



# Police killings and suicide among Black Americans

Ilias Kyriopoulos<sup>a</sup>, Sotiris Vondoros<sup>b,c,\*</sup>, Ichiro Kawachi<sup>c</sup>

<sup>a</sup> Department of Health Policy, London School of Economics & Political Science, London, United Kingdom

<sup>b</sup> King's College London, London, United Kingdom

<sup>c</sup> Harvard T.H. Chan School of Public Health, Boston, USA

## ARTICLE INFO

### Keywords:

Suicide  
Police killings  
Racism  
Discrimination  
Black mental health

## ABSTRACT

Black Americans are killed at higher rates by police than whites. Previous studies have shown that discrimination can lead to suicidal ideation, and that mental health of Black Americans deteriorates after police killings. The objective of this study is to examine whether police killings are associated with an increase in suicide rates amongst Black Americans. Controlling for a number of factors, we found that on months with at least one killing of a Black person by police, there were, on average, 0.0472 additional suicides per 100,000 Black Americans in the U.S. Census Division where the killing occurred. We did not find any spillover effects on other divisions. This association persisted when controlling for gun ownership, and did not seem to be a result of variance in deaths by assault. There was no association between killings of Black Americans and white suicides; white killings and Black suicides; or white killings and white suicides. This study highlights another reason for urgent action on reducing police killings.

## 1. Introduction

In 2019, an estimated 235 Black people were killed by police in the United States (Mapping Police Violence, 2020). Although Black people comprise only 13% of the population, they accounted for 28% of those killed by police in 2019 (Mapping Police Violence, 2020). About 1 in 1000 black men are killed over their life course by police in the US, as opposed to 1 in 2000 for all men (Edwards et al., 2019). Regardless of the trends in police killings, public awareness has increased due to the influence of social media and availability of footage. There has been increased scrutiny and discussion of this form of injustice as well as widespread distress, anger, and frustration.

Discrimination and racism have been associated with poor mental health outcomes (Brown et al., 2000; Kessler et al., 1999). Racism is a stressor for Black Americans (Clark et al., 1999) and can thus lead to suicide ideation or suicide attempts (Castle et al., 2011; Hollingsworth et al., 2017; Walker et al., 2014). Alang et al. (2017) discussed the potential mechanisms through which police violence and brutality impact health outcomes among Black Americans. These include fatal physical injuries and increased mortality, adverse physiological responses that increase morbidity, negative emotions and psychological well-being, financial and economic distress and Black communities' disempowerment and feelings of powerlessness (Alang et al., 2017). A recent study

showed that police killings have a detrimental effect on psychological distress among Black people (Bor et al., 2018): analysing data on police killings at the state level showed that the number of poor mental health days increased following the killing of Black Americans in the same State – an association that was not observed amongst white respondents. Police killings of unarmed African Americans have also been associated with an increase in emergency department visits for this population group (Das et al., 2021). Recent quantitative studies employed survey data and found that police violence and assaultive victimization are associated with increased prevalence of suicidal ideation, suicide attempts and psychotic experiences (DeVylder et al., 2017, 2018). Evidence also shows that negative police encounters are linked with greater odds of reporting depression and anxiety especially among Black Americans (Alang et al., 2021a; Bowleg et al., 2020), higher unmet needs for mental health services (Alang et al., 2021b) and greater level of mistrust in medical institutions (Alang et al., 2020). Exposure to police killings has been found to increase the incidence of emotional disturbance among Black American students (Ang, 2020), who also experience worse educational performance due to aggressive policing and violence (Ang, 2020; Legewie and Fagan, 2019).

Given that based on the existing literature, racism and discrimination is a mental health risk factor, the objective of this study is to examine whether police killings of Black people are associated with an increase in

\* Corresponding author. King's College London, London, United Kingdom.

E-mail address: [vondoros@hsph.harvard.edu](mailto:vondoros@hsph.harvard.edu) (S. Vondoros).

