

Adolescent Alcohol Use, Peer and Neighborhood Effects, and Unobserved Factors

Recent work on alcohol- and drug-related risk behaviors has emphasized peer/neighborhood effects (Manski, 1993, Becker, 1996), individual personal factors (Becker and Murphy, 1988; Pacula (1998)), and the influence of genetic predispositions (Cutler and Glaeser, 2005). DeCicca *et al.* (2000) introduced a model in which the derived demand for risk behaviors is influenced by peer acceptance, personal characteristics influencing the marginal utility of the risk behavior, and family acceptance; Duarte, Escario and Molina (2007) added individual unobserved factors (such as stressful events or personal failures), modeled in their case as correlated error terms between the demand function for alcohol and the demand function for truancy. They follow the estimation lead of Gaviria and Raphael (2001) in addressing peer-effect endogeneity by instrumenting the peer group behavioral variables and including school-defined independent variables.

This literature leads to one reduced-form equation for each risk behavior. For example, for Duarte, Escario and Molina the dependent variable representing the risk behavior (alcohol use or truancy) is a linear function of characteristics of the respondent (gender, age, membership in an association or club), family environment (education level of parents, presence of father in the home, available income and income squared, presence of smokers), school characteristics (public/private school, class size greater than

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15), dummy variables for the 18 regions of the country, and, as proxies of permissiveness, presence of smokers in the home and school involvement in anti-drinking or anti-truancy campaigns. The dependent variables are binary (“In the last month, have you been drunk / skipped classes?”).

The final independent variable in the estimations is the peer-influence variable, calculated as the respondents’ classmates’ averaged dependent variable after removing the influence of the respondent. Duarte, Escario and Molina instrument this peer influence with different variables for each equation, each time using variables measured at the Spanish-provincial level. Alcohol peer effects were instrumented with unemployment rate, per capita income, and death prevalence due to suicide, lung cancer, cirrhosis, car accidents and alcoholic psychosis. Peer truancy is instrumented by centers of child education per 1000 children younger than 14, unemployment rate, per capita income and traffic accidents.

The two Duarte, Escario and Molina equations are then estimated as bi-variate probit simultaneous equations using two-step maximum likelihood estimation, reporting bootstrapped 200-replication standard errors. Their data come from the 2004 Spanish Survey on Drug Use in the School Population, representing 14-16-year-olds’ private responses to questions about drug use, personal characteristics, family and school environments. The authors find positive and significant peer effects, and argue for the presence of unobserved individual influences; other influences have generally non-controversial signs, with no significant effect for parents’ level of education but a significant association between risk behaviors and both income and presence of a smoker in the home. A variable interacting peer effects with absence of father in the home was

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not statistically significant, taken as evidence that peer effects are not necessarily stronger in that circumstance. Interacting peer effects with school type did yield significant coefficients, though of opposite signs in the two regressions.

Our Data

As with Duarte, Escario and Molina (2007), our data employ surveys to allow measurement of peer influences from the perspective of the adolescents, in addition to relying on other sources for non-peer-effect influences. Our unique data set presents fine details about alcohol use and peer effects, and allows consideration of influences of parents, older siblings, and neighborhood/community effects.

We consider adolescent alcohol and drug use in rural communities, as this is an under-studied topic relative to urban adolescent risk behaviors. We define rural communities as those with populations of 2,500 or fewer people, located at least 30 miles from a metropolitan area and not adjacent to interstate highways. Four states were selected from the 1999 National Household Survey on Drug Abuse (DHHS, 2000), scoring among the highest nationally in adolescent (aged 12-17) binge drinking: North Dakota (the highest nationally), South Dakota, Wyoming, and Wisconsin.¹ In addition to census data, additional information about each community was gathered by interviewing community leaders as well as adolescents.

Census data were used to determine which towns met selection criteria. Because many rural towns consolidate middle and high schools, we determined which communities had schools serving sixth through eighth grade students. The data were stratified in two additional ways, population and proximity from urban areas, resulting in

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a narrowed list of 360 towns (101 in North Dakota, 108 in South Dakota, 117 in Wisconsin, and 34 in Wyoming). Twenty-two communities were randomly selected from the 360, resulting in seven in North Dakota, seven in Wisconsin, five in South Dakota, and three in Wyoming.

All adolescents from the sixth through eighth grades in each community were asked to participate. The adolescent sample of 1424 6th-8th graders was 47% male and 84% Caucasian, with a mean age of 12.48 years. The response rate was 73%. Data from a randomly-selected 20% of parents of adolescents in these grades were also collected. Parent data were aggregated to serve as a reference group. Parents were asked about perceptions of their community in general, and community attitudes toward adolescent drinking in particular. All sixth through eighth grade teachers in each community were asked to participate. Community leaders in each location also included the following: two law enforcement officers, one principal, one social services coordinator, one mental health counselor, one newspaper editor, one mayor, and three members of the clergy. We identified community leaders by working with community schools and community social service agencies. The adult sample was 98% Caucasian and 42% male, with 70% having children under the age of 18. The average age was 44.03 years, ranging from 20 to 81. 31% of the adult sample were parents, 27% were teachers, and the rest were community leaders.

