



The Devil's in the Details: Identifying the Link between Access to Alcohol and Criminal Behavior

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Disclaimer

Research highlight

Background

Data & Identification

Key Findings

Concluding remarks

Disclaimer

The results in this paper are not official statistics, they have been created for research purposes from the Integrated Data Infrastructure (IDI) managed by Statistics New Zealand. The opinions, findings, recommendations and conclusions expressed in this paper are those of the author(s) not Statistics NZ.

Access to the anonymised data used in this study was provided by Statistics NZ in accordance with security and confidentiality provisions of the Statistics Act 1975. Only people authorised by the Statistics Act 1975 are allowed to see data about a particular person, household, business or organisation and the results in this [report, paper] have been confidentialised to protect these groups from identification.

Careful consideration has been given to the privacy, security and confidentiality issues associated with using administrative and survey data in the IDI. Further detail can be found in the Privacy impact assessment for the Integrated Data Infrastructure available from www.stats.govt.nz.

Research highlight

Highlights

- ✦ We provide NZ-specific evidence on the impact of minimum legal age of purchasing alcohol (MLPA) on youth crime.
- ✦ Focusing on alcohol-related crimes in two (5-year) periods, empirical analysis incorporates RDD method to estimate the local average treatment effects of interest.
- ✦ Our study suggests that age-specific trends in overall alcohol-related crimes are likely to be driven by other relevant legislations (such as drunk driving laws).
- ✦ For an unbiased estimation of the effect of MLPA on youth crime, one needs to account for confounding influences of those regulations.

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Background

- Alcoholism imposes large social costs.
 - Increases delinquency - Crime and risky behavior (Sen, 2002; Cook & Moore, 2002; French & Maclean, 2006).
 - Has adverse health impacts - Substance abuse and traffic accidents (Young, 1993; Ruhm, 1996; Chatterji et al, 2004; Carpenter, 2007)
- Allowing youth access to alcohol therefore poses a potential threat to the society.
 - Most economies regulate youth access to alcohol through regulations on minimum legal drinking age (MLDA) below which it is illegal to consume/purchase alcohol.
 - The United States is a classic example where MLDA is set to 21 since 1988.
 - In contrast, NZ presents a distinct legislative setting as it regulates the minimum legal purchasing age (MLPA) rather than the legal age of consuming alcohol.

- The social consequences of MLDA have been extensively studied in the literature.
 - The related space is dominated by evidence from US-based studies.
 - Not much literature on the impact of MLPA.
- The most widely studied outcomes include substance use, criminal offense/ victimization, and traffic-related accidents and fatality.
 - Evidence on substance use including alcohol consumption and drug use (Yoruk & Yoruk, 2011; Crost & Rees 2013).
 - Evidence on criminal offense/ victimization (Carpenter & Dobkin, 2015; 2017; Callaghan et al., 2016; Chalfin et al, 2019)
 - Evidence on traffic-related crash and other injuries (Lindo et al. 2016; Carpenter & Dobkin, 2017; **Boes & Stillman, 2017**)

New Zealand's Legislative Setting

- Since 1969 until December 1999, MLPA was 20 in NZ (Sale of Liquor Act 1969).
- In December 1999, MLPA was lowered to 18 (Sale of Liquor Amendment Act 1999).
 - Most NZ-based studies in this space look at the effect of change in the law in a DID framework.
 - Studied outcomes include health outcomes such as ED admissions due to intoxication (Everitt et al. 2015 ↑); traffic incidents (Kypri et al., 2006; 2017 ↑ for 15-19 year olds; Huckle & Parker 2019 ↑).
 - Boes & Stillman (2017) look at both the impact of MLPA and the law change on traffic-related crashes.
 - Find a short-run increase in traffic crashes after individual's 18th birthday.
- Other important NZ regulations that can influence trends in criminal convictions.
 - Blood and Breath Alcohol Limit (BBAC) regulations. Lower tolerance for individuals aged under 20.
 - Oranga Tamariki Act of 1989 - Individuals aged under 17 are to be tried in Youth Court and less punitive (plausibly promising RIP).
 - Land Transport (Driver Licensing) Rule 1999 - Age eligibility for drivers' license has been at least 16 years in NZ.

