

Appendix

Figure A1

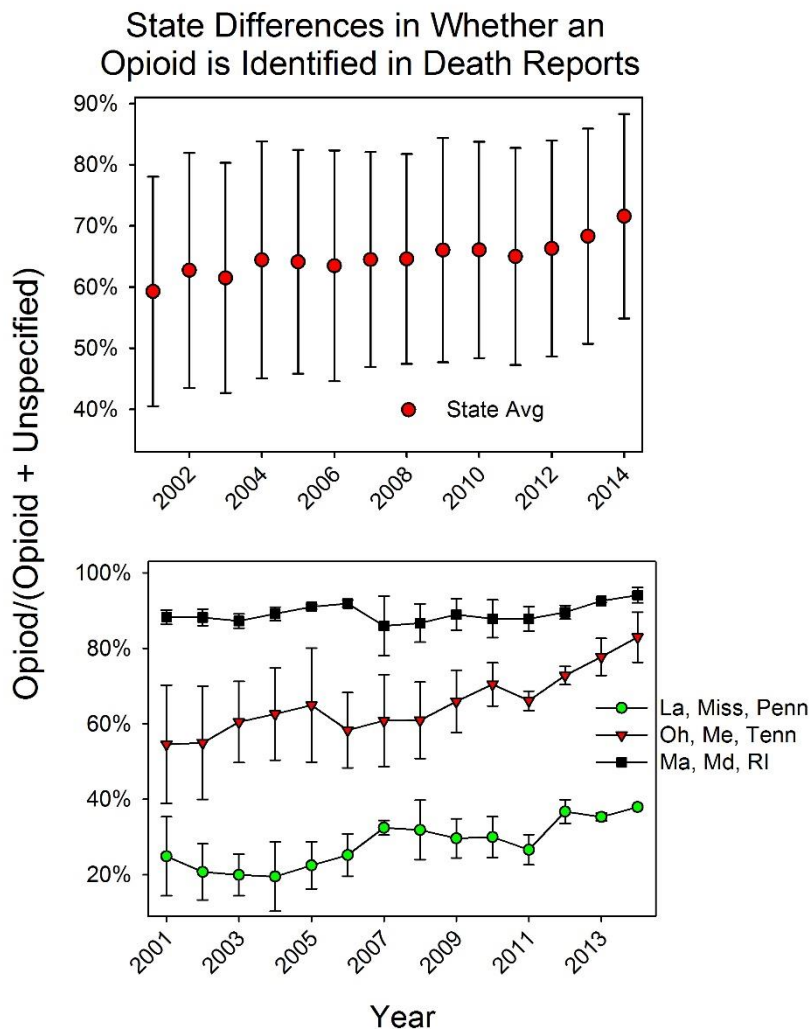


Figure A1: State differences in specifying opioids as causes of overdose deaths. On the x-axis is year; on the y-axis is the percentage of opioid specified overdose deaths. The denominator is opioid plus unspecified overdoses. The error bars indicate one standard deviation. The top panel shows the national averages; the bottom panel shows the three states with the highest and lowest specification percentages and the three states whose percentages changed the most (red triangles). La = Louisiana, Miss = Mississippi, Penn = Pennsylvania, Oh = Ohio, Me = Maine, Tenn = Tennessee, Ma = Massachusetts, Md = Maryland, RI = Rhode Island.