Data were gathered from all individuals through survey instruments. Adolescents completed the surveys during school time. Adult surveys were administered by telephone, after participants were informed about the project by letter. For each participant \$10.00 was donated to participating schools.

Our Model

Our data set includes the following variables (whose attributes are summarized in Table One) for the reduced-form estimations:

Characteristics of the respondent: Gender, age, grade in school, race, involvement in school-sponsored activities before/after school,² and religious involvement.³ Because depression is associated with alcohol use, tendencies toward depression were assessed with a ten-item scale from the Center of Epidemiologic Studies (CES-D).⁴

Family environment: Parents/step-parents present in home, number of older and younger brothers and sisters living at home, parents' drinking habits, number of hours on a typical school day the student is at home without an adult present. Perceptions of family economic hardship were measured by a seven-item instrument (Connor-Smith et al., 2000) developed for use with adolescents.⁵ Parental closeness was assessed with a 16-item scale modified by Lempers, Clark-Lempers, and Simons (1989) to assess parents' discipline, affection, and communication.⁶

Peer-influence variables: Perceived prevalence of peer alcohol use was assessed for each respondent with a six-item scale developed by Beck and Treiman (1996), assessing the perceived social norms of "other kids at school."⁷

Neighborhood/Community effects: Individual perceptions of community controls against adolescent drinking through collective efficacy and social cohesion were indexed by a principal-component reduction of ten Likert-scale survey questions developed by Sampson and Raudenbush (1999).⁸ Community supportiveness is an eight item scale developed by Chipeur *et al.* (1999) that measures general involvement of adults in

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youths' lives and job/free-time opportunities for youths in the community.⁹ Following the sociology literature,¹⁰ Census-sourced community-level socio-economic status (SES) variables were combined to index¹¹ community concentrated disadvantage, housing stability, and concentrated advantage/affluence.¹² Thus only three explanatory SES variables enter the regression, rather than the host of individual SES variables that they represent. We also include second estimations of all of our equations after including town-level fixed effects to refine the consideration of unobserved factors.

Dependent variables: Our basic alcohol consumption variable is the Quantity-Frequency Index (QFI) index (respondent's ounces of alcohol consumed in the last thirty days, derived from data about beer, wine and spirit consumption, obtained from adolescent surveys following from Armor and Polich, 1982).¹³ We also calculate a binary variable indicating whether the respondent has ever drunk alcohol without parents' knowledge from the response to a question concerning their age when they first drank without parents' knowledge. We measure individual drug use by summing the responses (1=yes) to two questions: "Have you ever smoked marijuana? Have you ever used any other illegal drugs?" We also invoke the peer-influence variable and the depression-tendency variable mentioned above as dependent variables in our system of equations.

Because of the diversity of units of measurement among the variables derived from scales and groups of items, we use unit-variance, zero-mean-standardized measurements of some variables, as indicated in Table One.

We use these variables to simultaneously estimate the coefficients in five regression equations:

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- (1) Alcohol Servings = f (Gender, Age, Grade, Race variables, School Activities, Religious Index, Depression Index, Male Parent Drinks, Female Parent Drinks, Home Hours Alone, Family Economic Strain, Parental Closeness, Peer Alcohol Use, Community Drinking Controls, Community Supportiveness, Concentrated Disadvantage, Housing Stability, Concentrated Advantage)¹⁴
- (2) Ever Drank = g (Gender, Age, Grade, Race variables, Religious Index, Both Parents, Older Sibling, Male Parent Drinks, Female Parent Drinks, Home Hours Alone, Family Economic Strain, Parental Closeness, Peer Alcohol Use, Community Drinking Controls, Community Supportiveness, Concentrated Disadvantage, Housing Stability, Concentrated Advantage)¹⁵
- (3) Drug Use = h (all prior RHS variables but Male Parent Drinks, Female Parent Drinks)
- (4) Depression Index = d (all RHS variables in (1) and (2) except Depression Index, Older Sibling, Peer Alcohol Use, Community Drinking Controls)
- (5) Peer Alcohol Use = p (Community Drinking Controls, Community Supportiveness, Concentrated Disadvantage, Housing Stability, Concentrated Advantage)

Our Results

We use a three-stage simultaneous equations estimation strategy to improve the efficiency of the estimators (relative to two-stage estimation) in the demand curves for alcohol use and illegal drug use, using Stata's *reg3* utility to derive the estimators.

