College of Public Health and Human Sciences

Impact of Substance Abuse Parity Legislation on Suicide

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Outline

- Background
- Method
- Results
- Discussion

Background (1)

- Annually 88,000 deaths due to alcohol related causes in the US
- Suicide – 4th leading cause of alcohol attributable deaths
- Strong association between alcohol and suicide
- In 2013, 16.6 millions adults have an alcohol use disorder – 1.3 millions received treatment
- Lack of health insurance coverage leads to inadequate treatment
- Improve access to behavioral health services would reduce alcohol attributable deaths

Background (2)

Mental health and substance abuse parity laws

Why?

- Improve coverage of behavioral services
- Put mental health and substance abuse on “par” to physical health

Types?

- **Full parity**
- **Mandated offering**
- Mandated benefit

History:

- California 1974
- Increased parity legislation by 2002
- Moved away from parity legislation

Background (3)

- Significant variation among state mental health and substance abuse laws
- Limited evidence on impacts of mental health and substance abuse parity laws
  - Expand access to care, increase treatment admission
- No research on impact of substance abuse parity laws on suicide/ alcohol-attributable suicide

Whether or not substance abuse parity laws contribute to a reduction in state suicide and state alcohol-attributable suicide?

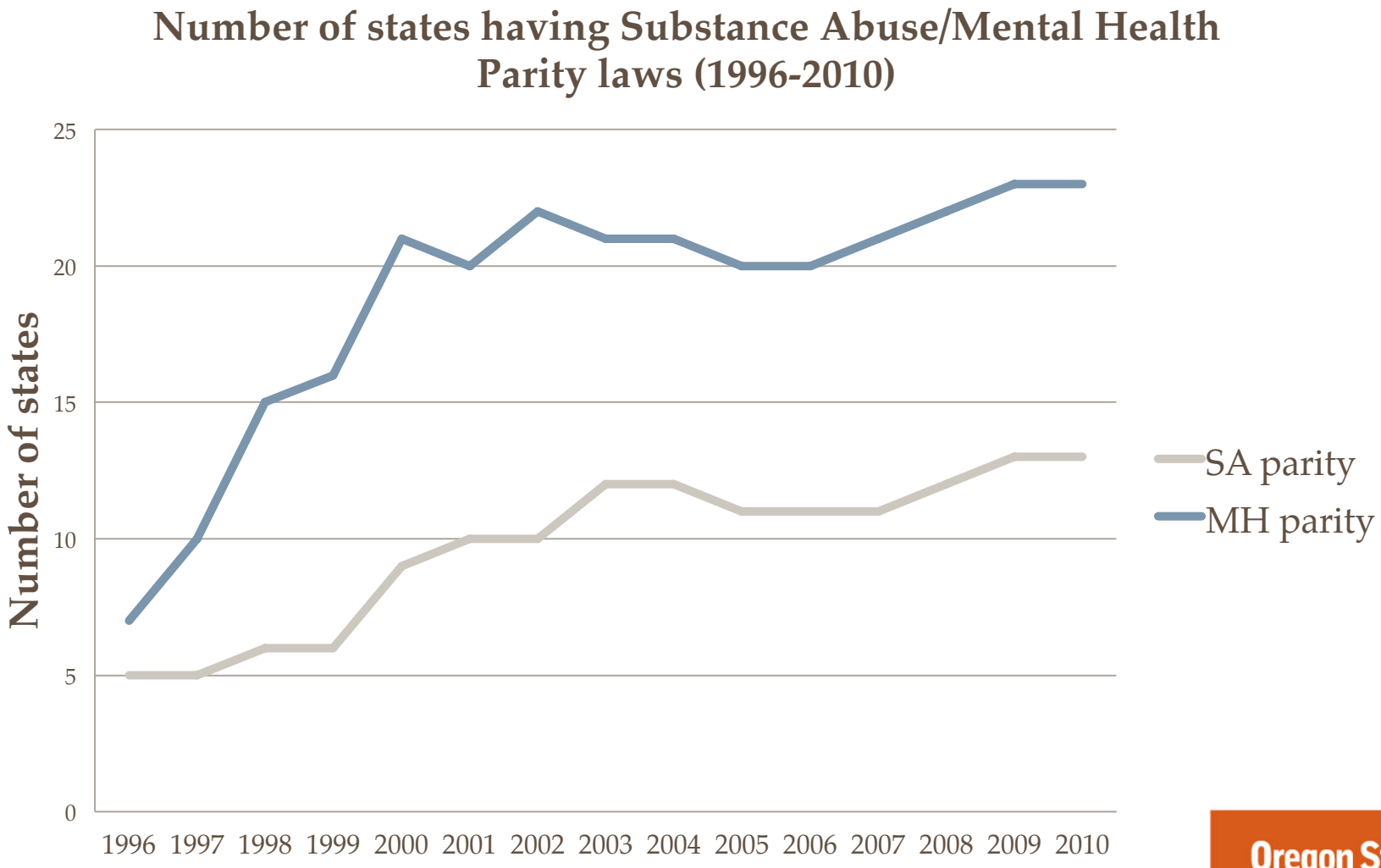
Method (1)