<https://doi.org/10.1016/j.socscimed.2022.114964>

Received 7 September 2021; Received in revised form 2 March 2022; Accepted 4 April 2022

Available online 7 April 2022

0277-9536/© 2022 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Black suicide rates in the US. Suicide rates have been demonstrating an upward trend in the US (Centers for Disease Control and Prevention, 2020a). Over 48,000 Americans died as a result of suicide in 2018 – the tenth leading cause of death overall in the country. Although suicide is one of the few major causes of death for which Black Americans have a lower risk compared to white Americans, rates have been increasing since 2010 (Centers for Disease Control and Prevention, 2020b). Recent studies and reports have also demonstrated an alarming increase in suicide rates among Black children and adolescents, which has grown faster than any other ethnic or racial group over the last few years (Bridge et al., 2018; Riley et al., 2021).

## 2. Materials and methods

We used publicly available monthly suicide data for the nine Census Bureau Divisions from 2013 to 2018, as reported by CDC Wonder, and performed the analysis at the Census Division level (each Division includes multiple States). We restricted our analysis to this time period due to data availability issues, as there were no data on police killings before 2013. We could not conduct the analysis at the state level due to the large number of missing values, as observations with fewer than 10 suicides per month are not reported by the CDC.

For our analysis, we focused on deaths from intentional self-harm for Black Americans, corresponding to ICD-10 codes X60–X84. Using population data from the US Census Bureau, mortality data were adjusted with the respective population size. We also obtained data on police killings that were collected and compiled by Mapping Police Violence, a collaboration that records data on police killings in the USA. This database is further validated and triangulated through searching police reports, criminal record databases, news reports, obituaries and social media (Das et al., 2021; Mapping Police Violence, 2020) and has been used and quoted by an increasing number of studies examining police violence (Bor et al., 2018; Das et al., 2021; Liu et al., 2021; Nicholson-Crotty et al., 2017; Rodenberg, 2020). Measuring police killings can be challenging, as administrative data tend to underreport them due to coverage and nonresponse errors (Bor et al., 2019; Feldman et al., 2017; Loftin et al., 2017). Despite the fact that Mapping Police Violence has been validated, using crowdsourced data has raised concerns, mainly with regards to distinguishing between armed and unarmed people that were killed (Lozada and Nix, 2019). Our study does not suffer from potential limitations arising from this differentiation, as we study the total number of police killings. Further, unemployment data were drawn from the US Bureau of Labor Statistics. To capture variation in household firearm ownership, we rely on data for the proportion of adults living in a household with a firearm per division. In doing so, we obtained annual data for population firearm ownership rates in each division from the RAND Corporation (Schell et al., 2020). These data are only available until 2016, and we therefore used them only in our supplementary analysis. Controlling for gun ownership is important, as it may be positively associated with both suicide rates and the probability of police killings (Hemenway et al., 2019; Miller and Hemenway, 2008). We thus included gun ownership rates as a regressor in a separate specification, and further controlled for division-specific year fixed effects. Summary statistics are presented in Table S1 in the Online Appendix.

We combined the data from different sources by geographic area and month. Where data were available at the State level instead of the Census level, we merged observations from different states into a single observation per month at the Division level, weighting for population where appropriate. Instead of using data at the State level, we relied on Census division-level data due to inherent data limitations. In particular, CDC Wonder suppresses any statistic for which the number of deaths is less than 10 for data protection reasons. Given that the present analysis focused on monthly data for deaths from suicides among Blacks (i.e. high-frequency data for a specific cause of death for a population group only), it is often the case that the monthly number of cases in a state does

not exceed 10, resulting in left-censoring. Having fewer than 10 deaths is less likely in larger geographical regions, such as US Census divisions, thus mitigating potential issues arising from heavy censoring.

Our dependent variable is deaths from intentional self-harm per 100,000 population among Black people, while the independent variable of interest is a binary indicator that takes the value of 1 if there was a police killing and zero otherwise. In our baseline model, we control for year dummies, month dummies and division-specific unemployment rates, as the latter is also associated with suicides (Reeves et al., 2012; Ruhm, 2000). In the additional models and sensitivity analyses, we also include household firearm ownership and division-specific year dummies as regressors. The results of the additional models are presented in the Online Appendix. In 80% of the observations there is at least one killing, so in addition to the binary indicator for police killings, we also employ an alternative variable of ordinal nature, which has three categories: none, one, two and three or more police killings. We additionally examined the association between killings in one Division and suicides in another.

