

Say No To Drug-Free School Zones

Analyzing the Effects of Relaxing Drug-Free Zone Laws on Crime

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Abstract

This paper analyzes the effects of relaxing Drug-Free Zone (DFZ) laws on crime. DFZ laws are long-standing and wide-spread sentencing laws that harshen the penalties for illegal drug-related activities committed in defined zones around schools and other locations where minors are expected to be present. They were originally created to discourage drug-related crime near and involving minors. However, their efficiency in doing so has not been rigorously evaluated. Using a difference-in-differences model, this paper estimates the effects of policy reforms that relax the severity of DFZ laws on various crime-related outcomes. The analysis yields no evidence of the policy reforms leading to increases in crime; the results do provide weakly significant evidence of possible reductions in the number of arrestees. Overall, these findings suggest that DFZ laws are generally not efficiently defined because their severity can be reduced without causing observed increases in crime. Due to the social, human capital, and fiscal costs associated with incarceration, policy makers should seek to correct these inefficiencies through policy reform.

Table 1: State Drug-Free Zone Policy Reforms

State	Reform Year	Reduced Penalties	Reduced Zone Size	Reduced Applicability	Data Quality or Availability
New Jersey	2010	✓			Not Available
South Carolina	2010			✓	Low Quality
Delaware*	2011	✓	✓		✓
Kentucky	2011	✓	✓		Low Quality
Massachusetts*	2012		✓	✓	✓
Indiana	2013		✓	✓	Low Quality
Connecticut*	2015	✓			✓
Utah*	2015	✓	✓	✓	✓
Illinois	2018		✓	✓	Low Quality

^a Only the emboldened states marked with an asterisk are included in the treatment group for this study due to limited data availability and quality.

Table 2: Data in the Final Sample

State	Non-DFZ Reform Year	DFZ Reform Year	Data Range	State	Non-DFZ Reform Year	DFZ Reform Year	Data Range
AL	2010		2006-2019	NE			1998-2019
AR	2011		2003-2019	NH	2012		2003-2019
AZ	2012		2005-2019	OH	2011		1998-2019
CO	2010		1997-2019	OK	2010		2008-2019
CT	2011	2015	1999-2019	OR	2013		2004-2019
DE	2011	2011	2001-2019	RI	2009		2005-2019
IA			1992-2019	SD	2013		2000-2019
ID	2011		1992-2019	TN			1998-2019
KS	2012		2000-2019	TX			1997-2019
LA	2012		2003-2019	UT	2013	2015	1993-2019
MA	2010	2012	1995-2019	VA			1994-2019
ME			2005-2019	VT	2013		1994-2019
MI	2010		1995-2019	WA	2012		2007-2019
MT			2005-2019	WI			2005-2019
ND	2011		1991-2019	WV	2013		1999-2019

Total pre-reform state-years for treatment states: 65

Total post-reform state-years for treatment states: 27

Total state-years for control states: 515

^a There are three categories of DFZ law reforms: reducing zone size; reducing sentencing penalties; reducing applicability. See Section ?? and Table 1 for more information on the DFZ reforms.

^b There are five general categories of non-DFZ drug law reform legislation: repealing or limiting mandatory penalties; modifying drug sentencing schemes; expanding access to early release mechanisms; expanding or strengthening community corrections; ameliorating collateral consequences. See Appendix in Subramanian & Moreno 2014 for more detailed description.

Table 3: Group Means

Crime Per 100,000	Control	Treatment	Difference
All Incidents	2,456.878 (1,423.426)	2,723.124 (1,560.095)	266.246 (189.441)
Drug Incidents	368.697 (251.372)	340.510 (229.415)	-28.186 (32.781)
School Incidents	124.941 (79.136)	179.504 (108.400)	54.563*** (10.910)
Drug-School Incidents	15.521 (11.212)	16.393 (9.434)	0.872 (1.442)
All Offenders	4,121.297 (2,371.571)	4,591.809 (2,775.341)	470.512 (318.491)
Drug Offenders	476.982 (326.126)	452.567 (309.390)	-24.415 (42.690)
School Offenders	145.832 (92.696)	211.629 (130.986)	65.797*** (12.857)
Drug-School Offenders	20.860 (15.391)	22.693 (13.520)	1.834 (2.000)
All Arrestees	1,156.020 (685.723)	1,467.382 (990.049)	311.362*** (95.528)
Drug Arrestees	358.552 (257.255)	361.746 (259.797)	3.194 (33.900)
School Arrestees	45.357 (32.235)	76.634 (53.126)	31.277*** (4.629)
Drug-School Arrestees	13.612 (10.903)	16.822 (10.621)	3.210** (1.431)
N	515	65	580