Drug overdose deaths, 2001 to 2014

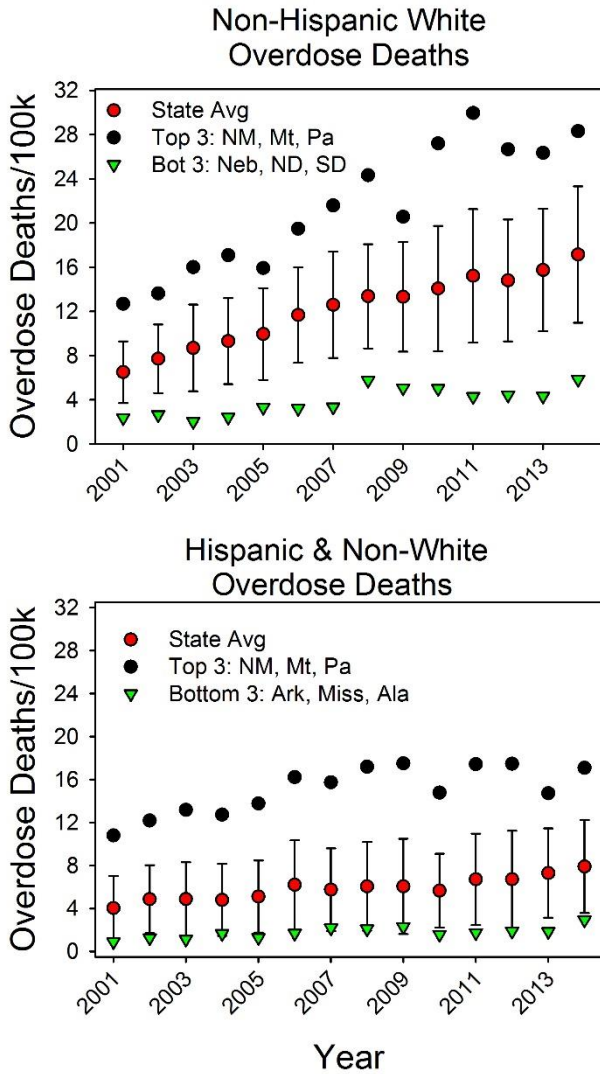


Figure A2. Non-Hispanic White and Hispanic/Non-White overdose deaths. On the x-axis is year; on the y-axis are drug overdose death rates. The red circles show the national averages. The green triangles are the averages for the three states with the lowest overdose rates. The black circles are the averages for the three states with the highest overdose rates. For both populations, the between state variation is greater than the year-to-year variation. NM = New Mexico, Mt = Montana, SD = South Dakota, Ark = Arkansas, Miss = Mississippi, Ala = Alabama

Variance Accounted For in Non-Hispanic White
Overdose Deaths: Each State in Each Year

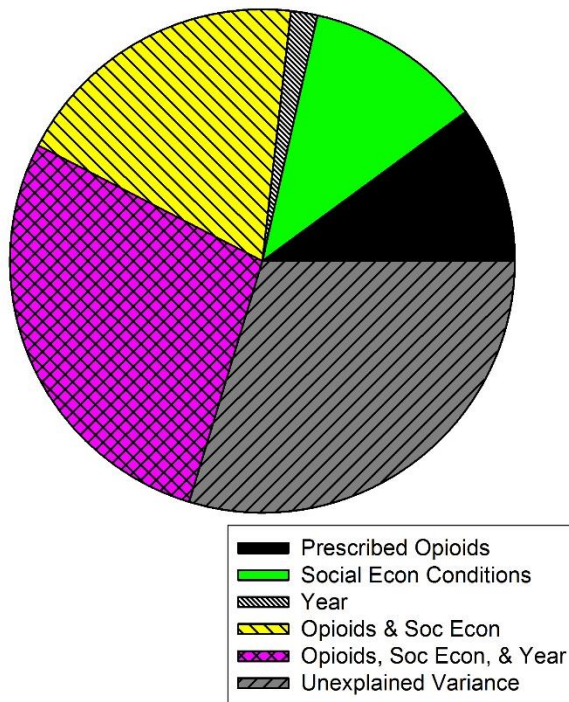


Figure A3. The dependent measure was Non-Hispanic White overdose death rates for each state in each year. The sectors show the amounts of variance accounted for by individual predictors and subsets of the predictors. The common variances among the predictors were the strongest predictors. Table A2 (this *Appendix*) lists the numerical values corresponding to each sector.

Variance Accounted For in Hispanic
& Non-White Overdose Deaths:
Each State in Each Year