Our results are summarized in Table 2, in which we report coefficients only for variables that are statistically significant. (We reproduce the full regression results in Tables 3 and 4.) Column One lists the right-hand-side variables that were statistically significant in any of the regressions. Column Two presents our estimates of the regression in which *Alcohol Servings* (amount consumed during the prior thirty days) is

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the dependent variable--first without town-level fixed effects, then including fixed effects. Column Three presents our other alcohol-related regressions, this time with *Ever Drank* (indicating whether the student has ever drunk alcohol without a parent's knowledge) as the dependent variable. Again, the results excluding town-level fixed effects appear to the left of those including fixed effects. Column Four presents the results for the *Drug Use* dependent variable, column five the *Depression* regression, and column six the regressions for *Peer Alcohol Use*. The Chi-squared tests for all ten regressions indicate that they are statistically significant, with all probability values less than 0.0000.¹⁶

Consider first the alcohol-related results of columns two and three. The inclusion of fixed effects has little effect on the magnitudes of the coefficients, and does not have a consistent effect on statistical significance of coefficients by reducing or increasing their standard errors. Thus, taken together, the fixed-effect and non-fixed-effect regressions tell a consistent story about the factors that influence alcohol consumption. It appears that, in general, different factors affect the long-term decision about whether to have ever drunk than decisions about how much to drink: only family economic distress, community supportiveness, and peer alcohol use are significant in both the *Alcohol Servings* and *Ever Drank* regressions, and even this is not consistently the case across fixed-effect and non-fixed-effect specifications. It appears that *Alcohol Servings* is more influenced by drinking habits of the male parent (but not the female parent), depression, and the triad of family economic strain, community supportiveness and peer alcohol use; *Ever Drank*, on the other hand, is influenced by the triad (especially peer behavior and community supportiveness), age, parental closeness, and (strongly) the religious index,

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number of hours alone at home, and community drinking controls. Peer influence seems to matter, but presence of an older sibling does not. Having both parents present in the home does not affect behavior, but the engagement of a parent (indexed by number of hours alone at home and parental closeness) does affect drinking behavior. The “human” aspects of the community (community supportiveness, community drinking controls, peer behavior, home hours alone, parental closeness) matter more than community SES variables (concentrated advantage and disadvantage, housing stability), though personal family economic stress does affect drinking behavior. The largest influences over *Ever Drank*, as measured by their relative regression coefficients, are peer behavior and the religious index; the size of those coefficients is dwarfed by the coefficients in the *Alcohol Servings* regression, in which depression, male parent drinking, family economic strain, peer behavior and community supportiveness all have significantly larger coefficients.

Column four’s regression for *Drug Use* is highly statistically significant, but multicollinearity among the explanatory variables has left only one regression with one statistically-significant individual coefficient. Thus, while the regressions cumulatively explain and forecast drug use well, they do not identify individual influences over student behavior in this area. The signs on the coefficients are as expected, with the exception of a (very small) positive coefficient on the religious index and peer (alcohol) behavior coefficients. The signs on the economic variables (family hardship, concentrated disadvantage and advantage, housing stability) indicate that drug use is to some extent associated with relative affluence rather than poverty.

Column five’s *Depression Index* results tell a consistent and statistically-significant story about influences associated with depression. Concentrated disadvantage,

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community supportiveness, parental closeness and family economic strain bear highly significant coefficients with the expected sign. Grade level (and not age) has a significant negative coefficient, as does gender (indicating that males have lower depression indexes) and Asian race (associated with higher depression indexes). Family economic distress and community supportiveness are significant in this regression and the alcohol-related regressions; otherwise the influences over depression seem to a large extent to be different from those related to alcohol use.

Column six summarizes our equation instrumenting peer alcohol use. It appears that these results are particularly strong, as all explanatory variables are quite significant and all coefficients are of the expected sign. Thus both the community's "human aspects" (community supportiveness, community drinking controls) and the community's SES qualities (concentrated disadvantage, housing stability, concentrated advantage) exert a significant effect upon peer effects.

Conclusion

Our estimating procedure and unique data set allow a rich interpretation of the forces driving adolescent alcohol use, drug use, and depression. The intermingled causes and effects indicate that effective interventions must be multi-faceted and will not necessarily follow an intuitively obvious simple received wisdom.

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Table 1. Variable definitions means and standard deviations

Variable	Definition	Mean, s.d. ¹
Alcohol Servings	Ounces of alcohol consumed in prior thirty days, from questions about beer/ wine/ spirits consumption	0, 1 2.51, 16.15
Ever Drank	Indicator variable =1 if student has ever drunk alcohol without parents' knowledge	0.27, 0.44
Gender	Gender of respondent; 1=male, 0=female	0.49, 0.50
Age	Age of respondent	12.47, 0.99
Grade	Grade-level of respondent	7.02, 0.81
Race B Race In Race A Race H	Indicator variables for race=black, American Indian, Asian, Hispanic	0.01, 0.11 0.08, 0.27 0.01, 0.11 0.04, 0.20
School Activities	Involvement in school-sponsored before/after school activities (1=seldom/never, 2=occasionally, 3=regularly)	0, 1 2.23, 0.72
Religious Index	Index of religious involvement from three-item scale	0, 1 9.63, 3.09
Depression Index	Index of depression-related self-assessment from 10-item scale	0, 1 14.95, 5.69
Both Parents	Number of parents living in the home, =1 if two parents, 0 otherwise	0.86, 0.35
Older Sibling	=1 if an older sibling is present in the home, otherwise =0	0.55, 0.50
Male Parent Drinks Female Parent Drinks	Student report of parent drinking for male and female parent present in home; =1 if "quite a bit" or "a great deal," =0 if "never," "a little," or "some."	0.06, 0.24 0.02, 0.13
Home Hours Alone	Typical school-day number of hours student is at home without a parent present	2.23, 2.17
Family Economic Strain	Index of perceived family economic	0, 1

¹ Followed by mean and s.d. of underlying variable when standardized. Average age for first trying alcohol without parents present was 10.63 (s.d.=2.21) for the 27% who have done so.

