Online Appendix to
Nash Equilibria on (Un)Stable Networks

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Contents

A Implementation details

This appendix contains details about the data, the sample construction, the parametrization of the model and the estimation. The website `www.antonbadev.net/neks` contains additional details including the implementation code.

A.1 Add Health Data

This research uses data from Add Health, a program project directed by Kathleen Mullan Harris and designed by J. Richard Udry, Peter S. Bearman, and Kathleen Mullan Harris at the University of North Carolina at Chapel Hill, and funded by grant P01-HD31921 from the Eunice Kennedy Shriver National Institute of Child Health and Human Development, with cooperative funding from 23 other federal agencies and foundations. Special acknowledgment is due Ronald R. Rindfuss and Barbara Entwisle for assistance in the original design. Information on how to obtain the Add Health data files is available on the Add Health website (http://www.cpc.unc.edu/addhealth). No direct support was received from grant P01-HD31921 for this analysis.

A.2 Sample selection and sample statistics

This research uses data from Wave I of Add Health. The in-home questionnaire contains 44 sections collecting a wide array of information about adolescents. In particular, the data contain information about adolescents' friendship networks. Each respondent is asked to nominate up to five of her best male and female friends. If individual A nominates individual B as a friend, this does not imply that B nominates A. Because in the proposed model a friendship nomination involves *consent*, a friendship presumes that both individuals have nominated each other as friends.[1]

In addition to the friendship network data, I use demographic data for the adolescents (age, gender, grade, and race), for their home environments (presence of smoker in the household, pupil's income and allowances, and mother's education), and data for their

[1] In addition to the in-home interview from Wave I, data on friendship are available from the in-school and Wave III interviews. However, the in-school questionnaire itself does not provide information on important dimensions of an individual's socio-economic and home environment, such as student allowances, parental education, and parental smoking behaviors. On the other hand, during the collection of the Wave III data, the respondents were not in high school any more. For more details on Add Health research design, see `www.cpc.unc.edu/projects/addhealth/design`

smoking behavior. The adolescent's smoking status is deduced from the question, "During the past 30 days, on how many days did you smoke cigarettes?" and if the answer was one or more days, the student's smoking status is set to positive. Because all of the students in the saturated sample were eligible for in-home interview, I have detailed information about student friends as well.

As pointed earlier the schools from the saturated sample (16 schools out of 80) were illegible for exhaustive survey. Since the size of the schools from this sample ranges from 20 to more than 1500, the smallest and the largest schools are dropped. Also, a special needs school is dropped for having atypical smoking and friendship patterns. After this still the largest school in the sample enrolls more than 4 times more students compared to the second largest. To maintain sample observations of comparable size (each school is an observation), this school is split into grades 9, 10, 11, and 12 and, for this school, each grade is treated as a separate network.[2] Finally, schools with fewer than 100 students are discarded because such large schools are likely to be very different than the rest.[3] Table 8 shows selected descriptive statistics for the estimation sample.

Table 1: Descriptive Statistics for the estimation sample

	Overall	Min	Max	Median
Students	1342	110	234	162
Smoking	0.41	0.12	0.54	0.44
Male	0.52	0.41	0.58	0.53
Whites	0.92	0.42	0.99	0.98
Blacks	0.05	0.00	0.45	0.00
As-Hi-Ot	0.03	0.00	0.13	0.02
Price	164.99	137.31	220.09	160.06
Avg income	83.90	47.25	145.85	71.55
Mom edu	0.73	0.56	0.84	0.74
HH smokes	0.48	0.25	0.61	0.51
Num friends	0.97	0.29	1.53	0.88

Note: The final sample contains students from 8 high schools. Min, max, and median are reported at a school level.

[2]Less than 20% of the friendships are inter-grade so that this split does not affect substantially the friendship network.

[3]Indeed, schools with fewer than 100 students feature very few friendships (median number of friendships 0.6) and very low smoking rates (median smoking 0.09).