Based on the results of the Hausman test, we used a fixed effects model, which is a consistent estimator. Therefore, in our baseline model, we control for Census division fixed effects to account for time-invariant confounders; year fixed-effects; month fixed-effects to account for seasonality; and the monthly unemployment rate for each division, as the latter is also associated with suicides. A series of robustness checks were performed to further validate our baseline findings. First, we repeat the estimation of our main model after replacing deaths from police killings with deaths from assaults (ICD codes: X85–Y09) in general. This would allow us to rule out the possibility that it is not deaths from police violence that matter, but assaults or homicides in general. Second, we replicate our baseline analysis using data on white suicides and police killings among Blacks. Third, we test the association between police killings of white people and suicides among Black people. Fourth, we examine whether police killings of white people affect suicides among whites. Finally, a placebo test checks if police killings one month *later* is associated with the suicide rates among Black people – which they should not, (i.e. if so, the cause would follow after the result). Failing to show statistically significant evidence in these models would be reassuring, essentially serving as falsification tests for our main empirical model. Robust standard errors were used in all models.

## 3. Results

Results of the baseline model – a Fixed Effects Panel Data approach – are presented in Table 1. There are 0.0472 more suicides per 100,000 Black Americans in months where there was at least one police killing of a Black person compared to months without such a killing [coef: 0.0472; 95%CI: 0.0089 to 0.0855; p-value = 0.022]. According to the post-estimation predictive margins, there are 0.6078 suicides per 100,000 Black Americans where there was no police killing, with the respective rate increasing to 0.6550 in case of at least one police killing of a Black American.

It could be that higher gun ownership rates means greater access to means of suicide (Miller and Hemenway, 2008), but this might also make law enforcement officers more likely to open fire (Nagin, 2020).

**Table 1**  
Baseline results.

	Fixed Effects
Police killings of Black people	0.0472** (0.0166)
Observations	508
R-squared	0.213
Number of divisions	9

Dependent variable: number of suicides per 100,000 Black People. Robust standard errors in parentheses. We control for unemployment rate, month dummies and year dummies.

We therefore added this variable in the model as a confounder. Results are presented in [Table S2](#) in the Online Appendix and confirm the results of the baseline model [coef: 0.0459; 95%CI: -0.0016 to 0.00935; p-value = 0.056].

Could it be that more killings of Black people in general (rather than police killings) drive suicides up? We studied whether deaths as a result of assault are associated with higher suicide rates, and found no such relationship [coef: -0.0221; 95%CI: -0.0579 to 0.0136; p-value = 0.191] ([Table S3](#) in the Online Appendix).

We also considered whether the effects on suicide are limited to the Division in which the killing occurred, or whether there were spillover effects on other Divisions. We found no effects of killings in one Division on suicides in other Divisions ([Table S4](#) in the Online Appendix).

We conducted two sets of falsification tests. [Table 2](#) presents the results of the first set, where we examine the relationship between black killings and white suicides; white killings and black suicides; and white killings and white suicides. Results in column 1 shows that black killings do not have an effect on white suicides [coef: -0.0040; 95%CI: -0.0247 to 0.0166; p-value = 0.665]. Similarly, there is no effect of white killings on black suicides [coef: 0.0111; 95%CI: -0.0263 to 0.0486; p-value = 0.518], or white killings on white suicides [coef: 0.0033; 95%CI: -0.0363 to 0.0429; p-value = 0.852].

Could the results of the baseline model be random? The second falsification test ([Table S5](#) in the Online Appendix) studied whether killings in one month would be associated with suicides in the *previous* month (if so, the cause would follow after the result) – which they did not [coef: -0.0148; 95%CI: -0.0883 to 0.0588; p-value = 0.656].

We subjected our results to a number of robustness tests and sensitivity analyses. In 80% of the observations there is at least one police killing reported, which means that the model with a binary explanatory variable might not provide enough detail. We thus introduced an ordinal model ([Table S6](#) in the Online Appendix). One killing is positively associated with suicides [coef: 0.027; 95%CI: 0.001 to 0.058; p-value = 0.043], and so are two or more killings [coef: 0.066; 95%CI: 0.017 to 0.115; p-value = 0.015] and three or more killings [coef: 0.046; 95%CI: -0.000 to 0.092; p-value = 0.050].

