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Alcohol and Marijuana Use Among College Students: Economic Complements or Substitutes?

Jenny Williams, UIC and Adelaide Uni

Rosalie Liccardo Pacula, RAND and NBER

Frank J. Chaloupka, UIC and NBER

Henry Wechsler, Harvard School of Public Health

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Alcohol and Marijuana Use Among College Students

Purpose

- To investigate the economic relationship between alcohol and marijuana use for college students.

Motivation

- Heightened awareness of the high prevalence of alcohol use and abuse on college campuses has given rise to campuses level policies targeting this problematic behavior.
- Research has found that these policies have been successful at discouraging drinking in general and frequent binge drinking.
- At the same time, marijuana use among college students has risen dramatically.

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WHY SHOULD WE CARE ABOUT COLLEGE STUDENTS IN PARTICULAR?

- There are a number of factors that put college students at greater risk than other young adults of developing illicit drug use behaviors:
 - *Absence of parental controls and oversight.*
 - *Tendency of college students to try new, previously prohibited behaviors.*
 - *Economic ability to afford illicit drugs*
- 2. Even if drug use is transient, it may have long term consequences through educational outcomes and hence human capital accumulation, which is especially relevant to this population.

WHAT WE DO IN THIS STUDY

- Examine own and cross-price effects in annual and thirty-day participation equations for alcohol and marijuana use
 - measures of the monetary price and non-monetary price of using marijuana as well as alcohol are included in the models

- We investigate whether the the relationship between substance use and policy variables differ between
 - males and females
 - minors and college students who are of legal drinking age

SPECIFICATION OF THE MODEL

The decision to use alcohol and/or marijuana among college students can be described by the latent variable model:

$$(1) A_{ij}^* = X_{ij}\beta + P_j\phi + \varepsilon_{ij}$$

$$(2) M_{ij}^* = X_{ij}\alpha + P_j\kappa + \mu_{ij}$$

- X_{ij} represents individual (i) and community-level (j) factors

- P_j is a vector of prices an individual living in community j faces (both the monetary and non-monetary components of price)

We do not observe true demand -- only whether or not the student decides to use each of these substances.

The probability that a student decides to use alcohol and marijuana can be written as :

$$(3) \text{Prob}(A_{ij} = 1) = \text{Prob}(X_{ij}\beta + P_j\phi + \varepsilon_{ij} > 0)$$

$$(4) \text{Prob}(M_{ij} = 1) = \text{Prob}(X_{ij}\alpha + P_j\kappa + \mu_{ij} > 0)$$

STATISTICAL ISSUES

- monetary and non-monetary components of price are measured at both the college level (P_c) and the state level (P_s)
- there may be additional unobserved variables impacting policy variables that induce a correlation among the error terms of individuals coming from the same school and/or state “cluster”
- state sentiment regarding substance use may be correlated with our measured policy variables
- correlation in error terms at the college level is due in large part to the sampling methodology employed in the CAS

DATA

- **The Harvard School of Public Health College Alcohol Study (CAS)**
 - CAS is a nationally representative survey of full-time students at 4 year colleges.
 - Both students and administrators are surveyed
 - We pool the 1993, 1997 & 1999 waves
 - dependent variables for the analysis are:
 - a. marijuana in the last month
 - b. marijuana in the last year
 - c. alcohol in the last month
 - d. alcohol in the last year
 - we also control for a range of individual and college characteristics

Alcohol and Marijuana Use in the Past Month

		Marijuana Use		Total
		NO	YES	
Alcohol Use	NO	0.308	0.007	0.315
	YES	0.543	0.142	0.685
	Total	0.851	0.149	1.000

DATA

B. PRICE AND POLICY VARIABLES: MARIJUANA

- monetary cost of marijuana use measured by DEA 19 Cities price (1982-1998)
 - missing observations
 - measurement error in matching price to college location

- non-monetary component of price is measured by:
 - maximum fine for possession of one ounce of marijuana
 - an indicator for the decriminalization of marijuana use

DATA

C. PRICE AND POLICY VARIABLES: ALCOHOL

➤ monetary cost of marijuana use is measured by the sum of state and federal beer taxes on a 12oz can of beer