A.3 Parametrization and re-parametrizations

For the empirical specifications selected parameters in (1) and (3) are functions of the data. In particular, the utility of smoking is

$$\begin{aligned} v(X_i) &= v_0 + v_{price} p_i && (1)\\ &\quad + v_{hhsmokes}\chi(HHS_i) + v_{momeduc}\chi(MOMEDUC_i) && (2)\\ &\quad + v_{black}\chi(BLACK_i) + v_{grade9+}\chi(GRADE9P_i) && (3) \end{aligned}$$

and the utility of friendship is

$$\begin{aligned} w(X_i, X_j) &= w_0 + w_{sex}\chi(sex_i \neq sex_j) && (4)\\ &\quad + w_{grade}\chi(grade_i \neq grade_j) + w_{race}\chi(race_i \neq race_j) && (5) \end{aligned}$$

Also, there is a term $q_{ijk}g_{ij}g_{jk}g_{ki}$ in which $q_{ijk} = q(X_i, X_j, X_k) = q\chi(grade_i > 9)\chi(grade_j > 9)\chi(grade_k > 9)$. In addition to the above 11 parameters, there are the externalities' parameters ϕ, ϕ_S, and ϕ_N.

In table 9, the parameters have been transformed for ease of interpretation as follows. Instead of v_0, I report the baseline probability of smoking $\theta_1 = \frac{e^{v_0}}{1+e^{v_0}} \in [0,1]$. Next, the baseline number of friends is $\theta_8 = (n-1)\frac{e^{w_0}}{1+e^{w_0}} \in [0, n-1]$ where n is the size of the network. Also some parameters have been re-parametrized as marginal probabilities in ppt (in table 9 indicated as MP) or as relative marginal probabilities in pct (in table 9 indicated as $MP\%$). For example:[4]

$$\frac{e^{v_0+v_{hhsmokes}}}{1+e^{v_0+v_{hhsmokes}}} - \frac{e^{v_0}}{1+e^{v_0}} = \theta_3 \quad (6)$$

$$\frac{e^{w_0+w_{diffsex}}}{1+e^{w_0+w_{diffsex}}} : \frac{e^{w_0}}{1+e^{w_0}} = 1+\theta_9 \quad (7)$$

A.4 Priors and Markov chain parameters

All priors are set to normal distributions with parameters displayed in table 2. The other parameters of the algorithm from table 1 are as following. The size of the posterior sample is $T = 10^5$ from which the first 20% are discarded. The size of the interior loop, from steps $4-12$, is $R = 10^3$ for each network. The proposal for θ' in step 2 is a random walk. The

[4]Note that the reparametrization is bijective so that it does not affect the estimation.

Table 2: Parameters of the prior distributions

	Utility of smoking				
	Parameter	Prior mean	Prior StD	Posterior mean (median)	90% Credible set
1	Baseline probability of smoking	0.20	0.10	0.18 (0.14)	[0.15, 0.22]
2	Price $\times 100$	-0.50	1.00	-0.24 (-0.61)	[-0.48, -0.01]
3	Mom edu (HS&CO)^{MP}	-0.05	0.05	-0.05 (-0.07)	[-0.07, -0.03]
4	HH smokes	0.10	0.10	0.14 (0.09)	[0.11, 0.17]
5	Grade 9+^{MP}	0.20	0.20	0.16 (0.08)	[0.11, 0.20]
6	Blacks^{MP}	-0.20	0.20	-0.31 (-0.38)	[-0.37, -0.26]
7	30% of the school smokes^{MP}	0.05	0.10	0.05 (0.01)	[0.03, 0.08]
	Utility of friendships				
	Parameter	Prior mean	Prior StD	Posterior mean (median)	90% Credible set
8	Baseline number of friends	3.00	2.00	3.40 (2.70)	[2.88, 3.88]
9	Different sex$^{MP\%}$	-0.70	0.50	-0.72 (-0.80)	[-0.77, -0.66]
10	Different grades$^{MP\%}$	-0.70	0.50	-0.89 (-0.93)	[-0.92, -0.86]
11	Different race$^{MP\%}$	-0.50	0.50	-0.39 (-0.61)	[-0.56, -0.24]
12	Cost/Economy of scale	0.00	0.50	-0.22 (-0.25)	[-0.24, -0.19]
13	Triangles$^{MP\%}$	0.00	2.00	1.22 (0.91)	[0.98, 1.45]
14	ϕ^{MP}_{smoke}	0.05	0.05	0.05 (0.03)	[0.04, 0.06]
15	$\phi^{MP}_{nosmoke}$	0.05	0.05	0.04 (0.03)	[0.03, 0.05]

Note: All prior distributions are normals.

process k is a mixture of two processes: with 75% k is small, i.e. $k = 2$ and with 25% it is drawn from discrete uniform on $\{2, \ldots, n-1\}$. Once k is fixed, the state S' in step 8 is drawn from uniform in the permissible neighborhood. In addition, with small probability (0.05) a large step is proposed where $S' = 1 - S$ and $A' = 1 - A$.