Note, Treatment means calculated only using pre-reform data.

Table 4: Incidents of Crime per 100,000 People

	All Incidents	Drug Incidents	School Incidents	Drug-School Incidents
DFZ Reform	-424.2 (314.7) [0.232713] {0.6589}	-71.57 (91.88) [0.513993] {0.6589}	-46.35 (33.68) [0.275132] {0.6589}	-4.460 (2.935) [0.190937] {0.6083}
N	607	607	607	607
Sample Average	2519.51	373.83	131.7	15.84
Baseline Average	2533.95	348.57	141.27	17.81
State Fixed Effects	yes	yes	yes	yes
Year Fixed Effects	yes	yes	yes	yes
Other Reforms	yes	yes	yes	yes

* $p < .10$, ** $p < .05$, *** $p < .01$

^a Clustered standard errors in parentheses; clustered at the state level with a total of 30 states. Wild clustered bootstrapped p-values in square brackets; calculated using 1 million iterations. Romano-Wolf FWER correction p-values in braces; calculated using 10 thousand iterations.

^b Sample averages calculated over the full used sample; baseline averages calculated only using data from 2009 and 2010 since the first DFZ reform was passed in 2011.

Table 5: Offenders per 100,000 People

	All Offenders	Drug Offenders	School Offenders	Drug-School Offenders
DFZ Reform	-692.3 (594.4) [0.320742] {0.6589}	-85.23 (125.2) [0.546365] {0.6589}	-51.34 (37.44) [0.266481] {0.6589}	-5.226 (3.913) [0.239876] {0.6589}
N	607	607	607	607
Sample Average	4219.46	485.06	154.2	21.38
Baseline Average	4285.8	458.41	165.76	24.4
State Fixed Effects	yes	yes	yes	yes
Year Fixed Effects	yes	yes	yes	yes
Other Reforms	yes	yes	yes	yes

* $p < .10$, ** $p < .05$, *** $p < .01$

^a Clustered standard errors in parentheses; clustered at the state level with a total of 30 states. Wild clustered bootstrapped p-values in square brackets; calculated using 1 million iterations. Romano-Wolf FWER correction p-values in braces; calculated using 10 thousand iterations.

^b Sample averages calculated over the full used sample; baseline averages calculated only using data from 2009 and 2010 since the first DFZ reform was passed in 2011.

Table 6: Arrestees per 100,000 People

	All Arrestees	Drug Arrestees	School Arrestees	Drug-School Arrestees
DFZ Reform	-290.7 (171.5) [0.125407] {0.5443}	-108.2 (97.98) [0.32601] {0.6589}	-27.25* (13.74) [0.098713] {0.4534}	-8.433*** (2.633) [0.024997] {0.2372}
N	607	607	607	607
Sample Average	1217.36	365.42	49.3	13.98
Baseline Average	1272.37	354.81	56.98	16.49
State Fixed Effects	yes	yes	yes	yes
Year Fixed Effects	yes	yes	yes	yes
Other Reforms	yes	yes	yes	yes

* $p < .10$, ** $p < .05$, *** $p < .01$

^a Clustered standard errors in parentheses; clustered at the state level with a total of 30 states. Wild clustered bootstrapped p-values in square brackets; calculated using 1 million iterations. Romano-Wolf FWER correction p-values in braces; calculated using 10 thousand iterations.

^b Sample averages calculated over the full used sample; baseline averages calculated only using data from 2009 and 2010 since the first DFZ reform was passed in 2011.