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	strain from 7-item scale	11.46, 5.61
Parental Closeness	Index of parental closeness from 16-item scale	0, 1 38.59, 6.72
Peer Alcohol Use	Index of perceived adolescent peer prevalence of alcohol use	0, 1 8.16, 3.86
Community Drinking Controls	Index of community controls on adolescent drinking, from 10-item scale	0, 1 32.26, 6.26
Community Supportiveness	Index of community supportiveness, from 8-item scale	0, 1 26.51, 6.31
Concentrated Disadvantage	Summed standardized relevant SES variables	0, 1 0.06, 2.34
Housing Stability	Summed standardized relevant SES variables	0, 1 0.06, 1.41
Concentrated Advantage	Summed standardized relevant SES variables	0, 1 0.21, 2.89
Drug Use	Sum of student responses to ever used marijuana/ drugs questions; 1=yes in both cases	0.08, 0.33

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Table 2. Summary of regression results: Coefficients, standard errors

N=656. Significance: *=0.10, **=0.05, ***=0.01

(1)	(2) Alcohol Servings (df=635)		(3) Ever Drank (df=635)		(4) Drug Use (df=635)		(5) Depression (df=637)		(6) Peer Alcohol Use (df=651)	
	No FEs	With FEs	No FEs	With FEs	No FEs	With FEs	No FEs	With FEs	No FEs	With FEs
RHS Variables										
<i>Gender</i>							-.29*** .06	-.31*** .06		
<i>Age</i>			.05* .03							
<i>Grade</i>							-.13** .06	-.11* .07		
<i>Race: Asian</i>	-.86* .52				-.54* .32		.67*** .26	.60** .26		
<i>Religious Index</i>			-.05*** .02	-.04** .03						
<i>Depression Index</i>	1.03* .62									
<i>Male parent drinks</i>	.37** .16	.32** .15								
<i>Home hours alone</i>			.02*** .01	.02*** .01						
<i>Family economic distress</i>	-.27** .13	-0.21* 0.11	-.03* .02 P=.108				.19*** .03	.18*** .03		
<i>Parental closeness</i>				-.03* .02			-.40*** .03	-.40*** .03		
<i>Peer alcohol use</i>		.14* .08 P=.108	.10*** .02	.10*** .02						
<i>Community drinking controls</i>			-.04** .02	-.04** .02					-.85*** .15	-.85*** .15
<i>Community supportive- ness</i>	-.10* .06	-.13*** .05	-.04** .02	-.04** .02			-.08** .03	-.08** .03	-.45*** .15	-.45*** .15
<i>Concentrated disadvantage</i>							.02* .01		.20*** .06	.19*** .06
<i>Housing Stability</i>									.30*** .10	.30*** .10
<i>Concentrated Advantage</i>									.10** .05	.10** .05
χ^2 stat***	91.27	116.28	174.17	198.47	87.76	102.04	435.84	470.97	112.70	112.93
<i>rmse</i>	1.17	1.02	0.39	0.39	0.47	0.47	.76	.74	3.41	3.41

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Table 3. Regression results details, no fixed effects

Three-stage least-squares regression

Equation	Obs	Parms	RMSE	chi2	P
AlcoholSer~D	656	21	1.174376	91.27	0.0000
EverDrank	656	21	.3949946	174.17	0.0000
DrugUse	656	21	.4703012	87.76	0.0000
Depression~D	656	19	.7559403	435.84	0.0000
PeerAlcohol~e	656	5	3.40956	112.70	0.0000

