

Web Appendix

What to Do When Everything Happens at Once: Analytic Approaches to Estimate the Health Effects of Co-occurring Social Policies

Ellicott C. Matthay, Laura M. Gottlieb, David Rehkopf, May Lynn Tan, David Vlahov, and M. Maria Glymour

Table of Contents

Web Table 1: Social policy studies identified in systematic sample 2

Web Figure 1: Schema of alternative approaches to address policy co-occurrence by severity of policy co-occurrence and degree of departure from original causal question 10

Web Table 1: Social policy studies identified in systematic sample

Citation	Policy	Topic area	Study design	Methods used that address policy co-occurrence
Liao Z, Zhou Y, Li H, et al. The Rates and Medical Necessity of Cesarean Delivery in the Era of the Two-Child Policy in Hubei and Gansu Provinces, China. <i>Am J Public Health</i> . 2019;109(3):476–482.	Limiting fertility to 1 child or 2 children	Fertility	Before-after	None
Boertien D, Vignoli D. Legalizing Same-Sex Marriage Matters for the Subjective Well-being of Individuals in Same-Sex Unions. <i>Demography</i> . 2019;56(6):2109–2121.	Legalization of same-sex marriage	Lesbian, gay, bisexual, and transgender (LGBT) rights	Before-after	None
Ahmed S, Fielding D. Changes in maternity leave coverage: Implications for fertility, labour force participation and child mortality. <i>Social Science & Medicine</i> . 2019;241:112573.	Maternity leave coverage	Family leave	Regression	Adjust for co-occurring policies; Select a less-correlated measure of policy exposure
Evans WN, Kroeger S, Palmer C, et al. Housing and Urban Development–Veterans Affairs Supportive Housing Vouchers and Veterans’ Homelessness, 2007–2017. <i>Am J Public Health</i> . 2019;109(10):1440–1445.	Supportive housing vouchers	Housing	Instrumental variables	Select a less-correlated measure of policy exposure
Högberg B, Strandh M, Petersen S, et al. Education system stratification and health complaints among school-aged children. <i>Social Science & Medicine</i> . 2019;220:159–166.	Stratification of students by ability	Education	Regression	Adjust for co-occurring policies; Identify and evaluate the impacts of policy clusters
Bose B, Heymann J. Effects of tuition-free primary education on women’s access to family planning and on health decision-making: A cross-national study. <i>Social Science & Medicine</i> . 2019;238:112478.	Tuition-free primary education	Education	Differences-in-differences	Adjust for co-occurring policies; Define the outcome on subpopulations likely to be affected by the index policy but not other co-occurring policies
Delaruelle K, van de Werfhorst H, Bracke P. Do comprehensive school reforms impact the health of early school leavers? Results of a comparative difference-in-	Comprehensive school reforms	Education	Differences-in-differences	Adjust for co-occurring policies

difference design. <i>Social Science & Medicine</i> . 2019;239:112542.				
Rajmil L, Fernández de Sanmamed M-J. Austerity Policies and Mortality Rates in European Countries, 2011–2015. <i>Am J Public Health</i> . 2019;109(5):768–770.	Austerity	Macroeconomic policy	Differences-in-differences	Identify and evaluate the impacts of policy clusters
Regidor E, Mateo A, Barrio G, et al. Mortality in Spain in the Context of the Economic Crisis and Austerity Policies. <i>Am J Public Health</i> . 2019;109(7):1043–1049.	Austerity	Macroeconomic policy	Before-after	None
Patler C, Hamilton E, Meagher K, et al. Uncertainty About DACA May Undermine Its Positive Impact On Health For Recipients And Their Children. <i>Health Affairs</i> . 2019;38(5):738–745.	Deferred Action for Childhood Arrivals	Immigration	Differences-in-differences	Define the outcome on subpopulations likely to be affected by the index policy but not other co-occurring policies
Bruzelius E, Baum A. The Mental Health of Hispanic/Latino Americans Following National Immigration Policy Changes: United States, 2014–2018. <i>Am J Public Health</i> . 2019;109(12):1786–1788.	Modified Immigration and Customs Enforcement (ICE)	Immigration	Differences-in-differences	Identify and evaluate the impacts of policy clusters
Ku L, Brantley E, Pillai D. The Effects of SNAP Work Requirements in Reducing Participation and Benefits From 2013 to 2017. <i>Am J Public Health</i> . 2019;109(10):1446–1451.	Supplemental Nutritional Assistance Program	Poverty and social welfare	Panel fixed effects	Adjust for co-occurring policies
Ettinger de Cuba S, Chilton M, Bovell-Ammon A, et al. Loss Of SNAP Is Associated With Food Insecurity And Poor Health In Working Families With Young Children. <i>Health Affairs</i> . 2019;38(5):765–773.	Supplemental Nutritional Assistance Program	Poverty and social welfare	Regression	Adjust for co-occurring policies; Restrict the study sample to the region of common support; Define the outcome on subpopulations likely to be affected by the index policy but not other co-occurring policies
Heflin CM, Ingram SJ, Ziliak JP. The Effect Of The Supplemental Nutrition Assistance Program On Mortality. <i>Health Affairs</i> . 2019;38(11):1807–1815.	Supplemental Nutritional Assistance Program	Poverty and social welfare	Instrumental variables	Adjust for co-occurring policies; Identify and evaluate the impacts of policy clusters
Rummo PE, Noriega D, Parret A, et al. Evaluating A USDA Program That Gives SNAP Participants	Supplemental Nutritional	Poverty and social welfare	Differences-in-differences	Define the outcome on subpopulations likely to be affected