A.5 Model fit

Table 11 compares statistics from the data to statistics from a sample generated with the estimated model. This is a sample of size 1000 where each draw is generated via a long-run ($20,000$ draws) of the kCD with random utility parametrized with a draw from the posterior. In addition to statistics that are directly targeted by the model's parameters (overall prevalence, density, and average degree), statistics which are only indirectly governed by model's parameters are reported in tables 11 and 12, e.g. maximum degree, certain

Table 3: Model fit

Selected moments		
Moment	Model	Data
Prevalence	0.410 (0.408)	0.408
Density	0.007 (0.005)	0.005
Avg degree	1.250 (0.966)	0.973
Min degree	0.275 (0.000)	0.000
Max degree	4.808 (4.568)	5.308
$a_i g_{ij} a_j / n$	0.543 (0.253)	0.256
$(1 - a_i) g_{ij} (1 - a_j) / n$	0.400 (0.396)	0.404
Two-paths/n	0.639 (0.490)	0.501
Triangles/n	7.686 (0.023)	0.066
Mixing patterns		
HI	0.239 (0.231)	0.236
CHI	-0.300 (-0.299)	-0.303
FSI	0.665 (0.667)	0.662

Note: Columns Data and Model compare selected moments of the estimation sample with those of synthetic data generated by the estimated model. For the latter mean and median are reported (median in parentheses). Two-paths is defined as $\sum_{i>j} g_{ij} g_{il} (1 - g_{il})$. Triangles is defined as $\sum_{i>j>l} g_{ij} g_{il} g_{il}$. The Homophily index (HI), Coleman homophily index (CHI), and Freeman segregation index (FSI) are measures of the mixing patterns between students with the same smoking statuses (see also table 12). For more details about computing those indices, see Currarini et al. (2010) Definitions 1 and 2 in the supplemental appendix.

Table 4: Fit mixing matrix (model left, data right)

		Nominee		*Nominee*	
		Smoker	Nonsmoker	Smoker	Nonsmoker
Nominator	Smoker	**65% (56.6)**	35% (30.1)	**63% (52.1)**	37% (30.4)
	Nonsmoker	29% (30.1)	**71% (74.0)**	29% (30.4)	**71% (75.4)**

friendship configurations, mixing etc.

Overall the model fits well the smoking decisions and the network features of the data. The only caveat is the number of triangles as fraction of the size of the network which in the data is 0.066 while the draws from the model are right-skewed (i.e., have a long tail to the right) with mean of 10.4 and median of 0.023. This is due to the presence of very few draws with very densely connected networks. The most likely reason for this discrepancy is that in the model triangles are generated only via a single parameter which does not depend on observables, i.e. race, sex etc. This parsimonious specification is dictated by the small sample size and further exploration of this feature is left for the future.

B Background on tobacco smoking

Tobacco is the single greatest preventable cause of death in the world today.[5] In the United States alone, cigarette smoking causes approximately $443,000$ deaths each year (accounting for one in every five deaths) and imposes an economic burden of more than $193 billion a year in health care costs and loss of productivity. Approximately 1 million young people under 18 years of age start smoking each year; about 80% of adults who are smokers started smoking before they were 18 (Kessler et al., 1996; Liang et al., 2001). Despite an overall decline in smoking prevalence from 2005 to 2010, when the percentage of current smokers decreased from 20.9% to 19.3%, the reduction in teen smoking has been less pronounced. In fact, the proportions of 8th and 10th graders who smoke increased slightly in 2010. As with many human behaviors, social interactions (peer influence) have often been pointed to as a major driving force behind adolescent smoking choices.