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
AlcoholSer~D					
Gender	.1989001	.1918079	1.04	0.300	-.1770364 .5748367
Age	-.0266258	.083796	-0.32	0.751	-.190863 .1376115
Grade	.070628	.1212007	0.58	0.560	-.1669211 .3081771
RaceB	-.3209045	.3359346	-0.96	0.339	-.9793242 .3375151
RaceIn	.0870394	.1562326	0.56	0.577	-.2191709 .3932498
RaceA	-.8599012	.5167829	-1.66	0.096	-1.872777 .1529747
RaceH	-.2510467	.197093	-1.27	0.203	-.637342 .1352485
SchoolActi~D	-.0295681	.0416782	-0.71	0.478	-.1112558 .0521197
ReligiousI~D	-.0200327	.0543351	-0.37	0.712	-.1265275 .0864621
Depression~D	1.0326	.6237131	1.66	0.098	-.189855 2.255056
MParentDri~s	.3714624	.158587	2.34	0.019	.0606376 .6822873
FParentDri~s	-.1044191	.4425405	-0.24	0.813	-.9717826 .7629443
HomeHoursA~e	.0198124	.0192697	1.03	0.304	-.0179556 .0575803
FamilyEcon~D	-.268609	.1291663	-2.08	0.038	-.5217702 -.0154478
ParentalCl~D	.3744625	.2486557	1.51	0.132	-.1128937 .8618187
PeerAlcohol~D	.0870405	.096261	0.90	0.366	-.1016276 .2757086
CommunityD~D	.049836	.0483875	1.03	0.303	-.0450017 .1446737
CommunityS~D	-.1008865	.0554523	-1.82	0.069	-.2095711 .007798
Co~advantage	-.0242516	.0184024	-1.32	0.188	-.0603197 .0118165
HousingSta~y	.0311499	.0295722	1.05	0.292	-.0268105 .0891104
Co~Advantage	-.0021675	.0144883	-0.15	0.881	-.030564 .026229
_cons	-.2717838	.5510877	-0.49	0.622	-1.351896 .8083283
EverDrank					
Gender	-.0478697	.0326538	-1.47	0.143	-.11187 .0161305
Age	.0509296	.0286178	1.78	0.075	-.0051603 .1070195
Grade	.0147497	.0340302	0.43	0.665	-.0519483 .0814477
RaceB	.1159508	.1310274	0.88	0.376	-.1408582 .3727598
RaceIn	.0204196	.0601893	0.34	0.734	-.0975493 .1383886
RaceA	.0426316	.1362463	0.31	0.754	-.2244062 .3096695
RaceH	.048907	.0779664	0.63	0.530	-.1039044 .2017184
ReligiousI~D	-.052728	.0177301	-2.97	0.003	-.0874785 -.0179776
BothParents	-.0035431	.0468883	-0.08	0.940	-.0954424 .0883563
OlderSibling	.0119821	.0315213	0.38	0.704	-.0497985 .0737627
MParentDri~s	.0632454	.0662195	0.96	0.340	-.0665424 .1930331
FParentDri~s	.1206425	.1526095	0.79	0.429	-.1784666 .4197517
HomeHoursA~e	.0191117	.0073347	2.61	0.009	.0047361 .0334874
FamilyEcon~D	-.0277249	.0172395	-1.61	0.108	-.0615138 .0060639
ParentalCl~D	-.0288629	.0186252	-1.55	0.121	-.0653677 .0076419
PeerAlcohol~D	.0985095	.0184199	5.35	0.000	.0624072 .1346117
CommunityD~D	-.0381944	.0179267	-2.13	0.033	-.0733302 -.0030586
CommunityS~D	-.0397556	.0186515	-2.13	0.033	-.0763118 -.0031994
Co~advantage	-.0009198	.0069916	-0.13	0.895	-.0146231 .0127835
HousingSta~y	.0070311	.0117993	0.60	0.551	-.0160951 .0301572
Co~Advantage	-.0028962	.0056011	-0.52	0.605	-.0138742 .0080818

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_cons	-.5032486	.218949	-2.30	0.022	-.9323807	-.0741164

DrugUse						
Gender	.1686742	.1263692	1.33	0.182	-.0790049	.4163533
Age	.0081459	.0448585	0.18	0.856	-.0797752	.096067
Grade	.0580971	.0721211	0.81	0.421	-.0832575	.1994518
RaceB	.1109476	.148047	0.75	0.454	-.1792193	.4011145
RaceIn	-.0123423	.0715297	-0.17	0.863	-.152538	.1278535
RaceA	-.535637	.3166434	-1.69	0.091	-1.156247	.0849725
RaceH	.0827403	.0883309	0.94	0.349	-.090385	.2558656
SchoolActi~D	-.0145933	.0199453	-0.73	0.464	-.0536854	.0244988
ReligiousI~D	.0122873	.0308066	0.40	0.690	-.0480925	.0726672
Depression~D	.5597288	.4387856	1.28	0.202	-.3002751	1.419733
BothParents	-.0488014	.0500653	-0.97	0.330	-.1469277	.0493248
OlderSibling	.0355599	.0570239	0.62	0.533	-.076205	.1473247
HomeHoursA~e	.0027882	.0088415	0.32	0.752	-.0145409	.0201174
FamilyEcon~D	-.0931528	.087093	-1.07	0.285	-.2638521	.0775464
ParentalCl~D	.2094244	.1709781	1.22	0.221	-.1256866	.5445354
PeerAlcho~D	-.0167041	.0607887	-0.27	0.783	-.1358478	.1024396
CommunityD~D	-.0006018	.0196632	-0.03	0.976	-.039141	.0379373
CommunityS~D	-.0101451	.0301648	-0.34	0.737	-.069267	.0489768
Co~advantage	-.0000526	.0085121	-0.01	0.995	-.016736	.0166308
HousingSta~y	-.0105508	.0132623	-0.80	0.426	-.0365443	.0154428
Co~Advantage	-.0014991	.0063705	-0.24	0.814	-.013985	.0109869
_cons	-.4820295	.2459506	-1.96	0.050	-.9640837	.0000247