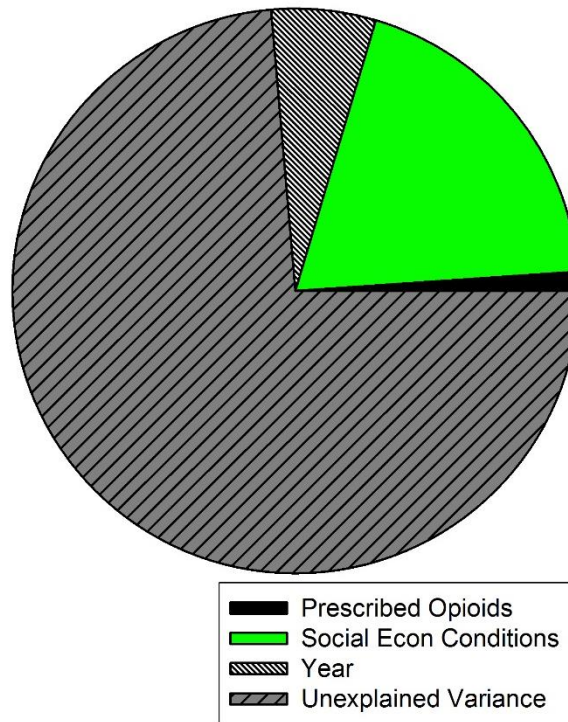
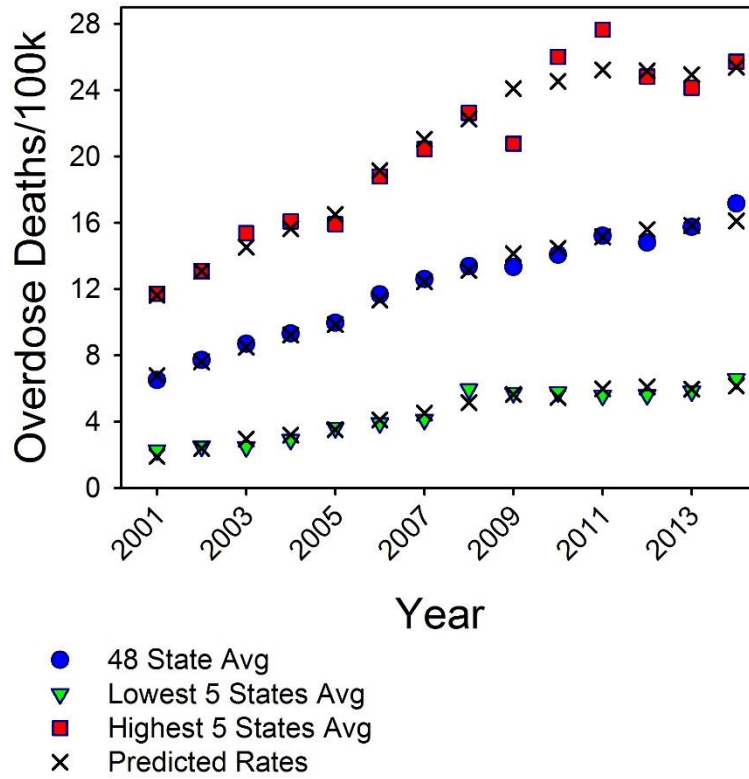


Figure A4. The dependent measure was Hispanic/Non-White overdose death rates for each state in each year. The sectors reflect the amounts of variance accounted for by the predictors. Social economic conditions include work force participation and percentage of Black residents in each state. See Table A4 (this *Appendix*) for the numerical values that correspond to each sector.

Fixed Effects Obtained & Predicted Overdose Death Rates: Non-Hispanic Whites



Drug overdose deaths, 2001 to 2014

Table A1: Cells show correlations between Non-Hispanic White overdose deaths and (1) prescription rates, (2) employment, and (3) twenty-four measures relevant to intergenerational income mobility from the *Opportunity Insights* project. The correlations were calculated for each year of the study. (See “Table A1 continued” for the years 2008-2014.)

Year		2001	2002	2003	2004	2005	2006	2007
Amounts of Prescribed and Dispensed Opioids		0.62	0.70	0.65	0.72	0.69	0.69	0.72
Employment	% in Labor Force	-0.49	-0.49	-0.54	-0.63	-0.45	-0.62	-0.58
	Unemployment Rate	0.28	0.39	0.32	0.23	0.29	0.32	0.10
Inter-Generational Income Mobility	Relative Mobility	0.08	-0.01	0.07	0.12	0.15	0.28	0.23
	Absolute Mobility	-0.30	-0.20	-0.25	-0.28	-0.33	-0.36	-0.34
	Bottom 5 th to Top 5 th Income Mobility	-0.38	-0.31	-0.38	-0.41	-0.49	-0.53	-0.47
	Probability 1980 Cohort Earns More Than Parents	-0.42	-0.49	-0.36	-0.47	-0.40	-0.44	-0.45
Inequality	Gini	0.44	0.45	0.46	0.46	0.47	0.56	0.53
	Income % of Top 1 %	0.27	0.33	0.23	0.17	0.23	0.25	0.22
	% in Middle Class	-0.38	-0.34	-0.34	-0.26	-0.29	-0.37	-0.36
Parents' Income	25 th Percentile Income (Parents)	-0.25	-0.20	-0.29	-0.38	-0.30	-0.39	-0.40
	% of Parents in Lowest decile of Income Distribution	0.30	0.26	0.37	0.43	0.39	0.52	0.51
	Median Income (parents)	-0.14	-0.09	-0.19	-0.29	-0.23	-0.29	-0.30
Family Social Factors	% Divorced	0.39	0.42	0.40	0.53	0.46	0.47	0.50
	% Single mothers	0.30	0.18	0.28	0.26	0.30	0.42	0.36
	Teen Birth Rate	0.34	0.27	0.34	0.47	0.45	0.53	0.53
Community Social Factors	Social Capital	-0.64	-0.66	-0.62	-0.65	-0.66	-0.71	-0.70
	% Religious	-0.28	-0.36	-0.26	-0.34	-0.21	-0.26	-0.28
	Violent crime	0.26	0.26	0.31	0.29	0.29	0.33	0.39
Community Economic Factors	Local Tax Rate	-0.28	-0.18	-0.27	-0.31	-0.26	-0.33	-0.36