- **Data:** 15 year-state panel data for 50 states and DC (1996 – 2010) (N = 765)
- **Dependent variables:**
  - Suicide (*S*): suicide rates per 100,000 population
  - Alcohol-attributable suicide (S^{alco}): alcohol-attributable suicide rates per 100,000 population
- **Main independent variables:**
  - Substance abuse parity (Par^{SA}) - binary
  - Mental health parity (Par^{MH}) - binary
  - Par^{SA} x Par^{MH}
- **State covariates:** socio-demographic characteristics, economic condition, per-capita substance/mental health treatment beds

Method (2): Descriptive statistics

Variables	Mean	SD
Dependent variables		
S	12.56	3.50
S_{male}	20.46	5.55
S_{female}	4.89	1.56
S^{Alco}	5.80	1.80
S_{male}^{Alco}	7.90	2.40
S_{female}^{Alco}	3.75	1.37
Main independent variables		
Par^{SA}	0.19	0.39
Par^{MH}	0.37	0.48
Par^{SA} x Par^{MH}	0.15	0.36

Method (3): Parity law trends



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Method (4): Empirical models

OLS models:

$$\begin{cases} S_{st} \\ S_{st}^{Alco} \end{cases} = \beta_1 \cdot Par_{st}^{SA} + \beta_2 \cdot Par_{st}^{MH} + X_{st} \cdot \beta + \varepsilon_{st}$$

$$\begin{cases} S_{st} \\ S_{st}^{Alco} \end{cases} = \beta_1 \cdot Par_{st}^{SA} + \beta_2 \cdot Par_{st}^{MH} + \beta_3 \cdot Par_{st}^{SA} \times Par_{st}^{MH} + X_{st} \cdot \beta + \varepsilon_{st}$$

S = Alcohol attributable suicide rates per 100,000 populations

S^{Alco} = Alcohol attributable suicide rates per 100,000 populations

Par^{SA} = Substance abuse parity laws

Par^{MH} = Mental Health parity laws

X = covariates

s & *t* index state & year, respectively

Method (5): Empirical models

Two-way fixed-effects models:

$$\begin{cases} S_{st} \\ S_{st}^{Alco} \end{cases} = \beta_1 \cdot Par_{st}^{SA} + \beta_2 \cdot Par_{st}^{MH} + X_{st} \cdot \beta + \alpha_s + t_t + \varepsilon_{st}$$

$$\begin{cases} S_{st} \\ S_{st}^{Alco} \end{cases} = \beta_1 \cdot Par_{st}^{SA} + \beta_2 \cdot Par_{st}^{MH} + \beta_3 \cdot Par_{st}^{SA} \times Par_{st}^{MH} + X_{st} \cdot \beta + \alpha_s + t_t + \varepsilon_{st}$$

α_s : dummies for states

t_t : dummies for time (*year*)

Results

Effect of Substance Abuse Parity laws on suicide (1)

	DVs	Suicide		Alcohol-attributable suicide	
	IVs	OLS	State-year FE	OLS	State-year FE
All	SA parity	**-0.54****	0.16	-0.13	0.05
	MH parity	-0.06	-0.14	-0.04	-0.16
Male	SA parity	-0.54	0.26	-0.02	0.07
	MH parity	-0.42	-0.12	-0.13	-0.08
Female	SA parity	-0.24	0.05	-0.10	0.03
	MH parity	-0.25	-0.17	-0.21*	-0.23

