Health Policy and Genetic Endowments: Understanding Sources of Response to MLDA laws

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Abstract

This paper uses policy-induced variation in legal access to alcohol in the US to explore interactions between genetic predispositions and health behaviors. It is well known that Minimum Legal Drinking Age (MLDA) laws have discrete impacts on binge drinking behaviors (Fletcher 2018), but less is known about heterogeneity of the effects and the "types" of individuals most and least affected. Using the Add Health data, this paper explores differential policy effects based on polygenic scores PGS, which are genome-wide summary measures predicting health outcomes. Specifically, we leverage PGS for alcoholism, binge drinking, and drinking frequency, but also broader based PGS measures for general risk taking proclivities as well as "off site" PGS for tobacco use to explore heterogeneities in response to the policy and consider mechanisms for the responses.

Like previous literature using the Add Health and other datasets, we find important main effects of MLDA in increasing recent binge drinking episodes by approximately 5 percentage points (see Table 2). The effects are concentrated in males (9 percentage points) (not shown). We also find MLDA effects are concentrated entirely in individuals with high PGS for alcohol use and find similar effects for individuals with high PGS for binge drinking. However, we find that general PGS for risk taking or PGS for neuroticism does not show differential responses to MLDA laws (see Table 2). Interestingly we also find no evidence that individuals with a high PGS for alcohol frequency respond to MLDA. We are also able to compare these results with measures of parental alcoholism as a global proxy for family history.

We next explore whether there is additional heterogeneity by gender. We find suggestive evidence that the neuroticism PGS and general risk taking PGS separates reactions for males but not females and find different substitution patterns between tobacco PGS and MLDA reactions by gender.

Tables

Table 1
Add Health Wave 3 Summary Statistics
Sample with DNA and European Ancestry

Variable	Obs	Mean	Std Defv	Min	Max
Binge Drink Last 2 Weeks?	4,824	0.40	0.49	0	1
Age (W3)	4,852	21.83	1.76	18	27
Age 21	4,852	0.75	0.43	0	1
Male	4,852	0.46	0.50	0	1
White	4,852	0.98	0.13	0	1
Alcoholic Parent?	4,340	0.17	0.37	0	1
Alcohol PGS (std)	4,852	-0.01	1.00	-3.9	4.1
Risk Taking PGS (std)	4,852	0.00	1.00	-3.7	3.4

Table 2
MLDA Effects on Binge Drinking Behavior
Main Effects and Stratified Results based on PGS

Outcome	Binge Drink	Binge Drink	Binge Drink	Binge Drink	Binge Drink	Binge Drink	Binge Drink
Sample	Full	DNA Sample	DNA Sample	DNA Sample High Alcohol PGS	DNA Sample Low Alcohol PGS	DNA Sample High Risk PGS	DNA Sample Low Risk PGS
VARIABLES							
Age>=21	0.048***	0.057**	0.058**	0.110***	0.008	0.071**	0.051
	(0.014)	(0.025)	(0.025)	(0.035)	(0.035)	(0.035)	(0.035)
Age (W3)	0.021	0.028	0.027	0.001	0.049	0.041	0.013
	(0.013)	(0.024)	(0.024)	(0.034)	(0.033)	(0.034)	(0.034)
Age-squared	-0.001***	-0.001**	-0.001**	-0.001	-0.001**	-0.001*	-0.001
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Male	0.186***	0.201***	0.203***	0.220***	0.183***	0.223***	0.184***
	(0.007)	(0.014)	(0.014)	(0.020)	(0.020)	(0.020)	(0.020)
PC			1.326	1.751	0.152	-0.275	3.010*
			(1.151)	(1.687)	(1.809)	(1.773)	(1.668)
Constant	0.172	0.212	0.226	0.536	-0.055	0.027	0.435
	(0.145)	(0.269)	(0.269)	(0.383)	(0.379)	(0.378)	(0.382)
Observations	15,074	4,824	4,824	2,367	2,457	2,411	2,413
R-squared	0.042	0.045	0.051	0.065	0.049	0.063	0.049

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