Drug overdose deaths, 2001 to 2014

	Poverty Rate	0.22	0.19	0.31	0.38	0.29	0.41	0.41
	% < 15 Minute Commute to Work	-0.49	-0.49	-0.48	-0.41	-0.45	-0.51	-0.48
Early Education	Student/Teacher Ratio	0.22	0.38	0.30	0.32	0.37	0.27	0.32
	Elementary school Test score	-0.54	-0.55	-0.56	-0.54	-0.55	-0.63	-0.60
	High School Drop-Out Rate	0.28	0.29	0.31	0.29	0.31	0.32	0.32
College Education	Colleges Per Capita	-0.34	-0.40	-0.34	-0.28	-0.36	-0.40	-0.33
	College Graduation Rate	-0.23	-0.19	-0.12	-0.26	-0.14	-0.17	-0.27

Table A1 continued: Cells show correlations between Non-Hispanic White overdose deaths and (1) prescription rates, (2) employment, and (3) twenty-four measures relevant to intergenerational income mobility from the *Opportunity Insights* project. The correlations were calculated for each year of the study. (See “Table A1” for 2001-2007.)

Year		2008	2009	2010	2011	2012	2013	2014
Amounts of Prescribed and Dispensed Opioids		0.68	0.65	0.63	0.70	0.66	0.64	0.68
Employment	% in Labor Force	-0.61	-0.58	-0.77	-0.74	-0.70	-0.62	-0.57
	Unemployment	0.27	0.44	0.53	0.52	0.51	0.53	0.58
Inter-Generational Income Mobility	Relative Mobility	0.23	0.19	0.30	0.26	0.32	0.34	0.39
	Absolute Mobility	-0.38	-0.42	-0.38	-0.33	-0.28	-0.23	-0.26
	Bottom 5 th to Top 5 th Mobility	-0.47	-0.54	-0.51	-0.45	-0.43	-0.39	-0.39
	Probability 1980 Cohort Earns More Than Parents	-0.39	-0.45	-0.43	-0.43	-0.41	-0.37	-0.32
Inequality	Gini	0.50	0.52	0.51	0.45	0.45	0.46	0.39
	Income % of Top 1 %	0.15	0.23	0.17	0.20	0.26	0.29	0.26
	% in Middle Class	-0.27	-0.30	-0.29	-0.28	-0.31	-0.35	-0.35
Parents' Income	25 th Percentile Income (Parents)	-0.48	-0.43	-0.47	-0.34	-0.25	-0.20	-0.12
	% of Parents in Lowest Decile of Income Distribution	0.52	0.46	0.53	0.41	0.37	0.36	0.28
	Median Income (Parents)	-0.38	-0.35	-0.36	-0.21	-0.12	-0.05	0.03