** p<0.05, ** p<0.01*

Effect of Substance Abuse Parity laws on suicide (2)

	DVs	Suicide		Alcohol-attributable suicide	
	IVs	OLS	State-year FE	OLS	State-year FE
All	SA parity	-0.133	0.232	-0.082	0.560
	MH parity	0.026	-0.130	-0.035	-0.085
	SA parity x MH parity	**-0.530**	**-0.107**	**-0.059**	**-0.564**
Male	SA parity	-0.305	0.265	-0.367	0.407
	MH parity	-0.370	-0.119	-0.205	-0.033
	SA parity x MH parity	**-0.305**	**-0.009**	**0.448**	**-0.371**
Female	SA parity	-0.030	0.210	0.154	0.703
	MH parity	-0.209	-0.149	-0.158	-0.140
	SA parity x MH parity	**-0.275**	**-0.176**	**-0.335**	**-0.740**

Discussion

- No statistically significant effect of substance abuse/mental health parity laws on suicide
- Results are consistent with current literature
- Possibility of joint effect of substance abuse parity and mental health parity on suicide

Limitations

- Suicide as crude a measure of parity law compared to other outcome (e.g. quality of life)
- Indirect method to quantify alcohol-attributable suicide

THANK YOU!

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Appendices

Method (2) : Alcohol-attributable suicide

Alcohol attributable fraction of suicide (AAF)

X

Suicide rates

Method (3) : Alcohol-attributable suicide

Alcohol attributable fraction of suicide (AAF)

X

Suicide rates

How many percent of total state suicide is related to alcohol use?

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Method (4) : Alcohol-attributable suicide

Alcohol attributable fraction of suicide (AAF) X Suicide rates

$$AAF_{st} = \sum_{j=0}^{3} \frac{prev_{st}^{j} \cdot (RR^{j} - 1)}{1 + prev_{st}^{j} \cdot (RR^{J} - 1)}$$

Average daily alcohol consumption (Behavioral Risk Factor Surveillance System - BRFSS)

Zaridze et al., 2009

AAF = alcohol attributable fraction of suicide

prev^{J} = proportion of people reporting average daily alcohol consumption at level *j*

RR = relative risk or the likelihood of suicide at a specific alcohol consumption level *j*

s & *t* index state & year, respectively

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Method (5) : Dataset

Variables	Mean	SD	Data sources
Dependent variables			
S	5.80	1.80	CDC's WISQARS™ (1996 – 2010)
S^{AIco}	12.56	3.50	
Main independent variables			
Par^{SA}			National Conference of State Legislature (NCSL) Robinson, G. K.et al. (2007).
Par^{MH}			
Par^{SA} x Par^{MH}			
Socio-demographic covariates			
Population	5,669,141	6,314,700	Census Bureau
Male to female ratio	0.97	0.04	Census Bureau
Proportion of black Americans	9.05	11.15	Census Bureau

Method (6) : Dataset

Variables	Mean	SD	Data sources
Proportion of age group			Census Bureau
20-24	7.00	0.75	
25-34	13.46	1.36	
35-44	14.95	1.45	
45-54	14.06	1.21	
55-64	9.97	1.58	
65+	12.74	1.83	
Proportion of divorce	4.02	1.06	Census Bureau
Economic status			
State per-capita income (thousand dollars)	40.85	7.18	Bureau of Economic Analysis
Proportion of the poor	12.26	3.37	Census Bureau
Gini	0.63	0.07	Bureau of Economic Analysis

Method (7) : Dataset

Variables	Mean	SD	Data sources
Proportion of unemployment	5.27	1.86	Bureau of Labor Statistics
SA/MH treatment beds			
Number of substance abuse treatment beds per 100,000 populations	3.10	3.10	American Hospital Association Annual Survey of Hospitals (AHA)
Number of psychiatric abuse treatment beds per 100,000 populations	36.21	19.47	American Hospital Association Annual Survey of Hospitals (AHA)
Other covariates			
Proportion of Medicaid beneficiaries	16.35	5.75	
Per-capita alcohol consumption	2.33		