BBAC Limit - History

Timeline of Legislative Regulations on Blood and Breath Alcohol Limit

Regulation	Time of enforcement	Relevant general provisions	Legal breath and blood alcohol limit	
			20 years & above	Under 20 years
Transport Amendment Act (No. 3) 1992	April 1993	Introduction of compulsory breath testing and legal blood and breath alcohol limits introduced for those under 20 years	<ul style="list-style-type: none"> - Breath limit: 400 µg/litre - Blood alcohol level limit: 80mg/100ml 	<ul style="list-style-type: none"> - Breath limit: 150 µg/litre - Blood alcohol level limit: 30mg/100ml
Land Transport (Road Safety and Other Matters) Amendment Act 2011	August 2011	The legal blood alcohol limit and the breath limit for those under 20 years is lowered to zero.	<ul style="list-style-type: none"> - Breath limit: 400 µg/litre - Blood alcohol level limit: 80mg/100ml 	Both breath and blood alcohol limits set to zero
Land Transport (Road Safety and Other Matters) Amendment Act 2011	September 2012	The concept of interlock license and zero alcohol licenses are introduced to allow a previously convicted person (regardless of his/her age) to drive but with a zero blood alcohol and breath limit.	<ul style="list-style-type: none"> - Breath limit: 400 µg/litre - Blood alcohol level limit: 80mg/100ml 	Both breath and blood alcohol limits continue to be zero
The Land Transport Amendment Act (no 2) 2014	December 2014	New breath alcohol and blood alcohol limit for drivers aged 20 years and over.	<ul style="list-style-type: none"> - Breath limit: 250 µg/litre - Blood alcohol level limit: 50mg/100ml 	Both breath and blood alcohol limits continue to be zero

Our Contribution

- First study to provide comprehensive evidence on the impact of MLPA (and not MLDA) on youth crime.
- Adds to the international evidence in literature characterized by US-based empirical evidence.
 - NZ presents a unique legislative framework and compared to the US (or other MLDA jurisdictions), the crime rate is much lower.
 - One of the very few studies (other than Carpenter & Dobkin's 2015 study) to look at specific crimes that can be attributed to alcohol or drinking/ violation of liquor laws.
 - Utilizes extremely detailed offence classification to disentangle the confounding influences of other relevant regulations.
 - By focusing on two distinct periods specific to two MLPA's, our analysis provides suggestive evidence on differences in youth response to greater access to alcohol.

Data & Identification

- Study periods - 1994-1998 for evidence on **MLPA 20** and 2013-2017 for evidence on **MLPA 18**
 - Data is at the monthly level.
- Ministry of Justice Court Charges Data
 - Selected all court charges that were found guilty (convictions).
 - Using the detailed offence coding system under NZ law (as a part of New Zealand Crime and Safety Survey), a total of 211 crimes can be attributed to alcohol offences or violations of liquor regulations.
 - These crimes are classified into **age-dependent** and **independent** categories.
 - Other broad criminal categories (property, violence, burglary etc.) are considered based on ANZSOC classification systems.

Examples of classification of alcohol-related crimes

Few examples of different classifications of alcohol-related crimes

Traffic-related alcohol crimes	
Age-dependent	Age-independent
- <i>"Person under 20 Yr exceeded blood alcohol limit"</i>	- <i>"Driving under influence"</i>
- <i>"Breath alcohol level exceeded 250 mcgs but not more than 400 mcgs"</i>	- <i>"Excess breath alcohol, causing injury"</i>
Other alcohol crimes	
Age-dependent	Age-independent
- <i>"Person under 18 purchases liquor"</i>	- <i>"Alcohol offences"</i>
- <i>"Person under 18 without parent/guardian has alcohol to consume in public place"</i>	- <i>"Miscellaneous liquor offences"</i>

- Proxy of population cohort of individual aged between 16 and 22 is created using Department of Internal Affairs (DIA) Birth Registry.
 - Removed the deceased individuals using DIA Death Registry.
 - Demographic controls are derived from a combination of Birth Registry and Personal Details data.
- To test the direct impact of MLPA on alcohol consumption, NZ Health Survey has been used (administered by the Ministry of Health).
 - Surveys between 2010 and 2015 were used due to availability of birth year and month information.