Depression~D						
Gender	-.2923554	.0611259	-4.78	0.000	-.4121599	-.1725508
Age	.06632	.0538558	1.23	0.218	-.0392353	.1718754
Grade	-.1267583	.0640829	-1.98	0.048	-.2523584	-.0011581
RaceB	-.0345171	.2486057	-0.14	0.890	-.5217752	.4527411
RaceIn	.0702318	.1138263	0.62	0.537	-.1528637	.2933274
RaceA	.6651911	.2566011	2.59	0.010	.1622623	1.16812
RaceH	-.0414618	.1472327	-0.28	0.778	-.3300326	.2471091
SchoolActi~D	-.0236519	.0298615	-0.79	0.428	-.0821794	.0348757
ReligiousI~D	-.0518188	.0333989	-1.55	0.121	-.1172795	.0136419
BothParents	-.030401	.0827787	-0.37	0.713	-.1926444	.1318423
MParentDri~s	-.0412446	.0913763	-0.45	0.652	-.2203389	.1378496
FParentDri~s	-.3060397	.2768764	-1.11	0.269	-.8487074	.2366279
HomeHoursA~e	.0081645	.0138645	0.59	0.556	-.0190094	.0353383
FamilyEcon~D	.1922819	.0326509	5.89	0.000	.1282872	.2562766
ParentalCl~D	-.3972248	.0349761	-11.36	0.000	-.4657768	-.3286728
CommunityS~D	-.0811006	.034217	-2.37	0.018	-.1481647	-.0140364
Co~advantage	.0212973	.0129858	1.64	0.101	-.0041544	.0467491
HousingSta~y	.008095	.0223971	0.36	0.718	-.0358024	.0519925
Co~Advantage	.0074939	.0106335	0.70	0.481	-.0133474	.0283352
_cons	.1934925	.403792	0.48	0.632	-.5979252	.9849103

PeerAlcho~e						
CommunityD~D	-.8450506	.1460066	-5.79	0.000	-1.131218	-.5588828
CommunityS~D	-.4510822	.1500654	-3.01	0.003	-.745205	-.1569594
Co~advantage	.1954397	.0579247	3.37	0.001	.0819095	.30897
HousingSta~y	.2991971	.0991487	3.02	0.003	.1048692	.4935249
Co~Advantage	.0992097	.0470608	2.11	0.035	.0069723	.1914471
_cons	8.222476	.1337943	61.46	0.000	7.960244	8.484708

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Table 4. Regression results details, town-level fixed effects

Three-stage least-squares regression

Equation	Obs	Parms	RMSE	chi2	P
AlcoholSer~D	656	38	1.021667	116.28	0.0000
EverDrank	656	38	.3893248	198.47	0.0000
DrugUse	656	38	.4706828	102.04	0.0000
Depression~D	656	36	.743103	470.97	0.0000
PeerAlcohol~e	656	5	3.409513	112.93	0.0000

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
AlcoholSer~D					
Gender	.0847622	.1859314	0.46	0.648	-.2796566 .449181
Age	.0592355	.0777032	0.76	0.446	-.0930599 .211531
Grade	-.044117	.1101431	-0.40	0.689	-.2599935 .1717594
RaceB	-.3071291	.3228728	-0.95	0.341	-.9399481 .3256899
RaceIn	.1160958	.1519941	0.76	0.445	-.1818071 .4139987
RaceA	-.5692029	.460618	-1.24	0.217	-1.471998 .3335919
RaceH	-.3000243	.1946517	-1.54	0.123	-.6815345 .081486
SchoolActi~D	-.0310446	.0417218	-0.74	0.457	-.1128178 .0507286
ReligiousI~D	-.07718	.0519663	-1.49	0.137	-.179032 .024672
Depression~D	.698409	.5826088	1.20	0.231	-.4434832 1.840301
MParentDri~s	.3241081	.1542662	2.10	0.036	.0217519 .6264643
FParentDri~s	-.1660448	.4063722	-0.41	0.683	-.9625196 .63043
HomeHoursA~e	.0263095	.0186067	1.41	0.157	-.0101591 .062778
FamilyEcon~D	-.2084834	.1147075	-1.82	0.069	-.4333059 .0163392
ParentalCl~D	.2558495	.2339363	1.09	0.274	-.2026573 .7143563
PeerAlcohol~D	.1364944	.0848469	1.61	0.108	-.0298025 .3027913
CommunityD~D	.0597372	.048764	1.23	0.221	-.0358384 .1553128
CommunityS~D	-.1336421	.0535557	-2.50	0.013	-.2386094 -.020455
Co~advantage	-.0417721	.0315402	-1.32	0.185	-.1035898 .0200455
HousingSta~y	-.0093165	.0701965	-0.13	0.894	-.1468992 .1282661
Co~Advantage	-.0238666	.033798	-0.71	0.480	-.0901095 .0423763
EverDrank					
Gender	-.0512848	.0327882	-1.56	0.118	-.1155484 .0129789
Age	.0448602	.0294502	1.52	0.128	-.0128612 .1025817
Grade	.0273796	.0346957	0.79	0.430	-.0406228 .095382
RaceB	.0667715	.1315629	0.51	0.612	-.191087 .32463
RaceIn	.0186299	.0609618	0.31	0.760	-.1008531 .138113
RaceA	-.0212443	.1366998	-0.16	0.876	-.289171 .2466824
RaceH	.0304703	.0785896	0.39	0.698	-.1235625 .1845031
ReligiousI~D	-.0409328	.0184019	-2.22	0.026	-.0769999 -.0048657
BothParents	.0039708	.0465815	0.09	0.932	-.0873272 .0952688
OlderSibling	.0148659	.0315695	0.47	0.638	-.0470091 .0767409
MParentDri~s	.0704021	.0663388	1.06	0.289	-.0596195 .2004237
FParentDri~s	.1335964	.1523303	0.88	0.380	-.1649655 .4321583
HomeHoursA~e	.0203625	.007308	2.79	0.005	.0060391 .0346858
FamilyEcon~D	-.0253092	.0173561	-1.46	0.145	-.0593266 .0087082
ParentalCl~D	-.0314508	.0186322	-1.69	0.091	-.0679692 .0050676
PeerAlcohol~D	.0972115	.0184821	5.26	0.000	.0609871 .1334358
CommunityD~D	-.0380594	.0179862	-2.12	0.034	-.0733118 -.002807
CommunityS~D	-.040988	.0186095	-2.20	0.028	-.0774618 -.0045141
Co~advantage	.0056162	.0123433	0.46	0.649	-.0185762 .0298087
HousingSta~y	.0211135	.0291447	0.72	0.469	-.0360091 .0782361
Co~Advantage	-.0083967	.0138543	-0.61	0.544	-.0355506 .0187572