Financial Incentives To Buy Fresh Produce In Supermarkets. Health Affairs. 2019;38(11):1816–1823.	Assistance Program			by the index policy but not other co-occurring policies
Cuba SAE de, Bovell-Ammon AR, Cook JT, et al. SNAP, Young Children’s Health, and Family Food Security and Healthcare Access. American Journal of Preventive Medicine. 2019;57(4):525–532.	Supplemental Nutritional Assistance Program	Poverty and social welfare	Regression	Define the outcome on subpopulations likely to be affected by the index policy but not other co-occurring policies
Franckle RL, Thorndike AN, Moran AJ, et al. Supermarket Purchases Over the Supplemental Nutrition Assistance Program Benefit Month: A Comparison Between Participants and Nonparticipants. American Journal of Preventive Medicine. 2019;57(6):800–807.	Supplemental Nutritional Assistance Program	Poverty and social welfare	Differences-in-differences	Define the outcome on subpopulations likely to be affected by the index policy but not other co-occurring policies
Heflin C, Arteaga I, Hodges L, et al. SNAP benefits and childhood asthma. Social Science & Medicine. 2019;220:203–211.	Supplemental Nutritional Assistance Program	Poverty and social welfare	Regression	Define the outcome on subpopulations likely to be affected by the index policy but not other co-occurring policies; Select a less-correlated measure of policy exposure
Hamad R, Batra A, Karasek D, et al. The Impact of the Revised WIC Food Package on Maternal Nutrition During Pregnancy and Postpartum. Am J Epidemiol. 2019;188(8):1493–1502.	Women, Infants, and Children	Poverty and social welfare	Differences-in-differences	None
Hughes C. Reexamining the Influence of Conditional Cash Transfers on Migration From a Gendered Lens. Demography. 2019;56(5):1573–1605.	Conditional cash transfer	Poverty and social welfare	Regression	None
Angeles G, de Hoop J, Handa S, et al. Government of Malawi’s unconditional cash transfer improves youth mental health. Social Science & Medicine. 2019;225:108–119.	Unconditional cash transfer	Poverty and social welfare	Cluster randomized controlled trial	None
Litwin A, Perova E, Reynolds SA. A conditional cash transfer and Women’s empowerment: Does Bolsa Familia Influence intimate partner violence? Social Science & Medicine. 2019;238:112462.	Conditional cash transfer	Poverty and social welfare	Differences-in-differences	Adjust for co-occurring policies; Select a less-correlated measure of policy exposure

Lebihan L, Mao Takongmo CO. Unconditional cash transfers and parental obesity. <i>Social Science & Medicine</i> . 2019;224:116–126.	Unconditional cash transfer	Poverty and social welfare	Differences-in-differences	Define the outcome on subpopulations likely to be affected by the index policy but not other co-occurring policies
Shahidi FV, Muntaner C, Shankardass K, et al. The effect of unemployment benefits on health: A propensity score analysis. <i>Social Science & Medicine</i> . 2019;226:198–206.	Unemployment benefits	Unemployment, sick leave, and pension benefits	Propensity score matching	Define the outcome on subpopulations likely to be affected by the index policy but not other co-occurring policies
Chen X, Wang T, Busch SH. Does money relieve depression? Evidence from social pension expansions in China. <i>Social Science & Medicine</i> . 2019;220:411–420.	Pension generosity	Unemployment, sick leave, and pension benefits	Instrumental variables	Adjust for co-occurring policies; Select a less-correlated measure of policy exposure
Park W, Baek J. The impact of employment protection on health: Evidence from fixed-term contract workers in South Korea. <i>Social Science & Medicine</i> . 2019;233:158–170.	Employment protections	Unemployment, sick leave, and pension benefits	Differences-in-differences	Define the outcome on subpopulations likely to be affected by the index policy but not other co-occurring policies
Stacey N, Mudara C, Ng SW, et al. Sugar-based beverage taxes and beverage prices: Evidence from South Africa's Health Promotion Levy. <i>Social Science & Medicine</i> . 2019;238:112465.	Sugar-sweetened beverage tax	Food and beverage	Before-after	Adjust for clustered policies
Massri C, Sutherland S, Källestål C, et al. Impact of the Food-Labeling and Advertising Law Banning Competitive Food and Beverages in Chilean Public Schools, 2014–2016. <i>Am J Public Health</i> . 2019;109(9):1249–1254.	Banning sales of competitive food and beverages in schools	Food and beverage	Before-after	None
Lin B-H, Guthrie JF, Smith TA. Dietary Guidance and New School Meal Standards: Schoolchildren's Whole Grain Consumption Over 1994–2014. <i>American Journal of Preventive Medicine</i> . 2019;57(1):57–67.	School meal standards	Food and beverage	Before-after	Define the outcome on subpopulations likely to be affected by the index policy but not other co-occurring policies
Haghpanahan H, Lewsey J, Mackay DF, et al. An evaluation of the effects of lowering blood alcohol concentration limits for drivers on the rates of road traffic accidents and alcohol consumption: a natural	Lowering legal blood alcohol concentration limit for drivers	Alcohol control	Comparative interrupted time series	None