Table 7: Offenders per 100,000 People by Race

Race		All Offenders	Drug Offenders	School Offenders	Drug-School Offenders
Black	DFZ Reform	-1361.4 (1030.4) [0.261393] {0.5719}	-92.81 (484.7) [0.862207] {0.8666}	-124.4** (49.39) [0.023118] {0.3963}	-15.42 (9.289) [0.140073] {0.5544}
	Sample Average	7611.12	1294.37	315.65	43.15
	Baseline Average	7663.68	1245.95	361.57	45.16
White	DFZ Reform	-304.3 (227.6) [0.222692] {0.5312}	-40.74 (103.6) [0.711167] {0.7136}	-24.79 (17.57) [0.246281] {0.5312}	-5.917* (3.236) [0.114455] {0.4358}
	Sample Average	2030.17	405.01	77.68	19.01
	Baseline Average	2041.73	380.34	84.13	22.21
N		607	607	607	607
State Fixed Effects		yes	yes	yes	yes
Year Fixed Effects		yes	yes	yes	yes
Other Reforms		yes	yes	yes	yes

* $p < .10$, ** $p < .05$, *** $p < .01$

^a Clustered standard errors in parentheses; clustered at the state level with a total of 30 states. Wild cluster bootstrapped p-values in square brackets; calculated using one million iterations. Romano-Wolf familywise error rate correction p-values in braces; calculated using ten thousand iterations.

^b Sample averages calculated over the full used sample; baseline averages calculated only using data from 2009 and 2010 since the first DFZ reform was passed in 2011.

Table 8: Arrestees per 100,000 People by Race

Race		All Arrestees	Drug Arrestees	School Arrestees	Drug-School Arrestees
Black	DFZ Reform	-721.4 (576.3) [0.297815] {0.5719}	-174.7 (409.4) [0.694144] {0.7808}	-95.93** (39.67) [0.020701] {0.4164}	-18.63*** (5.845) [0.027224] {0.2697}
	Sample Average	3577.44	1009.09	164.97	30.26
	Baseline Average	3665.49	985.41	197.84	33.73
White	DFZ Reform	-170.0 (124.6) [0.218175] {0.5312}	-58.47 (74.93) [0.477164] {0.6243}	-19.36 (11.42) [0.194076] {0.4376}	-7.828*** (2.534) [0.027117] {0.2310}
	Sample Average	1030.33	313.94	39.9	12.71
	Baseline Average	1066.04	302.9	45.56	15.09
	N	607	607	607	607
	State Fixed Effects	yes	yes	yes	yes
	Year Fixed Effects	yes	yes	yes	yes
	Other Reforms	yes	yes	yes	yes

* $p < .10$, ** $p < .05$, *** $p < .01$

^a Clustered standard errors in parentheses; clustered at the state level with a total of 30 states. Wild cluster bootstrapped p-values in square brackets; calculated using one million iterations. Romano-Wolf familywise error rate correction p-values in braces; calculated using ten thousand iterations.

^b Sample averages calculated over the full used sample; baseline averages calculated only using data from 2009 and 2010 since the first DFZ reform was passed in 2011.

Table 9: Incidents of Crime per 100,000 People – excluding DE & UT

	All Incidents	Drug Incidents	School Incidents	Drug-School Incidents
DFZ Reform	-201.7 (258.8) [0.5295] {0.6365}	-196.5*** (63.98) [0.1831] {0.1596}	3.257 (14.34) [0.8365] {0.7447}	-5.949 (4.126) [0.4664] {0.5520}
N	561	561	561	561
Sample Average	2399.16	354.52	123.24	15.11
Baseline Average	2388.87	329.46	133.28	16.96
State Fixed Effects	yes	yes	yes	yes
Year Fixed Effects	yes	yes	yes	yes
Other Reforms	yes	yes	yes	yes

* $p < .10$, ** $p < .05$, *** $p < .01$

^a Clustered standard errors in parentheses; clustered at the state level with a total of 28 states. Wild cluster bootstrapped p-values in square brackets; calculated using 1 million iterations. Romano-Wolf FWER correction p-values in braces; calculated using 10 thousand iterations.