We also conducted a sensitivity analysis of the baseline model, testing models with stepwise inclusion and exclusion of control variables. Results are similar to those of the baseline model and hold the same interpretation ([Table S7](#) in the Online Appendix). [Table S8](#) in the Online Appendix also shows that results do not change when excluding the three Divisions with missing observations ([Table S8](#) in the Online Appendix). Finally, we also test the robustness of our findings after changing the econometric specification. As shown in [Table S9](#) in the Online Appendix, our results are robust after using a Fixed Effects Poisson model and a Fixed Effects linear model with log-transformed dependent variable.

#### 4. Discussion

This paper studied whether police killings are associated with an

increase in suicide rates amongst Black Americans. Results show that, controlling for a number of factors, there are 0.0472 additional Black suicides per 100,000 Black Americans in months with police killings of Black people compared to months without such killings. A higher number of police killings is also associated with higher suicide rates. The impact is limited to the particular Census Division the killing took place in, with effects not spilling over to other Divisions.

Our results are robust to several falsification tests, robustness checks and sensitivity analyses. We did not find any effect when considering the impact of Black killings on white suicides; white killings on Black suicides; or white killings on white suicides. We also found no effect of black deaths as a result of assault in general on black suicides – and that the increase in suicides persisted even when controlling for gun ownership. Could the results of the baseline model be random? A placebo test studied whether killings demonstrated any correlation with suicides the month before – which they did not. Different specifications included binary and ordinal models. Results did not change with stepwise exclusion of control variables.

Our results add to previous studies that suggest a deterioration of mental health among Black people following police killings ([Bor et al., 2018](#); [Das et al., 2021](#)), and exposure to police violence ([DeVylder et al., 2018](#)). They relate to a body of literature which shows that perceived racial injustice can affect mental health, and also contribute to the evidence on the impact of structural racism on population health outcomes and mortality ([Boyd, 2018](#)). Discrimination can lead to suicidal ideation or suicide attempts ([Castle et al., 2011](#); [Hollingsworth et al., 2017](#); [Walker et al., 2014](#)) and worse mental health outcomes ([Brown et al., 2000](#); [Cuevas et al., 2019](#); [Kessler et al., 1999](#)); while aggressive policing is associated with mental health problems ([Geller et al., 2014](#); [Hirschtick et al., 2020](#); [McLeod et al., 2020](#)). In addition, our study contributes to the literature on the impact of upstream exposure and the importance of looking beyond individual-level indicators of discrimination ([Bailey et al., 2017](#); [Cuevas and Boen, 2021](#); [Vines et al., 2017](#)), as well as the effect of various macro-level events and shocks on individual mental health outcomes ([Kavetsos et al., 2021](#); [Vandoros et al., 2019](#); [Vandoros and Kawachi, 2021](#)). Police killings are just the tip of the iceberg of much more pervasive police harassment of Black people (such as random police stops and random frisk and search ([Gelman et al., 2007](#))), and reminds Black civilians of the daily hassles they are forced to live with.

Our study is subject to limitations. We could not conduct the analysis at the state level due to the large number of missing values, as observations with fewer than 10 suicides per month are not reported by CDC. Some missing values do persist when estimating the model at the Division level, but results do not change when excluding the three Divisions with missing values. Results should be interpreted with caution, given that Census Divisions are large – and not necessarily homogenous-geographical regions. Using state-level data would substantially improve the study design and make the interpretation of the findings more straightforward. Furthermore, the unit of observation is the aggregate number of suicides per month, so we do not have information on individual characteristics or conditions that were present prior to suicides, and some suicides may not be recorded as such due to lack of evidence. Last, our analysis revealed an association between police killings and suicides among Black Americans, and further research is needed to uncover potential causal effects.

Overall, our results highlight yet one more suicide risk factor. Although Blacks have a lower suicide rate than whites ([Dow et al., 2019](#)), suicide rates have been increasing, possibly due to the decline in economic opportunity ([Chetty et al., 2020](#)). This study adds another factor associated with Black suicides.