Descriptive information - MOJ data

Variables	Mean (1994-1998)	Mean (2013-2017)
Male	0.508	0.513
European	0.619	0.600
Maori	0.217	0.244
Pacific Peoples	0.050	0.062
Asian	0.011	0.017
MELAA	0.009	0.012
<i><u>Crime rates (per 100000 population)</u></i>		
Sex & Violence	109.615	78.105
Against justice	163.922	150.395
Burglary & Theft	260.103	112.444
Dangerous Acts	139.388	51.085
Drugs	82.922	19.854
Fraud & Deception	48.712	11.498
Property Damage	80.121	43.351
Public Order	125.986	35.534
Traffic	102.971	113.027
Weapon	25.505	15.503
Alcohol - All	143.781	78.651
Alcohol age-independent	99.306	56.353
Traffic age independent	97.999	54.781
Traffic age dependent	35.614	22.785
Other alcohol age independent	1.308	1.572
Other alcohol age <u>dependent</u>	10.150	0.000
Observations (age-time)	4380	4380

- Local average treatment effects from sharp regression discontinuity (RD) design.
- Methodology:

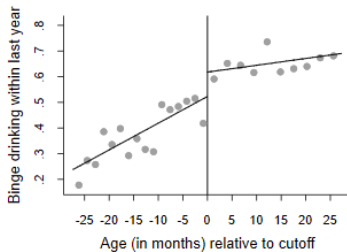
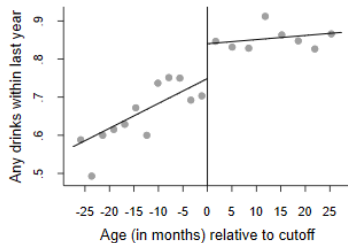
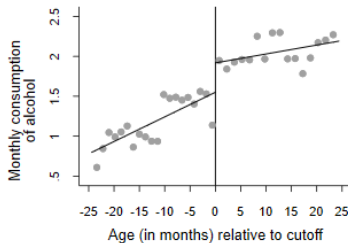
$$Y_a = \alpha + \rho \cdot \mathbf{1}\{age \geq MLPA\} + \gamma \cdot (age - MLPA) +$$

$$\delta \cdot [(age - MLPA) * \mathbf{1}\{age \geq MLPA\}] + \mathbf{X} \cdot \boldsymbol{\Gamma} + \lambda_t + \epsilon_a$$

where MLPA = Minimum Legal Alcohol Purchasing Age

Key Findings

Alcohol purchasing age & alcohol consumption



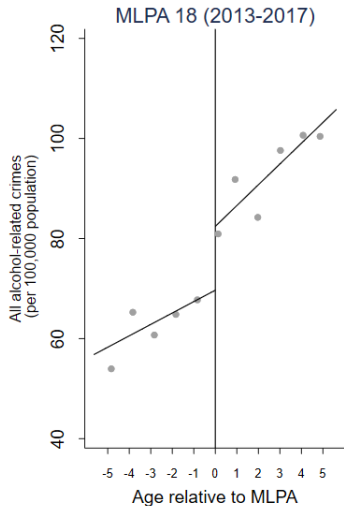
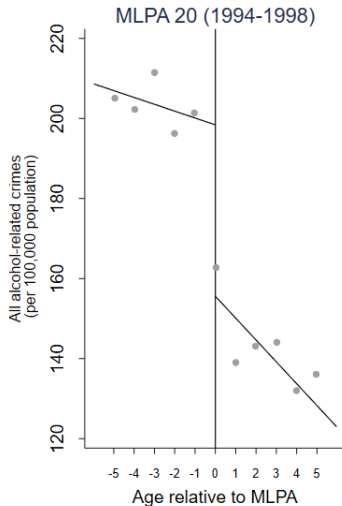
RD estimates of the 'First-stage' evidence

Table 1

Measures of alcohol consumption (2010-2015 NZHS)	Estimates
Log monthly consumption	0.388*** (0.130)
Any drinking in the past year	0.118*** (0.028)
Binge drinking in the past year	0.106*** (0.035)
Observations	66192

Notes: A triangular kernel is used to construct local polynomial estimators. Mean squared error-optimal bandwidths following Calonico, Cattaneo, and Titiunik (2014), h , determine the neighborhood of the age cut-off examined. Local linear regression is used to construct point estimators. Robust standard errors are clustered on the age in months. Models include cohort fixed effects. *, **, and *** signify statistical significance at the 10, 5, and 1 percent-levels, respectively.

All alcohol-related crimes - Contradictory effects!