^b Sample averages calculated over the full used sample; baseline averages calculated only using data from 2009 and 2010 since the first DFZ reform was passed in 2011.

^c Only Massachusetts and Connecticut are included as treatment units; Delaware and Utah are excluded from the sample.

Table 10: Offenders per 100,000 People – excluding DE & UT

	All Offenders	Drug Offenders	School Offenders	Drug-School Offenders
DFZ Reform	-244.2 (446.1) [0.6453] {0.7373}	-254.0*** (79.68) [0.1803] {0.1436}	2.293 (17.31) [0.9058] {0.7882}	-7.636 (5.037) [0.3831] {0.5338}
N	561	561	561	561
Sample Average	4019.12	458.42	143.71	20.27
Baseline Average	4056.67	433.57	156.65	23.2
State Fixed Effects	yes	yes	yes	yes
Year Fixed Effects	yes	yes	yes	yes
Other Reforms	yes	yes	yes	yes

* $p < .10$, ** $p < .05$, *** $p < .01$

^a Clustered standard errors in parentheses; clustered at the state level with a total of 28 states. Wild cluster bootstrapped p-values in square brackets; calculated using 1 million iterations. Romano-Wolf FWER correction p-values in braces; calculated using 10 thousand iterations.

^b Sample averages calculated over the full used sample; baseline averages calculated only using data from 2009 and 2010 since the first DFZ reform was passed in 2011.

^c Only Massachusetts and Connecticut are included as treatment units; Delaware and Utah are excluded from the sample.

Table 11: Arrestees per 100,000 People – excluding DE & UT

	All Arrestees	Drug Arrestees	School Arrestees	Drug-School Arrestees
DFZ Reform	-150.7 (122.5) [0.3142] {0.5520}	-196.9*** (56.34) [0.1745] {0.1091}	-5.775 (6.128) [0.3853] {0.5790}	-7.942** (2.870) [0.1678] {0.2088}
N	561	561	561	561
Sample Average	1131.05	344.38	44.41	13.15
Baseline Average	1166.51	329.9	51.2	15.35
State Fixed Effects	yes	yes	yes	yes
Year Fixed Effects	yes	yes	yes	yes
Other Reforms	yes	yes	yes	yes

* $p < .10$, ** $p < .05$, *** $p < .01$

^a Clustered standard errors in parentheses; clustered at the state level with a total of 28 states. Wild cluster bootstrapped p-values in square brackets; calculated using 1 million iterations. Romano-Wolf FWER correction p-values in braces; calculated using 10 thousand iterations.

^b Sample averages calculated over the full used sample; baseline averages calculated only using data from 2009 and 2010 since the first DFZ reform was passed in 2011.

^c Only Massachusetts and Connecticut are included as treatment units; Delaware and Utah are excluded from the sample.

Table 12: Offenders per 100,000 People by Race – excluding DE & UT

Race		All Offenders	Drug Offenders	School Offenders	Drug-School Offenders
Black	DFZ Reform	-1038.4 (704.2) [0.2449] {0.2125}	-583.1** (220.5) [0.1901] {0.1752}	-56.02** (24.71) [0.2007] {0.1771}	-25.36** (10.03) [0.1710] {0.1771}
	Sample Average	7310.29	1231.1	297.7	41.41
	Baseline Average	7317.21	1181.78	346.89	43.4
	DFZ Reform	-170.0 (189.3) [0.4071] {0.5017}	-202.9*** (52.57) [0.1702] {0.0364}	0.474 (9.724) [0.9698] {0.8412}	-6.570 (4.049) [0.2980] {0.3991}
	Sample Average	1932.05	385.99	72.69	18.05
	Baseline Average	1928.78	363.04	78.93	21.06
N		561	561	561	561
State Fixed Effects		yes	yes	yes	yes
Year Fixed Effects		yes	yes	yes	yes
Other Reforms		yes	yes	yes	yes

* $p < .10$, ** $p < .05$, *** $p < .01$

^a Clustered standard errors in parentheses; clustered at the state level with a total of 28 states. Wild cluster bootstrapped p-values in square brackets; calculated using 1 million iterations. Romano-Wolf FWER correction p-values in braces; calculated using 10 thousand iterations.