Our findings highlight yet another reason to urgently tackle discrimination and racism in law enforcement and society in general. In terms of suicide prevention, additional mental health support should be available to Black communities especially following events that demonstrate racism and discrimination. Attention should also be paid to

**Table 2**  
Falsification tests.

	(1) Black suicides	(2) White suicides	(3) White suicides
Police killings (White)	0.0111 (0.0162)		0.00331 (0.0172)
Police killings (Black)		-0.00404 (0.0090)	
Observations	508	648	648
R-squared	0.205	0.567	0.567
Number of divisions	9	9	9

Dependent variable: number of suicides per 100,000 Black (column 1) or White (columns 2–3) People. Robust standard errors in parentheses. We control for unemployment rate, month dummies and year dummies.

barriers of access to mental health support (Lindsey et al., 2010; Musa et al., 2009) and the root causes of racial health inequalities (Bailey et al., 2020). Restricting access to means also plays an important role (Miller and Hemenway, 2008), and high firearm ownership rates may be a factor that contributes to increasing suicide rates in the US, where it remains the leading means of suicide (Centers for Disease Control and Prevention, 2020a). In any case, there is urgent need for police reforms in order to tackle police killings.

## Funding

None.

## Credit author statement

Vandoros: Study concept and design. All authors: Literature review. Kyriopoulos: Data collection. Kyriopoulos and Vandoros: Statistical analysis. All authors: Interpretation of results. All authors: Drafting of manuscript. All authors: Critical revision.

## Data and materials availability

All data are publicly available through CDC Wonder, US Census Bureau, Mapping Police Violence, US Bureau of Labor Statistics and RAND Corporation.

## Declaration of competing interest

None.

## Acknowledgements

We would like to thank the Senior Editor of the Medical Geography Editorial Office and two anonymous referees for useful comments and suggestions that have helped improve the paper. Thanks are also due to Adolfo Cuevas. All outstanding errors are our own.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.socscimed.2022.114964>.