C Additional plots and tests

[5]The World Health Organization, *Report on the Global Tobacco Epidemic* (2008). The statistics for the U.S. are compiled from reports by the Surgeon General (2010), National Center for Health Statistics (2011), and Monitoring the Future (2011).

Table 5: Pairwise tests of the posteriors for the price parameter under different estimation scenarios

Estimation scenarios	Model	Fixed net	No net data	No PE	No tri	No cost
Model	1.00 (1.00)					
Exog net	0.00 (0.00)	1.00 (1.00)				
No net data	0.00 (0.00)	0.00 (0.00)	1.00 (1.00)			
No PE	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.00 (1.00)		

Note: Each cell compares the posterior distribution of the parameter price between a pair of estimation scenarios. The two p-values are from testing a hypothesis of equal means and from testing a hypothesis of equal distributions (two-sample Kolmogorov-Smirnov test).

Table 6: Pairwise tests of the policy effects for different levels of price change

Policy level (dP)	20	40	60	80	100	120
20	1.00 (1.00)					
40	0.00 (0.00)	1.00 (1.00)				
60	0.00 (0.00)	0.00 (0.00)	1.00 (1.00)			
80	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.00 (1.00)		
100	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.00 (1.00)	
120	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.00 (1.00)

Note: Each cell compares the policy effects for a pair of price changes. The two p-values are from testing a hypothesis of equal means and from testing a hypothesis of equal distributions (two-sample Kolmogorov-Smirnov test).

D Alternative specification log income/allowances

This appendix replicates the empirical analysis with an alternative specification where the price of tobacco is substituted with log income.

D.1 Sample statistics

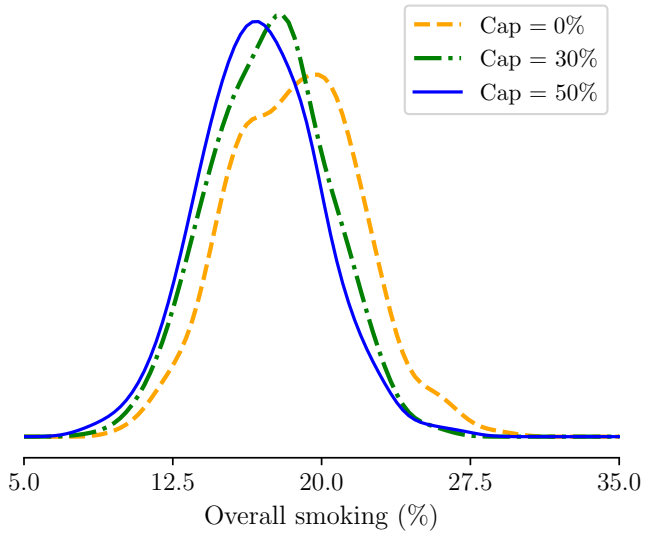
The estimation sample is based on the Saturated sample from the National Longitudinal study of Adolescent Health. The largest and the smallest schools are excluded from the sample. In addition, schools with total number of students below 100 are excluded. Further to ensure size comparability between schools, the larges school (SCID 058) is split into four school grades of approximately 200 students. This is important because the asymptomatic

Table 7: Pairwise tests of the response of the overall smoking to same-race caps

Same-race cap (%)	0	10	20	30	40	50
0	1.00 (1.00)					
10	0.00 (0.00)	1.00 (1.00)				
20	0.00 (0.00)	0.00 (0.00)	1.00 (1.00)			
30	0.00 (0.00)	0.00 (0.00)	0.62 (0.98)	1.00 (1.00)		
40	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.00 (1.00)	
50	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.69 (0.69)	1.00 (1.00)

Note: Each cell examines the change in overall prevelance between a pair of scenarios (same-race caps). The two p-values are from testing a hypothesis of equal means and from testing a hypothesis of equal distributions (two-sample Kolmogorov-Smirnov test). For example, both tests cannot reject the null (of equal means and equal distributions) of the overall smoking between a same-race cap of 40% and a same-race cap of 50% (p-value 0.37(0.95)). For all other cases the policy induces statistically significant changes in the overall smoking.

Figure 1: Overall smoking (schools Black and White) under different same-race caps



framework is in the number of schools growing (as opposed to the number of students in a single school). The estimation sample includes SCIDs: 003, 007, 008, 028, 058. Table 8 is reproduced from the main text for convenience.

