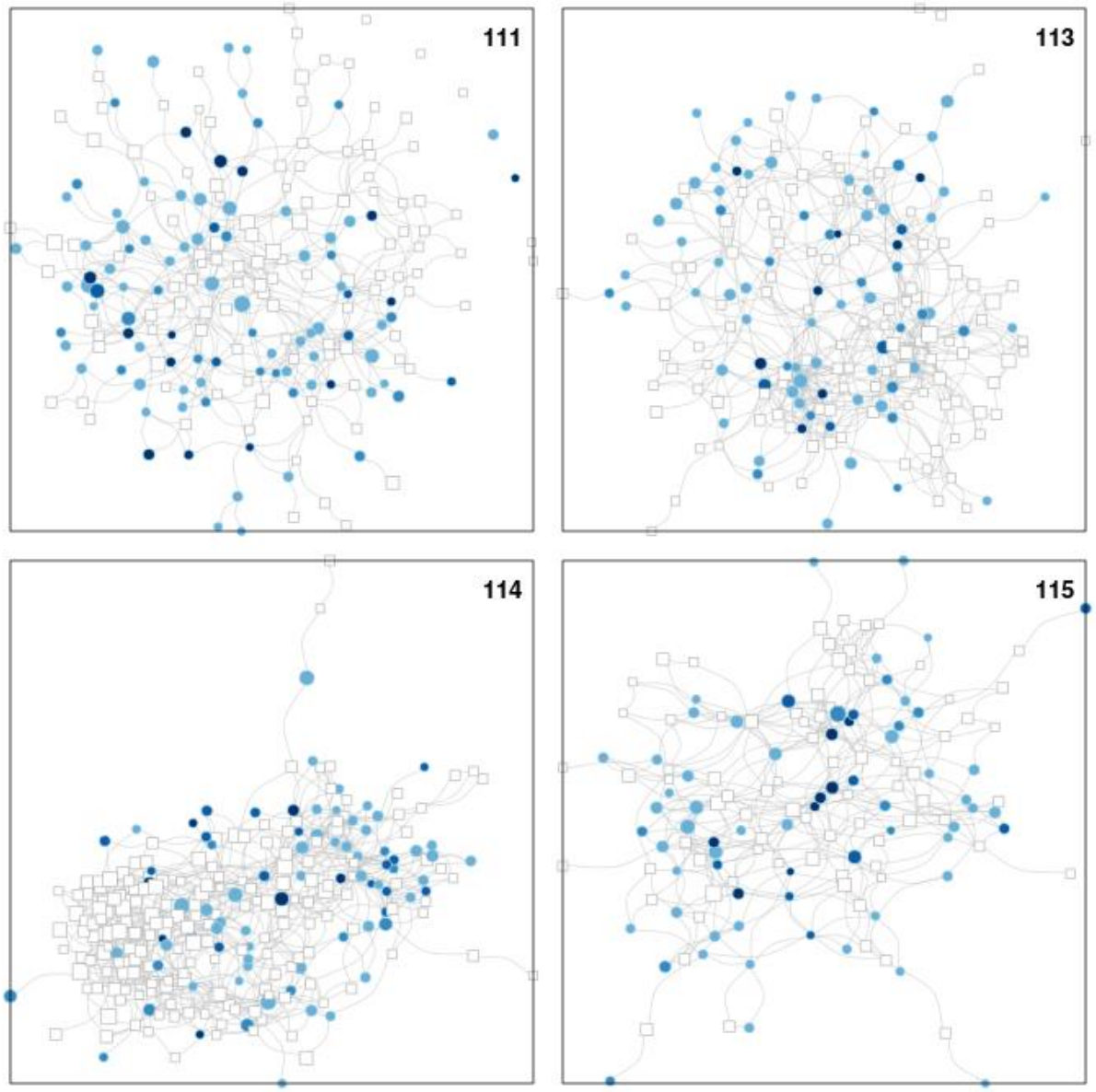
Robust standard errors in parentheses. Fixed effects per school are not reported.
*** p<0.01, ** p<0.05, * p<0.1

Preliminary Findings: IV Probit

Instruments for Exposure: Hispanic

VARIABLES	All schools	111	113	114	115
Exposure	0.666	-1.161	-0	1.992	-3.304
	(1.337)	(2.060)	(10.59)	(2.561)	(6.500)
free_lunch	0.217	0.465	0	-0.122	-0.0153
	(0.262)	(0.501)	(3.095)	(0.374)	(0.972)
own_home	0.0319	0.00134	0.0933	0.0423	0.171
	(0.139)	(0.265)	(1.019)	(0.287)	(0.291)
female	-0.0223	-0.0233	-0.386	0.119	-0.0969
	(0.132)	(0.267)	(1.179)	(0.278)	(0.360)
grades	-0.149	-0.331	-0.183	0.0161	-0.205
	(0.134)	(0.228)	(0.822)	(0.358)	(0.311)
Constant	-1.085	-0.195	0.368	-1.424	0.223
	(0.802)	(1.316)	(5.910)	(1.983)	(3.233)
Observations	**1,496**	**449**	**284**	**412**	**351**

Robust standard errors in parentheses. Fixed effects per school are not reported.
*** p<0.01, ** p<0.05, * p<0.1


111
113
114
115

Discussion

- Strong evidence in the SIENA models that smoking initiation diffused through the friendship networks in 3 schools (111, 114, and 115): the schools where lifetime smoking was associated with popularity (i.e., where having tried smoking was "cool")
  - When trying smoking is associated with higher social status, students may be more motivated to adopt the behavior if it is the norm among their friends
- There is no evidence that smoking diffused through the friendship network in School 113:
  - the only school where smoking was associated with a *decrease* in popularity (i.e., where having tried smoking was "uncool")
  - the school with the highest rates of lifetime smoking rates at baseline (27%) and follow up (48%), perhaps making this behavior less novel/important to social status
- Same neighborhood and demographics, but local school context matters.
- Overall, if smoking not "the norm" at school and is linked to high social status, social influence processes may be stronger.

Discussion (cont.)

- Power: Opted to retain participants with some missing data, to avoid biasing the sample. But analyses may be underpowered.
  - Furthermore, we only observe small number of individuals who initiate smoking behavior, which may not be enough to identify our models.
- On the other hand, while the Probit model supports SIENA, the IV Probit does not, but:
  - Our instrument variable is not continuous, and
  - MLEs (which we didn't show) and Two-step estimators show the analysis not to be robust (no consistency between to two of them).

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Thanks!