

Inequities in intimate partner homicide: social determinants of health mediate racial/ethnic disparities

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American Journal of Preventive Medicine

Appendix 2: Summary of methodology for social determinants of health (SDOH) variable selection

The following variables were initially considered for inclusion in the final model. Detailed descriptions of each variable can be found on the County Health Rankings website (<http://www.countyhealthrankings.org>).

- Income inequality ratio
- Median income
- Child poverty rate
- Unemployment rate
- Proportion of children without health insurance
- School funding adequacy
- Excessive drinking rate
- Teen birth rate
- High school completion rate
- Proportion of children raised in single-parent households
- Gender pay gap
- Mental health providers per capita
- Violent crime rate
- Rate of severe housing problems
- Food insecurity rate
- Homeownership rate
- Urbanicity

To reduce dimensionality and address multicollinearity, collinearity was assessed among pairs of candidate variables (Appendix figure 1). Based on this analysis, variables were excluded that exhibited high collinearity and could be removed without sacrificing conceptual integrity. The following variables were removed:

- Food insecurity
- Proportion of uninsured children
- Proportion of children in single-parent households
- Child poverty rate
- Teen birth rate
- Income inequality ratio
- Excessive drinking rate

Following these exclusions, a reanalysis of collinearity yielded improved results (Appendix figure 2). Next, a directed acyclic graph was constructed to guide additional dimension reduction. This analysis led to the exclusion of:

- Homeownership rate and rate of severe housing problems, as they were correlated with other variables and were less clearly in the causal pathway for intimate partner violence.
- High school completion rate, in favor of school funding adequacy. School funding adequacy was retained as it more plausibly represents an antecedent condition and is more actionable in terms of societal interventions.

This methodical approach allowed the use of a parsimonious set of SDOH variables with conceptual relevance and minimal collinearity, strengthening the model's robustness.

Appendix figure 1: Correlation plot of candidate social determinants of health variables.

income_ratio-	0.08	-0.36	0.52	0.42	0.29	0.12	0.06	0.55	-0.4	0.37	-0.31	-0.38	-0.08	0.26	0.58	-0.41	1
income_med-	-0.54	0.1	-0.77	-0.04	-0.19	0.11	-0.03	-0.46	0.56	-0.65	0.38	0.54	-0.15	-0.17	-0.79	1	-0.41
child_poverty-	0.32	-0.21	0.81	0.29	0.34	-0.05	0.1	0.69	-0.69	0.73	-0.53	-0.68	0.11	0.33	1	-0.79	0.58
unemployment-	-0.12	-0.11	0.32	0.37	0.24	0.16	0.08	0.33	-0.21	0.18	-0.13	-0.11	-0.28	1	0.33	-0.17	0.26
uninsured_children-	0.25	0.05	0.14	-0.02	-0.08	-0.12	-0.05	-0.07	-0.21	0.21	-0.24	-0.17	1	-0.28	0.11	-0.15	-0.08
school_funding-	-0.17	0.22	-0.56	-0.2	-0.37	0.12	-0.04	-0.6	0.56	-0.56	0.48	1	-0.17	-0.11	-0.68	0.54	-0.38
excessive_drinking-	-0.06	0.18	-0.61	-0.18	-0.19	0.05	0.01	-0.37	0.56	-0.54	1	0.48	-0.24	-0.13	-0.53	0.38	-0.31
teen_births-	0.32	-0.15	0.71	0.08	0.29	-0.1	-0.03	0.5	-0.68	1	-0.54	-0.56	0.21	0.18	0.73	-0.65	0.37
hs_completion-	-0.24	0.12	-0.62	-0.21	-0.2	0.16	-0.03	-0.44	1	-0.68	0.56	0.56	-0.21	-0.21	-0.69	0.56	-0.4
single_parent-	0.01	-0.42	0.5	0.39	0.49	0.07	0.12	1	-0.44	0.5	-0.37	-0.6	-0.07	0.33	0.69	-0.46	0.55
pay_gap-	-0.08	-0.22	0.04	0.27	0.1	0.11	1	0.12	-0.03	-0.03	0.01	-0.04	-0.05	0.08	0.1	-0.03	0.06
mh_providers-	-0.15	-0.37	-0.01	0.31	0.17	1	0.11	0.07	0.16	-0.1	0.05	0.12	-0.12	0.16	-0.05	0.11	0.12
violent_crime-	-0.18	-0.44	0.22	0.36	1	0.17	0.1	0.49	-0.2	0.29	-0.19	-0.37	-0.08	0.24	0.34	-0.19	0.29
housing_problems-	-0.22	-0.58	0.23	1	0.36	0.31	0.27	0.39	-0.21	0.08	-0.18	-0.2	-0.02	0.37	0.29	-0.04	0.42
food_insecurity-	0.34	-0.17	1	0.23	0.22	-0.01	0.04	0.5	-0.62	0.71	-0.61	-0.56	0.14	0.32	0.81	-0.77	0.52
homeownership-	0.18	1	-0.17	-0.58	-0.44	-0.37	-0.22	-0.42	0.12	-0.15	0.18	0.22	0.05	-0.11	-0.21	0.1	-0.36
urbanicity-	1	0.18	0.34	-0.22	-0.18	-0.15	-0.08	0.01	-0.24	0.32	-0.06	-0.17	0.25	-0.12	0.32	-0.54	0.08
	urbanicity	homeownership	food_insecurity	housing_problems	violent_crime	mh_providers	pay_gap	single_parent	hs_completion	teen_births	excessive_drinking	school_funding	uninsured_children	unemployment	child_poverty	income_med	income_ratio

Appendix figure 2: Correlation plot of refined candidate social determinants of health variables.