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DrugUse							
Gender	.1802577	.1594687	1.13	0.258	-.1322953	.4928107	
Age	.018406	.0452955	0.41	0.684	-.0703716	.1071836	
Grade	.0463597	.0775197	0.60	0.550	-.1055762	.1982955	
RaceB	.0925679	.1498847	0.62	0.537	-.2012007	.3863366	
RaceIn	-.0383151	.0753447	-0.51	0.611	-.185988	.1093578	
RaceA	-.5160041	.3357478	-1.54	0.124	-1.174058	.1420495	
RaceH	.0922379	.097837	0.94	0.346	-.099519	.2839948	
SchoolActi~D	-.013015	.0228328	-0.57	0.569	-.0577665	.0317365	
ReligiousI~D	.0050922	.0330625	0.15	0.878	-.0597091	.0698935	
Depression~D	.5698203	.5383232	1.06	0.290	-.4852738	1.624914	
BothParents	-.0382765	.0537882	-0.71	0.477	-.1436994	.0671464	
OlderSibling	.0275997	.0713047	0.39	0.699	-.1121549	.1673543	
HomeHoursA~e	.0036659	.0094362	0.39	0.698	-.0148286	.0221605	
FamilyEcon~D	-.0877071	.0999129	-0.88	0.380	-.2835327	.1081185	
ParentalCl~D	.2203158	.2114515	1.04	0.297	-.1941216	.6347532	
PeerAlcoho~D	-.0081179	.0669652	-0.12	0.904	-.1393674	.1231315	
CommunityD~D	.0035452	.0235725	0.15	0.880	-.0426561	.0497465	
CommunityS~D	-.0116679	.0353413	-0.33	0.741	-.0809356	.0575998	
Co~advantage	.0169522	.0162787	1.04	0.298	-.0149535	.0488579	
HousingSta~y	.0040514	.0320579	0.13	0.899	-.058781	.0668838	
Co~Advantage	.0027282	.0158468	0.17	0.863	-.028331	.0337874	

Depression~D							
Gender	-.3057939	.0612797	-4.99	0.000	-.4259	-.1856879	
Age	.0526377	.0555169	0.95	0.343	-.0561734	.1614488	
Grade	-.1120376	.0653369	-1.71	0.086	-.2400956	.0160204	
RaceB	-.0305132	.2489008	-0.12	0.902	-.5183498	.4573233	
RaceIn	.0761124	.1151977	0.66	0.509	-.1496709	.3018957	
RaceA	.6014614	.257455	2.34	0.019	.0968589	1.106064	
RaceH	-.0839174	.1483899	-0.57	0.572	-.3747563	.2069216	
SchoolActi~D	-.026261	.0308758	-0.85	0.395	-.0867765	.0342545	
ReligiousI~D	-.0478787	.0348533	-1.37	0.170	-.1161898	.0204324	
BothParents	-.0424366	.0856412	-0.50	0.620	-.2102904	.1254171	
MParentDri~s	-.0192797	.0900462	-0.21	0.830	-.195767	.1572076	
FParentDri~s	-.2480975	.2796777	-0.89	0.375	-.7962557	.3000607	
HomeHoursA~e	.0093706	.0138047	0.68	0.497	-.0176861	.0364274	
FamilyEcon~D	.1798252	.0328525	5.47	0.000	.1154355	.2442149	
ParentalCl~D	-.3994286	.0349802	-11.42	0.000	-.4679885	-.3308687	
CommunityS~D	-.0822119	.0340654	-2.41	0.016	-.1489789	-.0154449	
Co~advantage	.0266682	.0233682	1.14	0.254	-.0191326	.0724689	
HousingSta~y	.017041	.0550485	0.31	0.757	-.0908521	.1249341	
Co~Advantage	-.0051316	.0261334	-0.20	0.844	-.056352	.0460888	