All alcohol-related crimes - RD estimates

Table 2

	1994-1998 Estimates		2013-2017 Estimates	
	MLPA 20		MLPA 18	
Specification	Linear	Quadratic	Linear	Quadratic
Conventional	-42.9645*** (7.0156)	-42.1457*** (7.0377)	12.8595*** (2.7933)	12.4973*** (3.1215)
Bias-corrected	-39.1864*** (7.0156)	-43.1925*** (7.0377)	13.2868*** (2.7933)	11.5589*** (3.1215)
Robust	-39.1864*** (8.4428)	-43.1925*** (8.6129)	13.2868*** (3.4085)	11.5589*** (3.7351)
Effective observation (left)	300	420	300	360
Effective observation (right)	360	480	360	420
BW estimate, h	5.965	7.590	5.633	6.444
BW bias, b	10.82	11.47	9.037	9.983

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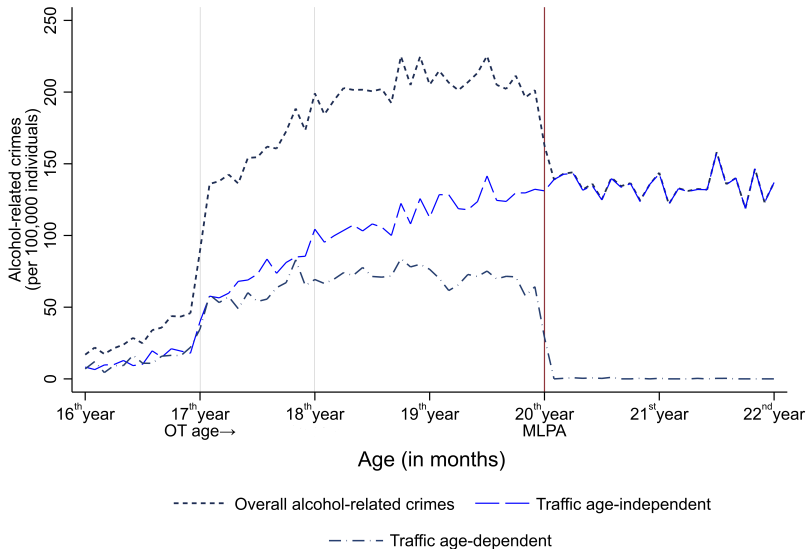
Classifications of crime - The answer lies here

Table 3

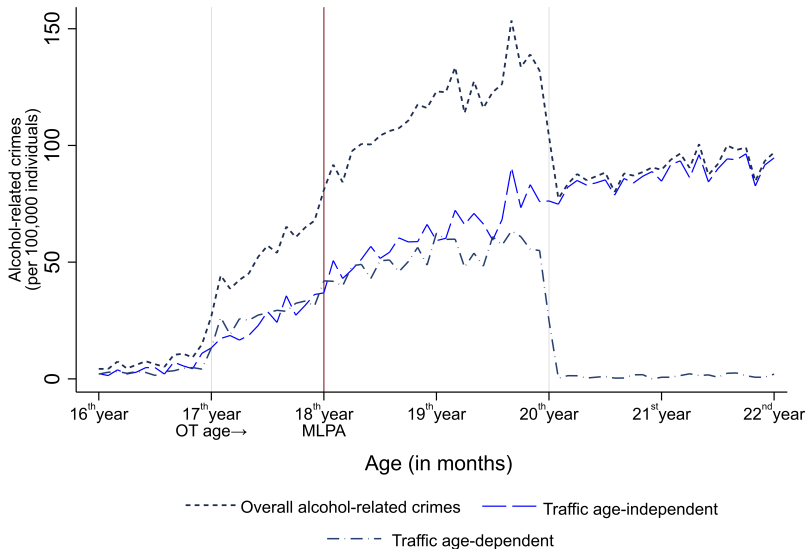
	1994-1998		2013-2017	
	Estimates		Estimates	
	MLPA 20		MLPA 18	
Crime-based outcomes	Linear	Quadratic	Linear	Quadratic
Alcohol age-independent crimes	0.0091 (4.0590)	-0.7595 (4.1867)	5.1090 (3.6249)	1.7828 (5.6787)
Traffic age-independent crimes	-0.2990 (4.1055)	-3.5498 (3.9500)	4.1560 (3.9224)	3.4064 (5.7771)
Traffic age-dependent crimes	-36.2828*** (7.5783)	-38.3127*** (8.2002)	9.2829*** (1.8844)	14.0657*** (1.4567)

Notes: The above table reports regression estimates from robust specification. A triangular kernel is used to construct local polynomial estimators. Mean squared error-optimal bandwidths following Calonico, Cattaneo, and Titiunik (2014), h , determine the neighborhood of the age cut-off examined. Local linear regression is used to construct point estimators. Robust standard errors are clustered on the age in months. Models include cohort fixed effects. *, **, and *** signify statistical significance at the 10, 5, and 1 percent-levels, respectively.