Drug overdose deaths, 2001 to 2014

Family Social Factors	% Divorced	0.51	0.59	0.54	0.47	0.36	0.31	0.24
	% Single mothers	0.39	0.39	0.36	0.28	0.26	0.33	0.31
	Teen Birth Rate	0.56	0.64	0.62	0.48	0.46	0.36	0.26
Community Social Factors	Social Capital	-0.66	-0.70	-0.66	-0.60	-0.60	-0.54	-0.48
	% Religious	-0.27	-0.25	-0.30	-0.34	-0.24	-0.21	-0.21
	Violent crime	0.38	0.40	0.40	0.36	0.31	0.41	0.33
Community Economic Factors	Local Tax Rate	-0.52	-0.45	-0.51	-0.46	-0.43	-0.33	-0.28
	Poverty Rate	0.46	0.36	0.45	0.33	0.28	0.23	0.12
	% < 15 Minute Commute to Work	-0.38	-0.40	-0.41	-0.45	-0.50	-0.50	-0.53
Early Education	Student/Teacher Ratio	0.28	0.40	0.22	0.21	0.23	0.14	0.06
	Elementary School Test Score	-0.62	-0.64	-0.61	-0.55	-0.55	-0.54	-0.45
	High School Drop-Out Rate	0.23	0.31	0.26	0.24	0.23	0.26	0.25
College Education	Colleges Per Capita	-0.26	-0.31	-0.32	-0.33	-0.40	-0.41	-0.41
	College Graduation Rate	-0.24	-0.28	-0.36	-0.26	-0.23	-0.12	-0.09

Drug overdose deaths, 2001 to 2014

Table A2. Regression variance accounted for (VAF) for Non-Hispanic White overdose deaths in each state for each year of the study (2001 to 2014).

Predictor	VAF percentages across states (48) and years (2001 -2014)
Legally available opioids (Rx)	0.101
Social Economic	0.114
Year	0.017
Rx & Social Economic	0.192
Rx & Year	0.137
Social Economic & Year	-0.012
Rx & Social Economic & Year	0.154
Total:	0.702

Table A3. Cells show correlations between Hispanic/Non-White overdose deaths and (1) prescription rates, (2) employment, and (3) twenty-four measures relevant to intergenerational income mobility from the *Opportunity Insights* project. The correlations were calculated for each year of the study. (See “Table A3 continued” for 2008-2014.)

Year:		2001	2002	2003	2004	2005	2006	2007
Amounts of Prescribed and Dispensed Opioids		-0.01	0.02	0.10	0.07	0.07	0.13	-0.04
Employment	% in Labor Force:	0.18	0.06	-0.09	-0.22	-0.10	-0.13	-0.11
	Unemployment:	-0.15	-0.13	-0.02	0.23	-0.05	-0.26	0.04
Inter-Generational Income Mobility	Relative Mobility	-0.10	-0.28	-0.32	-0.33	-0.29	-0.25	-0.37
	Absolute Mobility	0.21	0.25	0.24	0.20	0.22	0.27	0.26
	Bottom 5 th to top 5 th Mobility	0.11	0.25	0.24	0.23	0.18	0.15	0.33

Drug overdose deaths, 2001 to 2014

	Probability 1980 Cohort Earns More Than Parents	0.09	0.05	0.09	0.21	0.10	-0.06	0.14
Inequality	Gini	-0.00	-0.17	-0.13	-0.27	-0.13	-0.15	-0.24
	Income % of Top 1 %	0.19	-0.04	-0.03	-0.21	-0.04	-0.15	-0.19
	% in Middle Class	-0.16	0.06	0.07	0.27	0.11	0.20	0.21
Parents' Income	25 th Percentile Income (Parents)	0.33	0.28	0.20	0.14	0.17	0.12	0.13
	% of Parents in Lowest Decile of Income Distribution	-0.16	-0.23	-0.16	-0.16	-0.12	-0.09	-0.11
	Median Income (Parents)	0.40	0.31	0.22	0.10	0.18	0.12	0.08
Family Social Factors	% Divorced	-0.16	-0.00	0.01	0.04	0.05	0.18	0.09
	% Single Mothers	-0.02	-0.16	-0.10	-0.21	-0.10	-0.15	-0.17
	Teen Birth Rate	-0.22	-0.34	-0.24	-0.22	-0.14	-0.21	-0.16
Community Social Factors	Social Capital	0.07	0.17	0.10	0.21	0.09	0.16	0.21
	% Religious	0.11	-0.11	0.03	0.05	0.11	-0.12	0.16
	Violent Crime	0.17	0.05	0.11	-0.08	0.08	-0.02	-0.02
Community Economic Factors	Local Tax Rate	0.17	0.17	0.00	0.02	0.06	0.12	0.05
	Poverty Rate	-0.18	-0.19	-0.08	0.00	-0.03	-0.02	0.03
	% < 15 Minute Commute to Work	-0.18	0.02	0.05	0.18	0.10	0.13	0.29
Early Education	Student/Teacher Ratio	0.11	0.05	0.09	0.11	0.15	-0.05	0.10
	Elementary School Test Score	-0.11	0.06	0.02	0.11	-0.03	0.13	0.09
	High School Drop-Out Rate	0.11	0.02	-0.10	-0.23	-0.09	0.01	-0.09
College Education	Colleges Per Capita	-0.17	-0.03	-0.03	0.18	0.02	-0.01	0.14
	College Graduation Rate	-0.08	-0.11	-0.01	-0.08	-0.07	0.00	-0.18