- non-monetary component of price is measured by:

-campus level variables:

an indicator for a campus ban on alcohol use by students

availability of alcohol free dorms

indicators for 1 or more than 1bar within a mile of campus

-state level variables:

restrictions on happy hours

restrictions on low price sales

open container laws

➤ state level average price of a pack of 20 cigarettes

Table 3
Thirty Day Prevalence of Marijuana and Alcohol Use

	MARIJUANA		ALCOHOL	
	dF/dx	z-score	dF/dx	z-score
<i>State Indicators Included</i>				
price of an oz of commercial grade MJ	-0.0612	-1.81	-0.0985	-2.13
miles from school to 19 cities match	-0.0003	-2.37	-0.0001	-0.21
out of state match	0.0213	0.53	-0.0355	-0.64
max fine for pot possession	1.64E-05	1.74	-5.28E-06	-0.67
alcohol consumption banned on campus	-0.0191	-2.21	-0.0361	-1.91
one off campus bar within a mile of campus	0.0055	0.29	0.0236	0.62
greater than one off campus bar within a mile of campus	-0.0102	-0.6	0.0386	1.82
alcohol free dorms are available on campus	0.0047	0.86	0.0032	0.37
cigarette price	-0.0271	-0.78	-0.0437	-0.91

Table 3
Thirty Day Prevalence of Marijuana and Alcohol Use

	MARIJUANA		ALCOHOL	
	dF/dx	z-score	dF/dx	z-score
<i>No State Indicators Included</i>				
price of an oz of commercial grade MJ	-0.0049	-0.2	-0.0427	-1.04
mile from scholl to 19 cities match	-0.0003	-2.47	0.0000	-0.18
out of state match	0.0428	1.73	-0.0242	-0.54
decriminalization	0.0089	0.85	0.0056	0.26
max fine for pot possession	2.75E-05	3.61	-4.21E-06	-0.24
beer tax	-2.8007	-1.18	-5.9409	-1.82
state level restrictions on happy hours	-0.0211	-2.08	-0.0261	-1.66
state level restrictions on low prices	0.0047	0.41	0.0222	1.11
state level open container laws	-0.0121	-1.34	-0.0313	-1.93
alcohol consumption banned on campus	-0.0400	-4.05	-0.0915	-3.09
one off campus bar within a mile of campus	0.0145	0.65	0.0677	1.19
greater than one off campus bar within a mile of ca	-0.0071	-0.39	0.0965	2.33
alcohol free dorms are available on campus	0.0045	0.74	0.0014	0.13
cigarette price	0.0186	0.65	-0.0346	-0.77

RESULTS

- In models with state indicators:
 - DEA 19 cities price of marijuana is negative and significant in both marijuana and alcohol use equations
 - banning alcohol consumption on campus is associated with lower levels of alcohol and marijuana use
- In models without state indicators:
 - state level alcohol policy variables support a complementary relationship between alcohol and marijuana use



DIFFERENCES ACROSS AGE AND GENDER

- **DIFFERENCE ACROSS GENDER**
- the wald test rejects the null of identical coefficients across gender
- the only policy that has a differential effect across gender is campus bans on students drinking: bans have a negative effect on marijuana and alcohol use of females ONLY

B. DIFFERENCE ACROSS MINORS AND THOSE OF LEGAL DRINKING AGE

- the wald test rejects the null of identical coefficients across age groups
- there is no (statistical) difference in the response of marijuana use to policy variables across age groups
- the only policy that has a differential effect across age groups is miles between college and matched DEA reporting office: miles has a negative effect on marijuana use of older students ONLY



CONCLUSIONS AND POLICY IMPLICATIONS

1. examination of own- and cross-price effects suggests that alcohol and marijuana are economic complements for college students:
 - monetary price of marijuana
 - campus bans on alcohol use
 - beer tax and state level policies governing access to alcohol
2. recent efforts to reduce college students' social access to alcohol, and curb their binge drinking, has not contributed to the rise in marijuana use among this group
3. Given the price responsiveness of marijuana use found in this study, the drop in the price of marijuana over the past decade is the more likely explanation of the rise in use