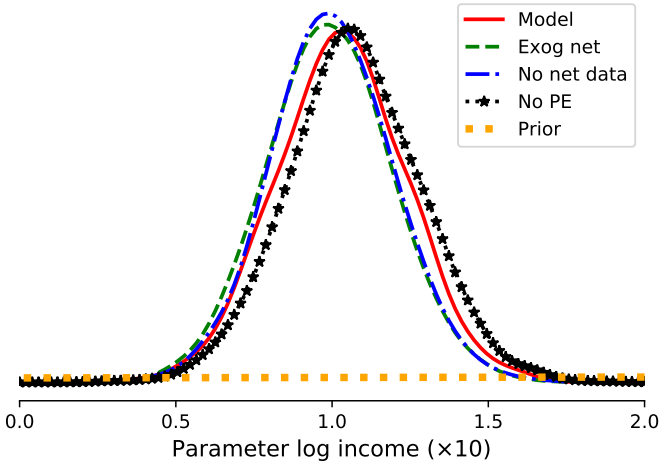
Table 8: Descriptive Statistics for the estimation sample

	Overall	Min	Max	Median
Students	1342	110	234	162
Smoking	0.41	0.12	0.54	0.44
Male	0.52	0.41	0.58	0.53
Whites	0.92	0.42	0.99	0.98
Blacks	0.05	0.00	0.45	0.00
As-Hi-Ot	0.03	0.00	0.13	0.02
Price	164.99	137.31	220.09	160.06
Avg income	83.90	47.25	145.85	71.55
Mom edu	0.73	0.56	0.84	0.74
HH smokes	0.48	0.25	0.61	0.51
Num friends	0.97	0.29	1.53	0.88

Note: The final sample contains students from 8 high schools. Min, max, and median are reported at a school level.

D.2 Estimates

Figure 2: Posterior distribution for the (log) income parameter



Note: The hypotheses for equal means between the model's posterior and each of the other posteriors on the plot are rejected with $p < 0.01$ by t-tests.

Table 9: Parameter estimates (posterior means)

	Utility of smoking				
	Parameter	No net data	Exog net	No PE	Model
1	Baseline probability of smoking	0.13***	0.17***	0.24***	0.21***
2	Log income ×10	1.0***	0.99***	1.07***	1.03***
3	Mom edu (HS&CO)^{MP}	−0.04***	−0.05***	−0.07***	−0.06***
4	HH smokes	0.11***	0.14***	0.17***	0.15***
5	Grade 9+^{MP}	0.15***	0.14***	0.2***	0.13***
6	Blacks^{MP}	−0.29***	−0.3***	−0.37***	−0.32***
7	30% of the school smokes^{MP}	0.07***	0.06***	–	0.05***
	Utility of friendships				
	Parameter	No net data	Exog net	No PE	Model
8	Baseline number of friends	–	–	4.53***	3.52***
9	Different sex$^{MP\%}$	–	–	−0.71***	−0.72***
10	Different grades$^{MP\%}$	–	–	−0.89***	−0.88***
11	Different race$^{MP\%}$	–	–	−0.32***	−0.45***
12	Cost/Economy of scale	–	–	−0.2***	−0.22***
13	Triangles$^{MP\%}$	–	–	1.13***	1.26***
14	ϕ^{MP}_{smoke}	–	0.05***	–	0.06***
15	$\phi^{MP}_{nosmoke}$	–	0.03***	–	0.04***

Note: MP stands for the estimated marginal probability in percentage points and MP% for estimated marginal probability in percent, relative to the baseline probability. The posterior sample contains 10^5 simulations before discarding the first 20%. The shortest 90/95/99% credible sets not including zero is indicated by */**/*** respectively.