## References

- Alang, S., McAlpine, D., McClain, M., 2021a. Police encounters as stressors: associations with depression and anxiety across race. *Socius* 7. <https://doi.org/10.1177/2378023121998128>.
- Alang, S., McAlpine, D., McCreedy, E., Hardeman, R., 2017. Police brutality and black health: setting the agenda for public health scholars. *Am. J. Publ. Health* 107, 662. <https://doi.org/10.2105/AJPH.2017.303691>.
- Alang, S., McAlpine, D.D., Hardeman, R., 2020. Police brutality and mistrust in medical institutions. *J. Racial Ethn. Heal. Disparities* 7, 760–768. <https://doi.org/10.1007/S40615-020-00706-W/FIGURES/1>.
- Alang, S., Rogers, T.B., Williamson, L.D., Green, C., Bell, A.J., 2021b. Police brutality and unmet need for mental health care. *Health Serv. Res.* 56, 1104–1113. <https://doi.org/10.1111/1475-6773.13736>.
- Ang, D., 2020. The effects of police violence on inner-city students. *Q. J. Econ.* 136, 115–168. <https://doi.org/10.1093/QJE/QJAA027>.
- Bailey, Z.D., Feldman, J.M., Bassett, M.T., 2020. How structural racism works — racist policies as a root cause of U.S. Racial health inequities. *N. Engl. J. Med.* 384, 768–773. <https://doi.org/10.1056/nejmms2025396>.
- Bailey, Z.D., Krieger, N., Agénor, M., Graves, J., Linos, N., Bassett, M.T., 2017. Structural racism and health inequities in the USA: evidence and interventions. *Lancet* 389, 1453–1463. [https://doi.org/10.1016/S0140-6736\(17\)30569-X](https://doi.org/10.1016/S0140-6736(17)30569-X).
- Bor, J., Venkataramani, A.S., Williams, D.R., Tsai, A.C., 2019. Validity of details in databases logging police killings — authors' reply. *Lancet* 393, 1413. [https://doi.org/10.1016/S0140-6736\(18\)33060-5](https://doi.org/10.1016/S0140-6736(18)33060-5).
- Bor, J., Venkataramani, A.S., Williams, D.R., Tsai, A.C., 2018. Police killings and their spillover effects on the mental health of black Americans: a population-based, quasi-experimental study. *Lancet* 392, 302–310. [https://doi.org/10.1016/S0140-6736\(18\)31130-9](https://doi.org/10.1016/S0140-6736(18)31130-9).
- Bowleg, L., del Río-González, A.M., Mbaba, M., Boone, C.A., Holt, S.L., 2020. Negative police encounters and police avoidance as pathways to depressive symptoms among US Black men, 2015–2016. *Am. J. Publ. Health* 110, S160–S166. <https://doi.org/10.2105/AJPH.2019.305460>.
- Boyd, R.W., 2018. Police violence and the built harm of structural racism. *Lancet* 392, 258–259. [https://doi.org/10.1016/S0140-6736\(18\)31374-6](https://doi.org/10.1016/S0140-6736(18)31374-6).
- Bridge, J.A., Horowitz, L.M., Fontanella, C.A., Sheftall, A.H., Greenhouse, J., Kelleher, K. J., Campo, J.V., 2018. Age-Related racial disparity in suicide rates among US youths from 2001 through 2015. *JAMA Pediatr.* 172, 697–699. <https://doi.org/10.1001/JAMAPEDIATRICS.2018.0399>.
- Brown, T.N., Williams, D.R., Jackson, J.S., Neighbors, H.W., Torres, M., Sellers, S.L., Brown, K.T., 2000. "Being black and feeling blue": the mental health consequences of racial discrimination. *Race Soc.* 2, 117–131. [https://doi.org/10.1016/S1090-9524\(00\)00010-3](https://doi.org/10.1016/S1090-9524(00)00010-3).
- Castle, K., Conner, K., Kaukeinen, K., Tu, X., 2011. Perceived racism, discrimination, and acculturation in suicidal ideation and suicide attempts among black young adults. *Suicide Life-Threatening Behav.* 41, 342–351. <https://doi.org/10.1111/j.1943-278X.2011.00033.x>.
- Centers for Disease Control and Prevention, 2020a. FastStats - suicide and self-inflicted injury [WWW Document]. <https://www.cdc.gov/nchs/fastats/suicide.htm> (accessed 26.11.2020).
- Centers for Disease Control and Prevention, 2020b. Suicide Rates for Females and Males by Race and Ethnicity: United States, 1999 and 2017 [WWW Document]. [https://www.cdc.gov/nchs/data/hestat/suicide/rates\\_1999\\_2017.htm](https://www.cdc.gov/nchs/data/hestat/suicide/rates_1999_2017.htm) (accessed 26.11.2020).
- Chetty, R., Hendren, N., Jones, M.R., Porter, S.R., 2020. Race and economic opportunity in the United States: an intergenerational perspective. *Q. J. Econ.* <https://doi.org/10.1093/qje/qjz042>.
