

Innovation methods

107 CAN SYNTHETIC CONTROLS IMPROVE CAUSAL INFERENCE IN INTERRUPTED TIME SERIES EVALUATIONS OF PUBLIC HEALTH INTERVENTIONS?

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10.1136/injuryprev-2020-savir.37

Statement of Purpose Interrupted time series (ITS) designs are a valuable quasi-experimental approach for evaluating public health interventions. ITS extends a single group pre-post comparison by using multiple timepoints to control for underlying trends. But history bias – confounding by unexpected events occurring at the same time of the intervention – threatens the validity of this design and limits causal inference. Synthetic control methodology (SCM), a popular data-driven technique for deriving a control series from a pool of unexposed populations, is increasingly recommended. We aimed to evaluate if and when SCM can strengthen an ITS design.

Methods/Approach First, we summarise the main observational study designs used in evaluative research, highlighting their respective uses, strengths, biases, and design extensions. Second, we outline when the use of SCM can strengthen ITS studies and when their combined use may be problematic. Third, we provide recommendations for using SCM in ITS and, using a real-world example of an evaluation of Florida's Stand Your Ground laws on homicides, we illustrate the potential pitfalls of using a data-driven approach to identify a suitable control series.

Results Our real-world evaluation demonstrates that the benefits of SCM in ITS depends on the nature of the time-varying confounding which presents the most plausible threat to the study's validity. We emphasise the importance of theoretical approaches for informing study design and argue that synthetic control methods are not always well-suited for minimising critical threats to ITS studies.

Conclusions Advances in SCM bring new opportunities to conduct rigorous research in evaluating public health interventions. However, incorporating synthetic controls in ITS studies may not always nullify important threats to validity nor improve causal inference.

Significance and Contributions to Injury and Violence Prevention Science We provide important methodological recommendations to guide advancement in the science of injury and violence prevention.

Motor vehicle crashes: epidemiology and interventions

109 IMPACT OF MOTOR VEHICLE CRASHES ON LONG-TERM HEALTHCARE UTILIZATION

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10.1136/injuryprev-2020-savir.38

Statement of Purpose The impact of a motor vehicle crash (MVC) on health can have effects beyond injuries treated immediately following the crash. Understanding the long-term effects of an MVC can help develop programs to assist injured persons while having minimal impact on the healthcare system.

Methods We probabilistically linked MVC records from 2011 and 2015 to emergency department (ED) and hospital discharge (inpatient) records from 2010 to 2016. To assess the long-term impact of an MVC, ED and inpatient visits up to a year following the data of the crash were considered matches. ED and inpatient visits in the year preceding the crash were also linked to use as a comparison of healthcare utilization before the event. Several confounders were assessed for their impact on post-crash healthcare usage, including age, sex, injury severity, and comorbidities identified on the hospital record at the time of the crash.

Results There were 652,486 persons involved in MVCs, of these 68,546 (10.5%) persons linked to an ED or inpatient record associated with their MVC and comprised our study population. A higher percentage of persons had hospital treatment in the year following their crash compared to the year before [19,568 (28.5%) vs. 16,500 (24.1%), McNemar's p -value < 0.001]. Increased hospitalization usage was consistent across all ages, sexes, and comorbidities. However, post-MVC healthcare resulted in higher median charges ($p < 0.001$) and lengths of stay (LOS) ($p < 0.001$). This relationship increased with age where those 65–89 years had pre-MVC median charges of \$3,497 and LOS of 2 but post-MVC median charges of \$4,330 and LOS of 5 ($p < 0.001$). Similarly, those with comorbidities experienced higher post-MVC charges (\$3,380 pre vs. \$4,362 post, $p < 0.001$).

Significance of Contributions MVCs have an impact beyond the event itself. Those who are most fragile, such as older persons and those with comorbidities, may be differentially impacted.

Mental health consequences of violence

110 THE CONTRIBUTION OF NEIGHBORHOOD CHARACTERISTICS TO PSYCHOLOGICAL SYMPTOM SEVERITY IN A COHORT OF INJURED BLACK PATIENTS

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10.1136/injuryprev-2020-savir.39

Background Traumatic injury is not evenly distributed across race and class in America. Black men are marginalized in society, often live in disadvantaged neighborhoods, and are at higher risk for injury mortality and ongoing physical and psychological problems following injury, including post-traumatic stress disorder (PTSD) and depression. While much research has examined individual factors associated with increased post-injury psychological symptoms, the contribution of the social and physical environment has been relatively understudied.

Purpose The purpose was to examine the contribution of neighborhood characteristics to PTSD and depressive symptom severity in Black men following serious injury.

Methods A secondary analysis of 451 seriously injured men living in Philadelphia were drawn from a prospective cohort