Table 10: Pairwise tests of the posteriors for the (log) income parameter under different estimation scenarios

Estimation scenarios	Model	Fixed net	No net data	No PE	No tri	No cost
Model	1.00 (1.00)					
Exog net	0.00 (0.00)	1.00 (1.00)				
No net data	0.00 (0.00)	0.00 (0.00)	1.00 (1.00)			
No PE	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.00 (1.00)		

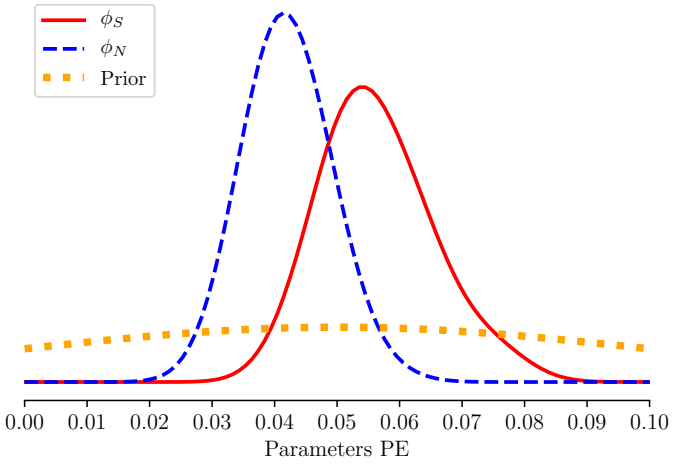
Note: Each cell compares the posterior distribution of the parameter (log) income between a pair of estimation scenarios. The two p-values are from testing a hypothesis of equal means and from testing a hypothesis of equal distributions (two-sample Kolmogorov-Smirnov test).

D.3 Model fit

Table 11 compares selected statistics from the data to those from a sample simulated with the estimated model.[6] In addition to statistics that are directly targeted by the model's

[6]Using the parameter estimates, a Markov chain of size 10^5 from the k-player dynamic is simulated from which, to reduce the auto dependence, every $1,000$ element is sampled.

Figure 3: Posterior distribution for the local PE parameters



Note: The hypotheses for equal means and equal distributions between the parameters for peer effects among smokers ϕ_S and among non-smokers ϕ_N are rejected with $p < 0.01$.

parameters (overall prevalence, density, and reciprocity), statistics which are only indirectly governed by model parameters are reported in tables 11 and 12, e.g. maximum degree, certain friendship configurations, mixing etc. Overall the model fits well the smoking decisions and the network features of the data. The only caveat is the number of triangles as fraction of the size of the network which in the data is 0.066 while in the sample generated by the model has mean 7.701 and median 0.024. The most likely reason for this discrepancy is that in the model triangles are generated only via a single parameter which does not depend on observables, i.e. race, sex etc. This parsimonious specification is dictated by the small sample size and further exploration of this feature of the data is left for the future.

Table 11: Model fit

Selected moments		
Moment	Model	Data
Prevalence	0.410 (0.408)	0.408
Density	0.007 (0.005)	0.005
Avg degree	1.250 (0.966)	0.973
Min degree	0.275 (0.000)	0.000
Max degree	4.808 (4.568)	5.308
$a_i g_{ij} a_j / n$	0.543 (0.253)	0.256
$(1-a_i) g_{ij} (1-a_j) / n$	0.400 (0.396)	0.404
Two-paths/n	0.639 (0.490)	0.501
Triangles/n	7.686 (0.023)	0.066
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HI	0.239 (0.231)	0.236
CHI	-0.300 (-0.299)	-0.303
FSI	0.665 (0.667)	0.662

Note: Columns Data and Model compare selected moments of the estimation sample with those of synthetic data generated by the estimated model. For the latter mean and median are reported (median in parentheses). Two-paths is defined as $\sum_{i>j} g_{ij} g_{il} (1 - g_{il})$. Triangles is defined as $\sum_{i>j>l} g_{ij} g_{il} g_{il}$. The Homophily index (HI), Coleman homophily index (CHI), and Freeman segregation index (FSI) are measures of the mixing patterns between students with the same smoking statuses (see also table 12). For more details, see Currarini et al. (2010) Definitions 1 and 2 in the supplemental appendix.

D.4 Counterfactual experiment: school racial desegregation

Starting point of this experiment is two racially homogeneous schools: School White and School Black. Gradually the racial composition of these schools is changed via swapping of students. Table 13 suggests that mixed-race schools smoke less.