Drug overdose deaths, 2001 to 2014

Table A3 continued: Cells show correlations between Hispanic/Non-White overdose deaths and (1) prescription rates, (2) employment, and (3) twenty-four measures relevant to intergenerational income mobility from the *Opportunity Insights* project. The correlations were calculated for each year of the study. (See “Table A3” for 2001-2007.)

Year:		2008	2009	2010	2011	2012	2013	2014
Amounts of Prescribed and Dispense Opioids		0.05	0.07	0.02	0.07	0.05	0.22	0.17
Employment	% in Labor Force:	-0.19	-0.26	-0.28	-0.28	-0.06	-0.07	-0.19
	Unemployment:	-0.25	-0.12	0.01	0.07	0.07	-0.04	0.18
Inter-Generational Income Mobility	Relative Mobility	-0.32	-0.29	-0.36	-0.33	-0.29	-0.09	-0.13
	Absolute Mobility	0.19	0.14	0.24	0.27	0.34	0.21	0.26
	Bottom 5 th to Top 5 th Mobility	0.11	0.25	0.24	0.23	0.18	0.15	0.33
	Probability 1980 cohort earns more than parents	0.10	0.01	0.01	0.04	-0.10	-0.09	0.01
Inequality	Gini	-0.20	-0.16	-0.24	-0.27	-0.20	-0.14	-0.18
	Income % of Top 1 %	-0.24	-0.23	-0.22	-0.29	-0.14	-0.12	-0.08
	% in Middle Class	0.25	0.20	0.28	0.35	0.24	0.16	0.12
Income	25 th Percentile Income (Parents)	0.03	0.02	0.09	0.07	0.12	0.15	0.23
	% of Parents in Lowest Decile of Income Distribution	-0.04	-0.06	-0.10	-0.10	-0.10	-0.08	-0.10
	Median Income (Parents)	-0.01	0.0	0.06	0.02	0.10	0.19	0.24
Family Social Factors	% Divorced	0.22	0.26	0.22	0.24	0.26	0.22	0.11
	% Single mothers	-0.12	-0.12	-0.21	-0.24	-0.22	-0.12	-0.06
	Teen Birth Rate	-0.13	-0.13	-0.08	-0.18	-0.10	-0.17	-0.18
Community Social Factors	Social Capital	0.22	0.20	0.19	0.23	0.17	0.16	0.17
	% Religious	0.00	-0.13	0.01	-0.08	-0.06	-0.15	0.05
	Violent crime	-0.01	0.03	0.01	-0.14	0.01	0.03	0.04
Community Economic Factors	Local tax	0.007	0.05	-0.03	0.03	0.05	0.04	0.10
	Poverty rate	0.10	0.02	0.07	0.08	0.00	0.01	-0.05
	% < 15 Minute Commute to Work	0.28	0.21	0.31	0.25	0.27	0.01	0.08

Drug overdose deaths, 2001 to 2014

Early Education	Student/teacher ratio	-0.04	-0.04	0.08	-0.08	-0.06	-0.12	-0.07
	Elementary school test score	0.08	0.15	0.08	0.10	0.11	-0.01	-0.01
	High School drop-out rate	-0.01	-0.04	-0.06	-0.14	0.02	0.03	0.03
College Education	College Per Capita	0.17	0.06	0.08	0.12	0.03	-0.06	-0.06
	College Graduation Rate	-0.11	-0.05	-0.20	-0.07	-0.16	-0.02	0.02

Table A4.

Table A2. Regression variance accounted for (VAF) for Hispanics and Non-White overdose deaths in each state for each year of the study (2001 to 2014).

Predictor	VAF across states (48) and years (2001 -2014): Hispanics & Non-Whites
Legally available opioids (Rx)	0.011
Social Economic	0.194
Year	0.060
Rx & Social Economic	-0.006
Total:	0.260