PeerAlcoho~e							
CommunityD~D	-.849855	.1463368	-5.81	0.000	-1.13667	-.5630401	
CommunityS~D	-.4495983	.1500961	-3.00	0.003	-.7437812	-.1554154	
Co~advantage	.1950698	.0579296	3.37	0.001	.0815298	.3086097	
HousingSta~y	.2990399	.0991492	3.02	0.003	.104711	.4933688	
Co~Advantage	.0992989	.0470611	2.11	0.035	.0070608	.191537	
_cons	8.22241	.1337944	61.46	0.000	7.960178	8.484642	

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¹ Because of the number of individual, family, and community-level variables, it was important to hold aspects of the broader context as constant as possible. For this reason we use relatively similar northern-plains states.

² This is measured by student response to a three-option scale: participating seldom/never, occasionally, or regularly.

³ This was assessed by three questions in which students indicated how often they attend religious services, how important religious faith is to them, and how much their religious beliefs affect decisions they make.

⁴ The original measure consists of 20 four-point Likert-scale questions, with responses ranging from "rarely or none of the time" to "most or all of the time." Sample items: "During the last two months, I thought my life had been a failure... I had crying spells." Several items pertained to issues not common to junior high students, such as a loss in sexual interest, and were deleted. Internal consistency was .88 in the adolescent sample (one item was deleted to increase reliability). Factor loadings ranged from .52 to .83, with an average factor loading of .71.

⁵ Internal consistency was .92 in our study, and factor loadings ranged from .77 to .88, averaging .83. Sample items: "My family doesn't have enough money to pay the bills... There's no money left over to do something fun as a family."

⁶ This scale used items from Schaefer (1965) Child Report of Parental Behavior Inventory, and from Roberts, Block, and Block (1984). Three components of parental treatment were tapped: parental discipline, affection, and communication. Sample items: "My parents try to understand how I see things... My parents find out about my misbehavior... My parents seem proud of the things I do." The internal consistency was .80 in the validation study (Lempers, Clark-Lempers, & Simons, 1989). In this study, internal consistency was .85 (four items deleted to increase reliability). Factor loadings ranged from .28 to .85, average loading of .61.

⁷ Items focused on drinking frequency and intensity, alcohol-impaired driving, and binge drinking. An item regarding drinking and driving was deleted because of the age of our respondents. Our internal consistency was .90. Factor loadings ranged from .84 to .91, with an average loading of .88.

⁸ Internal consistency was .86 in the adult sample (one item deleted to increase reliability), and factor loadings ranged from .57 to .76, averaging .69. Example items: “Most adults in this community don’t seem to mind too much if teenagers drink alcohol... The police in this community really crack down on teenagers using drugs... Most adults in this community put up with teenage drinking, as long as no one gets into trouble.”

⁹ Items’ wording was changed from “neighborhood” to “community,” as the original scale was developed for an urban sample. The scale had an internal consistency of .91, with factor loadings ranging from .66 to .85, average loading of .80. Sample items” “People in this community pitch in to help each other... In this community there are things for kids my age to do... Most adults in this community care about who I am and what I’m doing... There are enough good jobs in our community for adults who want to work.”

¹⁰ See, for example, Sampson et al. (1999).

¹¹ Concentrated Disadvantage combines the town-level child poverty rate, town family poverty rate, percent of female-headed households in the town, percent of population over 16 with less than high-school education, percent of population white, and town unemployment rate. Housing Stability combines the ratio of renter-occupied to owner-occupied housing and the change (1990-2000) in proportion of housing that is renter-

occupied. Concentrated Advantage/Affluence combines the percent of town's adults that are high-school graduates, percent who have at least a bachelor's degree, the product of town median income and town family poverty rate (a standard measure of relative concentration of affluence in the town), and the town's median household income.

¹² Others have instead included all of the SES variables individually as explanatory variables, or used principal-components reductions of the variables. Our Monte Carlo simulations indicated that the wisest specification for these community-level SES variables is to standardize each variable to zero-mean unit-standard-deviation, then sum these measures within the three categories. In the presence of multicollinearity, common in neighborhood-effects studies, small correlations among variables can lead to large, spurious variability in coefficient estimates; it appears that, in our case at least, data-reduction can outperform models that retain all of the original variables, and it appears that a simple summing of standardized variables is a better approach to data reduction than principal components approaches.

¹³ We also have age at first same-day drinking of more than three servings, number of days in the last thirty on which the respondent drank, and perceptions of where others their age get the alcohol they drink.

¹⁴ We do not include RHS variables for Both Parents Present and Older Sibling Present, judging these to more directly influence whether students have ever drunk than the amount they drink.

¹⁵ We do not include RHS variables for School Activities and the Depression Index, judging these to more directly influence the decision whether to drink than the amount consumed in the last 30 days.

¹⁶ We also report root mean squared error for each regression. We do not report R^2 for the regressions, since it has no statistical meaning in the context of simultaneous-equation 2SLS/IV estimations upon which our three-stage estimates are ultimately based.