Table 12: Fit mixing matrix (model left, data right)

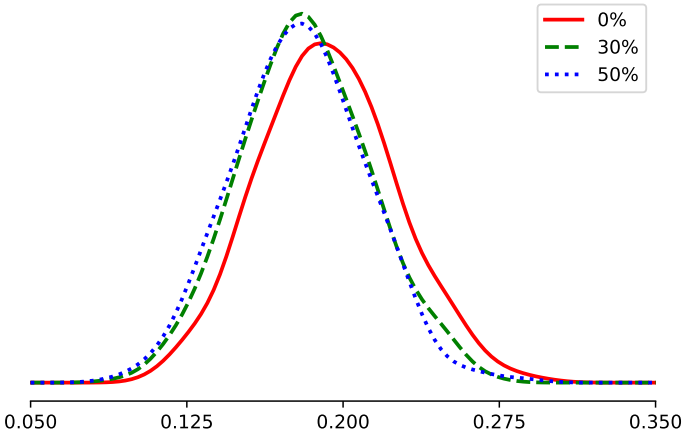
		Nominee		*Nominee*	
		Smoker	Nonsmoker	Smoker	Nonsmoker
Nominator	Smoker	**65% (56.6)**	35% (30.1)	**63% (52.1)**	37% (30.4)
	Nonsmoker	29% (30.1)	**71% (74.0)**	29% (30.4)	**71% (75.4)**

Table 13: Predicted Smoking Prevalence following Same-race Students Cap

Same-race cap (%)	School White	School Black	Overall
0	5.0	33.5	19.3
10	7.2	30.2	18.7
20	9.9	26.6	18.3
30	11.6	24.8	18.2
40	16.3	19.4	17.9
50	17.6	18.3	17.9

Note: A cap of $x\%$ same-race students is implemented with a swap of $(100-x)\%$ students. The last column shows the predicted changes in overall smoking under different same-race caps. The policy induces statistically significant changes in the overall smoking as suggested by the statistical tests in appendix D.

Figure 4: Simulation overall smoking for different same-race caps



Note: The hypotheses of equal means/distribution is examined in table 14.

D.5 Counterfactual experiment: policy spillovers

The final experiment examines the response of the students smoking to a policy that is very efficient, in terms of those who are exposed to the treatment stop smoking, but can only target a small portion of the student population, say because it is very expensive. It is a quantitative question then to what extent the treated will influence their peers as opposed to their peers un-friending those who stop smoking. To illustrate the effect I pick medium

Table 14: Pairwise tests of the response of the overall smoking to same-race caps

Same-race cap (%)	0	10	20	30	40	50
0	1.00 (1.00)					
10	0.00 (0.01)	1.00 (1.00)				
20	0.00 (0.00)	0.00 (0.00)	1.00 (1.00)			
30	0.00 (0.00)	0.00 (0.00)	0.58 (0.47)	1.00 (1.00)		
40	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.02 (0.00)	1.00 (1.00)	
50	0.00 (0.00)	0.00 (0.00)	0.01 (0.01)	0.04 (0.03)	0.68 (0.99)	1.00 (1.00)

Note: Each cell examines the change in overall prevelance between a pair of scenarios (same-race caps). The two p-values are from testing a hypothesis of equal means and from testing a hypothesis of equal distributions (two-sample Kolmogorov-Smirnov test). For example, both tests cannot reject the null (of equal means and equal distributions) of the overall smoking between a same-race cap of 40% and a same-race cap of 50% (p-value 0.37(0.95)). For all other cases the policy induces statistically significant changes in the overall smoking.

size schools with high $40 - 45\%$ smoking rates.

Table 15: Spillovers

Campaign (%)	Smoking	Predicted effect proportional	Actual effect	Multiplier
-	43.1	-	-	
3	40.7	1.3	2.4	1.9
5	39.3	2.2	3.8	1.8
10	35.7	4.3	7.4	1.7
20	29.8	8.6	13.3	1.5
30	24.5	12.9	18.6	1.4
50	15.8	21.5	27.2	1.3

Note: The first column lists the alternative attendance rates. The second and third columns display the smoking rate and the change in smoking rate respectively if the decrease would be proportional to the intervention, i.e. computes a baseline without peer effects. The last column computes the ratio between the percentage change in the number of smokers and the attendance rate. Note that that attendance is random with respect to the smoking status of the students. If the campaign is able to target only students who are currently smokers, the spillover effects will be even larger.

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