- Clark, R., Anderson, N.B., Clark, V.R., Williams, D.R., 1999. Racism as a stressor for African Americans: a biopsychosocial model. *Am. Psychol.* 54, 805–816. <https://doi.org/10.1037//0003-066x.54.10.805>.
- Cuevas, A.G., Boen, C., 2021. Tip of the iceberg: measuring racial discrimination in studies of health. *Stress Health* 37, 1043–1050. <https://doi.org/10.1002/SMI.3047>.
- Cuevas, A.G., Wang, K., Williams, D.R., Mattei, J., Tucker, K.L., Falcon, L.M., 2019. The association between perceived discrimination and allostatic load in the Boston Puerto Rican health study. *Psychosom. Med.* 81, 659–667. <https://doi.org/10.1097/PSY.0000000000000715>.
- Das, A., Singh, P., Kulkarni, A.K., Bruckner, T.A., 2021. Emergency Department visits for depression following police killings of unarmed African Americans. *Soc. Sci. Med.* 269, 113561. <https://doi.org/10.1016/j.socscimed.2020.113561>.
- DeVylder, J.E., Frey, J.J., Cogburn, C.D., Wilcox, H.C., Sharpe, T.L., Oh, H.Y., Nam, B., Link, B.G., 2017. Elevated prevalence of suicide attempts among victims of police violence in the USA. *J. Urban Health* 94, 629–636. <https://doi.org/10.1007/S11524-017-0160-3>.
- DeVylder, J.E., Jun, H.J., Fedina, L., Coleman, D., Anglin, D., Cogburn, C., Link, B., Barth, R.P., 2018. Association of exposure to police violence with prevalence of mental health symptoms among urban residents in the United States. *JAMA Netw. Open* 1, e184945. <https://doi.org/10.1001/jamanetworkopen.2018.4945>.
- Dow, W.H., Godoy, A., Lowenstein, C.A., Reich, M., 2019. Can Economic Policies Reduce Deaths of Despair? (No. NBER Working Paper No. 25787). NBER Working Paper, Cambridge, MA.
- Edwards, F., Lee, H., Esposito, M., 2019. Risk of being killed by police use of force in the United States by age, race-ethnicity, and sex. *Proc. Natl. Acad. Sci. Unit. States Am.* 116, 16793–16798. <https://doi.org/10.1073/pnas.1821204116>.
- Feldman, J.M., Gruskin, S., Coull, B.A., Krieger, N., 2017. Quantifying underreporting of law-enforcement-related deaths in United States vital statistics and news-media-based data sources: a capture-recapture analysis. *PLoS Med.* 14, e1002399. <https://doi.org/10.1371/JOURNAL.PMED.1002399>.
- Geller, A., Fagan, J., Tyler, T., Link, B.G., 2014. Aggressive policing and the mental health of young urban men. *Am. J. Publ. Health*. <https://doi.org/10.2105/AJPH.2014.302046>.
- Gelman, A., Fagan, J., Kiss, A., 2007. An analysis of the New York City police department's "stop-and-frisk" policy in the context of claims of racial bias. *J. Am. Stat. Assoc.* 102, 813–823. <https://doi.org/10.1198/016214506000001040>.
- Hemenway, D., Azrael, D., Conner, A., Miller, M., 2019. Variation in rates of fatal police shootings across US states: the role of firearm availability. *J. Urban Health* 96, 63–73. <https://doi.org/10.1007/s11524-018-0313-z>.
- Hirschtick, J.L., Homan, S.M., Rauscher, G., Rubin, L.H., Johnson, T.P., Peterson, C.E., Persky, V.W., 2020. Persistent and aggressive interactions with the police: potential mental health implications. *Epidemiol. Psychiatr. Sci.* 29, e19. <https://doi.org/10.1017/S2045796019000015>.
- Hollingsworth, D.W., Cole, A.B., O'Keefe, V.M., Tucker, R.P., Story, C.R., Wingate, L.R., 2017. Experiencing racial microaggressions influences suicide ideation through perceived burdensomeness in African Americans. *J. Counsel. Psychol.* 64, 104–111. <https://doi.org/10.1037/cou0000177>.
- Kavetsos, G., Kawachi, I., Kyriopoulos, I., Vandoros, S., 2021. The effect of the Brexit referendum result on subjective well-being. *J. R. Stat. Soc. Ser. A (Statistics Soc.)* 184, 707–731. <https://doi.org/10.1111/RSSA.12676>.
- Kessler, R.C., Mickelson, K.D., Williams, D.R., 1999. The prevalence, distribution, and mental health correlates of perceived discrimination in the United States. *J. Health Soc. Behav.* 40, 208–230. <https://doi.org/10.2307/2676349>.
- Legewie, J., Fagan, J., 2019. Aggressive policing and the educational performance of minority youth. *Am. Socio. Rev.* 84, 220–247. <https://doi.org/10.1177/0003122419826020>.
- Lindsey, M.A., Joe, S., Nebbitt, V., 2010. Family matters: the role of mental health stigma and social support on depressive symptoms and subsequent help seeking among