experiment. <i>The Lancet</i> . 2019;393(10169):321–329.				
Hamad R, Modrek S, White JS. Paid Family Leave Effects on Breastfeeding: A Quasi-Experimental Study of US Policies. <i>Am J Public Health</i> . 2018;109(1):164–166.	Paid family leave	Family leave	Differences-in-differences	None
Lin M, Wang Q. Center-based childcare expansion and grandparents' employment and well-being. <i>Social Science & Medicine</i> . 2019;240:112547.	Expansion of childcare centers	Dependent child benefits	Differences-in-differences	Adjust for co-occurring policies; Select a less-correlated measure of policy exposure
Pilkauskas N, Micheltore K. The Effect of the Earned Income Tax Credit on Housing and Living Arrangements. <i>Demography</i> . 2019;56(4):1303–1326.	Earned Income Tax Credit	Poverty and social welfare	Differences-in-differences	Adjust for co-occurring policies; Select a less-correlated measure of policy exposure
Gertner AK, Rotter JS, Shafer PR. Association Between State Minimum Wages and Suicide Rates in the U.S. <i>American Journal of Preventive Medicine</i> . 2019;56(5):648–654.	Minimum wage	Poverty and social welfare	Panel fixed effects	Adjust for co-occurring policies
Ferdinand AO, Aftab A, Akinlotan MA. Texting-While-Driving Bans and Motor Vehicle Crash-Related Emergency Department Visits in 16 US States: 2007–2014. <i>Am J Public Health</i> . 2019;109(5):748–754.	Banning texting while driving	Road traffic safety	Differences-in-differences	Adjust for co-occurring policies
Torche F, Sirois C. Restrictive Immigration Law and Birth Outcomes of Immigrant Women. <i>American Journal of Epidemiology</i> . 2019;188(1):24–33.	Various anti-immigrant inclusion	Immigration	Differences-in-differences	None
Myran DT, Chen JT, Bearnot B, et al. Alcohol Availability Across Neighborhoods in Ontario Following Alcohol Sales Deregulation, 2013–2017. <i>Am J Public Health</i> . 2019;109(6):899–905.	Alcohol sales deregulation	Alcohol control	Before-after	None
Tessler RA, Mooney SJ, Quistberg DA, et al. State-Level Beer Excise Tax and Firearm Homicide in Adolescents and Young Adults. <i>American Journal of Preventive Medicine</i> . 2019;56(5):708–715.	Beer excise tax	Alcohol control	Synthetic control	None