^b Sample averages calculated over the full used sample; baseline averages calculated only using data from 2009 and 2010 since the first DFZ reform was passed in 2011.

^c Only Massachusetts and Connecticut are included as treatment units; Delaware and Utah are excluded from the sample.

Table 13: Arrestees per 100,000 People by Race – excluding DE & UT

Race		All Arrestees	Drug Arrestees	School Arrestees	Drug-School Arrestees
Black	DFZ Reform	-464.0	-481.5***	-34.77**	-20.14***
		(368.1)	(172.9)	(16.44)	(7.190)
		[0.3145]	[0.1787]	[0.1921]	[0.1716]
		{0.2313}	{0.1752}	{0.1771}	{0.1752}
	Sample Average	3386.26	952.33	153.15	28.84
	Baseline Average	3432.77	919.67	184.79	31.61
White	DFZ Reform	-62.95	-149.4***	-1.864	-6.671**
		(99.62)	(40.33)	(5.769)	(2.540)
		[0.5609]	[0.1740]	[0.7896]	[0.1763]
		{0.6227}	{0.0430}	{0.7174}	{0.1391}
	Sample Average	966.22	298.57	36.75	12.01
	Baseline Average	984.49	284.52	41.41	14.08
	N	561	561	561	561
	State Fixed Effects	yes	yes	yes	yes
	Year Fixed Effects	yes	yes	yes	yes
	Other Reforms	yes	yes	yes	yes

* $p < .10$, ** $p < .05$, *** $p < .01$

^a Clustered standard errors in parentheses; clustered at the state level with a total of 28 states. Wild cluster bootstrapped p-values in square brackets; calculated using 1 million iterations. Romano-Wolf FWER correction p-values in braces; calculated using 10 thousand iterations.

^b Sample averages calculated over the full used sample; baseline averages calculated only using data from 2009 and 2010 since the first DFZ reform was passed in 2011.

^c Only Massachusetts and Connecticut are included as treatment units; Delaware and Utah are excluded from the sample.

Table 14: RDD first stage & reduced form estimates

	Coefficient	Std. Error	Z Score	95% Conf. Interval
First Stage	0.3859***	0.0308	12.5222	[0.3255, 0.4463]
Reduced Form	249.3***	51.2680	4.8627	[148.821, 349.789]

* $p < .10$, ** $p < .05$, *** $p < .01$

Computed with triangular kernel and bin size of 2.

Table 15: 2SLS using Z_3 to instrument for cal_int

	Productivity
cal_int	0.2352*** (0.0661)
N	1000
Sample Average	627.0161

* $p < .10$, ** $p < .05$, *** $p < .01$

Standard errors reported in parentheses.

Category	Average 2003-2005	Average 2006-2008	Average 2009-2010	Average 2011-2013	Average 2014-2016	Average 2017-Mar 2020	2020 (Pandemic)
Market work	37.38	38.16	35.1	35.66	36.55	36.45	32.12
Other income	0.15	0.15	0.25	0.16	0.11	0.24	0.24
Job search	0.27	0.37	0.56	0.47	0.44	0.36	0.27
Child care	2.9	2.82	2.98	2.84	2.76	2.69	2.39
Nonmarket work	14.52	13.78	35.1	13.39	13.66	13.19	14.6
Core home production	5.53	5.75	5.83	5.89	6.13	6.02	7.01
Home ownership	3.21	2.95	2.93	2.48	2.56	2.41	3.59
Obtaining goods	4.13	3.93	4.05	3.89	3.87	3.7	3.08
Others care	1.64	1.13	1.21	0.99	1.1	1.05	0.91
Leisure	108.25	108.62	110.36	110.9	110.35	110.7	115.19
TV	18.61	19.29	20.33	20.08	19.66	19.15	20.76
Socializing	7.48	7.24	7.23	7.56	7.61	7.63	8.82
Sleeping	58.51	58.88	59.39	59.83	60.19	60.99	62.27
Eating and personal	12.99	12.76	12.84	12.85	12.44	12.37	11.68
Other leisure	10.64	10.43	10.54	10.58	10.44	10.55	11.66
Other	4.49	4.07	4.69	4.59	4.13	4.38	3.19
Education	1.97	1.54	1.98	2.3	1.75	2.3	1.73
Civic	1.68	1.75	1.88	1.62	1.71	1.42	0.86
Own medical care	0.83	0.77	0.82	0.66	0.67	0.66	0.6