Age-specific crime trends: 1994-1998



Age-specific crime trends: 2013-2017



Supplemental analysis - 'Adulthood' effect & Other crimes

Table 4 – Testing 'Adulthood' effect using Census 2013

	Partnered		Married		Employed		Single household	
	Yr-18	Yr-20	Yr-18	Yr-20	Yr-18	Yr-20	Yr-18	Yr-20
Age threshold	0.0044 (0.0032)	0.0007 (0.0057)	0.0005 (0.0015)	0.00324 (0.00208)	0.0241*** (0.0085)	-0.0003 (0.0088)	0.00917*** (0.00260)	-0.0179** (0.00709)
Observations	54,036	55,479	54,036	55,479	54,036	55,479	54,036	55,479

Notes: The above regression is performed by simple OLS method where the 'Age threshold' variable indicates the individual being aged 18 & over and 20 & over. Sample of individuals with ages up to 6 months on either side of the respective age thresholds. The results hold when the bandwidth is extended to 132 months on the either side of the respective age cut-offs. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 5 - All other crime classifications

Broad ANZSOC classification	Sex & violence	Against justice	Burglary & theft	Dangerous acts	Drug offence	Fraud & deception	Property damage	Public order	Traffic (other)	Weapon
Period 1994-1998 MLPA 20	14.2788 (9.7211)	-3.4103 (13.3850)	-9.0437 (11.9553)	1.0654 (9.3107)	-1.9323 (4.6720)	0.9254 (3.8256)	-6.3439 (6.2616)	17.0890*** (4.2058)	6.8310 (5.1044)	-0.2694 (3.5040)
Period 2013-2017 MLPA 18	6.3362 (4.4010)	6.9206 (5.4934)	-18.6538*** (5.1343)	20.0721*** (2.4514)	-5.4912*** (2.0992)	0.3829 (1.1928)	10.7781*** (3.5245)	7.7439** (3.2334)	19.7115*** (3.8921)	4.6022*** (1.4226)

Notes: The above table reports regression estimates from robust specification. A triangular kernel is used to construct local polynomial estimators. Mean squared error-optimal bandwidths following Calonico, Cattaneo, and Titiunik (2014), h , determine the neighborhood of the age cut-off examined. Local linear regression is used to construct point estimators. Robust standard errors are clustered on the age in months. Models include cohort fixed effects. *, **, and *** signify statistical significance at the 10, 5, and 1 percent-levels, respectively.

Additional robustness checks: Standard RD assumptions

- Placebo tests with fake cutoff - Testing discontinuity in all alcohol-related crimes at 6 months prior- and post- MLPA.
 - No statistically significant variation.
- Individual level analysis - Linear RD in OLS and individual FE specification.
 - Findings consistent with main RDD specification estimated at the (age-time) aggregated level.
- Manipulation testing based on density discontinuity (McCrary 2008; Cattaneo, Jansson & Ma, 2018)
 - The birth information is obtained from administrative register - Unlikely to be manipulated.
 - P-value from conventional and robust specifications indicate insignificant results.
- Testing statistical power of the robust bias-corrected inference methods (Cattaneo, Titiunik & Vazquez-Bare, 2019)
 - All the estimates are at least as large as the usual threshold of 0.8.

Concluding remarks

Summary of findings

- The differential impact of MLPA on all alcohol-related crimes is mainly driven by age-dependent nature of certain criminal convictions.
 - For an unbiased estimation of the causal influence of MLPA on youth crime in NZ setting it is important to isolate the confounding influences of regulations that influence those crimes.
 - E.g. Regulations on age-based differences in blood/breath alcohol limits.
- For criminal convictions that can be prosecuted regardless of perpetrators' age, there is no impact of MLPA on youth criminal behavior.
 - An important contribution to the international literature.
 - Contrasting findings to the US-based evidence.
 - However, for MLPA 18, there is a sharp jump in age-dependent alcohol crimes.
 - It is unclear whether it's due to MLPA only or 'adulthood' effect or a combination of both.
 - The 1994-1998 (when MLPA was 20) plausibly presents a more convincing evidence.

Limitations and future scope

- Data on exact date of birth is not available.
 - Have to limit the analysis at the monthly level only.
 - Crime-based outcome measure is based on criminal convictions (possibility of unobserved behavior).
 - Minor misdemeanors such as violation of liquor bans are issued pre-charge warnings in NZ.
- Future studies can explore more on disentangling the MLPA effects from 'adulthood' impacts.
 - Long-term hospitalization/ crime victimization are other important social outcomes that can be explored using the IDI in future studies (Chalfen, Hansen & Ryley 2019).

Thank You

Thank you very much for your time.

Stay tuned! Working draft coming up soon.

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