Lira MC, Xuan Z, Coleman SM, et al. Alcohol Policies and Alcohol Involvement in Intimate Partner Homicide in the U.S. <i>American Journal of Preventive Medicine</i> . 2019;57(2):172–179.	Overall alcohol control policy stringency	Alcohol control	Regression	Use an overall policy stringency or generosity score
Everson EM, Dilley JA, Maher JE, et al. Post-Legalization Opening of Retail Cannabis Stores and Adult Cannabis Use in Washington State, 2009–2016. <i>Am J Public Health</i> . 2019;109(9):1294–1301.	Legalization of cannabis for recreational use	Drug control	Before-after	None
Mooney AC, Neilands TB, Giannella E, et al. Effects of a voter initiative on disparities in punishment severity for drug offenses across California counties. <i>Social Science & Medicine</i> . 2019;230:9–19.	Punishments for drug offenses	Drug control	Before-after	None
Doucette ML, Crifasi CK, Frattaroli S. Right-to-Carry Laws and Firearm Workplace Homicides: A Longitudinal Analysis (1992–2017). <i>Am J Public Health</i> . 2019;109(12):1747–1753.	Right-to-Carry firearm laws	Firearms	Panel fixed effects	Adjust for co-occurring policies
Klarevas L, Conner A, Hemenway D. The Effect of Large-Capacity Magazine Bans on High-Fatality Mass Shootings, 1990–2017. <i>Am J Public Health</i> . 2019;109(12):1754–1761.	Large-capacity magazine bans	Firearms	Panel fixed effects	None
Sivaraman JJ, Ranapurwala SI, Moracco KE, et al. Association of State Firearm Legislation With Female Intimate Partner Homicide. <i>American Journal of Preventive Medicine</i> . 2019;56(1):125–133.	Various firearms restrictions	Firearms	Regression	Use an overall policy stringency or generosity score
Ghiani M, Hawkins SS, Baum CF. Associations Between Gun Laws and Suicides. <i>Am J Epidemiol</i> . 2019;188(7):1254–1261.	Various firearm restrictions	Firearms	Differences-in-differences	Adjust for co-occurring policies; Use an overall policy stringency or generosity score
Levy DT, Yuan Z, Li Y, et al. The Minnesota SimSmoke Tobacco Control Policy Model of Smokeless Tobacco and Cigarette Use. <i>American Journal of Preventive Medicine</i> . 2019;57(4):e103–e115.	Various tobacco control	Tobacco control	Simulation model	None
Stallings-Smith S, Hamadi HY, Peterson BN, et al. Smoke-Free	Clean air restrictions	Tobacco control	Regression	None

Policies and 30-Day Readmission Rates for Chronic Obstructive Pulmonary Disease. American Journal of Preventive Medicine. 2019;57(5):621–628.				
Hernandez EM, Vuolo M, Frizzell LC, et al. Moving Upstream: The Effect of Tobacco Clean Air Restrictions on Educational Inequalities in Smoking Among Young Adults. Demography. 2019;56(5):1693–1721.	Clean air restrictions	Tobacco control	Panel fixed effects	Adjust for co-occurring policies
Kingsley M, Setodji CM, Pane JD, et al. Short-Term Impact of a Flavored Tobacco Restriction: Changes in Youth Tobacco Use in a Massachusetts Community. American Journal of Preventive Medicine. 2019;57(6):741–748.	Restrictions on flavored tobacco products	Tobacco control	Differences-in-differences	Adjust for co-occurring policies
Parmar D, Banerjee A. Impact of an employment guarantee scheme on utilisation of maternal healthcare services: Results from a natural experiment in India. Social Science & Medicine. 2019;222:285–293.	Guaranteed employment for rural workers	Unemployment, sick leave, and pension benefits	Differences-in-differences	None
Matthay EC, Farkas K, Rudolph KE, et al. Firearm and Nonfirearm Violence After Operation Peacemaker Fellowship in Richmond, California, 1996–2016. Am J Public Health. 2019;109(11):1605–1611.	Firearm violence prevention fellowship	Firearms	Synthetic control	Restrict the study sample to the region of common support; Define the outcome on subpopulations likely to be affected by the index policy but not other co-occurring policies
Wright M, McKelvey W, Curtis CJ, et al. Impact of a Municipal Policy Restricting Trans Fatty Acid Use in New York City Restaurants on Serum Trans Fatty Acid Levels in Adults. Am J Public Health. 2019;109(4):634–636.	Restricting trans fatty acid use in restaurants	Food and beverage	Differences-in-differences	Define the outcome on subpopulations likely to be affected by the index policy but not other co-occurring policies
Lee MM, Falbe J, Schillinger D, et al. Sugar-Sweetened Beverage Consumption 3 Years After the Berkeley, California, Sugar-Sweetened Beverage Tax. Am J Public Health. 2019;109(4):637–639.	Sugar-sweetened beverage tax	Food and beverage	Differences-in-differences	None
Roberto CA, Lawman HG, LeVasseur MT, et al. Association of a Beverage Tax on Sugar-	Sugar-sweetened beverage tax	Food and beverage	Differences-in-differences	Define the outcome on subpopulations likely to be affected

<p>Sweetened and Artificially Sweetened Beverages With Changes in Beverage Prices and Sales at Chain Retailers in a Large Urban Setting. JAMA. 2019;321(18):1799–1810.</p>				<p>by the index policy but not other co-occurring policies</p>
<p>Couttenier M, Petrencu V, Rohner D, et al. The Violent Legacy of Conflict: Evidence on Asylum Seekers, Crime, and Public Policy in Switzerland. American Economic Review. 2019;109(12):4378–4425.</p>	<p>Regulations on formal labor market involvement for refugees</p>	<p>Immigration</p>	<p>Regression, propensity score matching</p>	<p>None</p>

Web Figure 1: Schema of alternative approaches to address policy co-occurrence by severity of policy co-occurrence and degree of departure from original causal question