Category	Average 2003-2005	Average 2006-2008	Average 2009-2010	Average 2011-2013	Average 2014-2016	Average 2017-Mar 2020	2020 (Pandemic)
Market work	31.48	32.53	30.41	30.54	31.16	31.68	27.46
Other income	0.16	0.16	0.24	0.21	0.16	0.21	0.17
Job search	0.2	0.27	0.42	0.39	0.32	0.31	0.28
Child care	4.84	4.57	4.47	4.41	4.4	4.18	3.98
Nonmarket work	18.78	17.78	17.58	17.03	17.26	16.61	18.17
Core home production	9.56	9.38	9.38	9.42	9.54	9.36	10.45
Home ownership	2.4	2.17	2.11	1.88	1.88	1.71	2.74
Obtaining goods	5.2	5.03	4.84	4.61	4.71	4.42	3.91
Others care	1.61	1.19	1.24	1.12	1.12	1.12	1.08
Leisure	107.46	107.71	109.55	110.31	109.66	109.95	113.98
TV	17.03	17.55	18.57	18.52	18.03	17.87	19.22
Socializing	7.82	7.59	7.59	7.65	7.53	7.41	7.96
Sleeping	59.3	59.54	60.18	60.79	61.13	61.76	63.18
Eating and personal	13.36	13.26	13.32	13.36	13.06	12.96	12.1
Other leisure	9.93	9.74	9.86	9.99	9.92	9.95	11.52
Other	5.03	4.95	5.29	5.1	5.03	5.06	3.95
Education	2.11	2	2.16	2.29	2.16	2.45	2.18
Civic	1.93	1.98	2.15	1.93	1.95	1.76	1.01
Own medical care	0.98	0.96	0.97	0.88	0.92	0.84	0.77

Category	Average 2003-2005	Average 2006-2008	Average 2009-2010	Average 2011-2013	Average 2014-2016	Average 2017-Mar 2020	2020 (Pandemic)
Market work	37.38	38.16	35.1	35.66	36.55	36.45	32.12
Other income	0.15	0.15	0.25	0.16	0.11	0.24	0.24
Job search	0.27	0.37	0.56	0.47	0.44	0.36	0.27
Child care	2.9	2.82	2.98	2.84	2.76	2.69	2.39
Nonmarket work	14.52	13.78	35.1	13.39	13.66	13.19	14.6
Core home production	5.53	5.75	5.83	5.89	6.13	6.02	7.01
Home ownership	3.21	2.95	2.93	2.48	2.56	2.41	3.59
Obtaining goods	4.13	3.93	4.05	3.89	3.87	3.7	3.08
Others care	1.64	1.13	1.21	0.99	1.1	1.05	0.91
Leisure	108.25	108.62	110.36	110.9	110.35	110.7	115.19
TV	18.61	19.29	20.33	20.08	19.66	19.15	20.76
Socializing	7.48	7.24	7.23	7.56	7.61	7.63	8.82
Sleeping	58.51	58.88	59.39	59.83	60.19	60.99	62.27
Eating and personal	12.99	12.76	12.84	12.85	12.44	12.37	11.68
Other leisure	10.64	10.43	10.54	10.58	10.44	10.55	11.66
Other	4.49	4.07	4.69	4.59	4.13	4.38	3.19
Education	1.97	1.54	1.98	2.3	1.75	2.3	1.73
Civic	1.68	1.75	1.88	1.62	1.71	1.42	0.86
Own medical care	0.83	0.77	0.82	0.66	0.67	0.66	0.6