- african american boys. *J. Black Psychol.* 36, 458–482. <https://doi.org/10.1177/0095798409355796>.
- Liu, S.Y., Lim, S., Gould, L.H., 2021. Impact of law enforcement-related deaths of unarmed black New Yorkers on emergency department rates, New York 2013–2016. *J. Epidemiol. Community Health* 75, 258–263. <https://doi.org/10.1136/JECH-2020-214089>.
- Loftin, C., McDowall, D., Xie, M., 2017. Underreporting of homicides by police in the United States, 1976–2013. *Homicide Stud.* 21, 159–174. <https://doi.org/10.1177/1088767917693358>.
- Lozada, M.J., Nix, J., 2019. Validity of details in databases logging police killings. *Lancet* 393, 1412–1413. [https://doi.org/10.1016/S0140-6736\(18\)33043-5](https://doi.org/10.1016/S0140-6736(18)33043-5).
- Mapping Police Violence, 2020. Mapping Police Violence [WWW Document]. <https://mappingpoliceviolence.org/> (accessed 26.11.2020).
- McLeod, M.N., Heller, D., Manze, M.G., Echeverria, S.E., 2020. Police interactions and the mental health of black Americans: a systematic review. *J. Racial Ethn. Heal. Disparities* 7, 10–27. <https://doi.org/10.1007/s40615-019-00629-1>.
- Miller, M., Hemenway, D., 2008. Guns and suicide in the United States. *N. Engl. J. Med.* 359, 989–991. <https://doi.org/10.1056/nejmp0805923>.
- Musa, D., Schulz, R., Harris, R., Silverman, M., Thomas, S.B., 2009. Trust in the health care system and the use of preventive health services by older black and white adults. *Am. J. Publ. Health* 99, 1293–1299. <https://doi.org/10.2105/AJPH.2007.123927>.
- Nagin, D.S., 2020. Firearm availability and fatal police shootings. *Ann. Am. Acad. Polit. Soc. Sci.* 687, 49–57. <https://doi.org/10.1177/0002716219896259>.
- Nicholson-Crotty, S., Nicholson-Crotty, J., Fernandez, S., 2017. Will more black cops matter? Officer race and police-involved homicides of black citizens. *Publ. Adm. Rev.* 77, 206–216. <https://doi.org/10.1111/puar.12734>.
- Reeves, A., Stuckler, D., McKee, M., Gunnell, D., Chang, S., Sen, Basu, S., 2012. Increase in state suicide rates in the USA during economic recession. *Lancet*. [https://doi.org/10.1016/S0140-6736\(12\)61910-2](https://doi.org/10.1016/S0140-6736(12)61910-2).
- Riley, T., O'Reilly, L., Adams, S., 2021. Addressing suicide among black youths: a call to action within and outside clinical practice. *JAMA Pediatr.* <https://doi.org/10.1001/JAMAPEDIATRICS.2021.1693>.
- Rodenberg, H., 2020. Understanding police violence as a mutual problem. *Am. J. Publ. Health*. <https://doi.org/10.2105/AJPH.2020.305585>.
- Ruhm, C.J., 2000. Are recessions good for your health? *Q. J. Econ.* 115, 617–650.
- Schell, T., Peterson, S., Vegetabile, B., Scherling, A., Smart, R., Morral, A., 2020. State-Level Estimates of Household Firearm Ownership, State-Level Estimates of Household Firearm Ownership. RAND Corporation. <https://doi.org/10.7249/tl354>.
- Vandoros, S., Avendano, M., Kawachi, I., 2019. The EU referendum and mental health in the short term: a natural experiment using antidepressant prescriptions in England. *J. Epidemiol. Community Health* 73, 168–175. <https://doi.org/10.1136/JECH-2018-210637>.
- Vandoros, S., Kawachi, I., 2021. Economic uncertainty and suicide in the United States. *Eur. J. Epidemiol.* 36, 641–647. <https://doi.org/10.1007/S10654-021-00770-4/TABLES/3>.
- Vines, A.I., Ward, J.B., Cordoba, E., Black, K.Z., 2017. Perceived racial/ethnic discrimination and mental health: a review and future directions for social Epidemiology. *Curr. Epidemiol. Reports* 4, 156–165. <https://doi.org/10.1007/S40471-017-0106-Z>.
- Walker, R.L., Salami, T.K., Carter, S.E., Flowers, K., 2014. Perceived racism and suicide ideation: mediating role of depression but moderating role of religiosity among African American adults. *Suicide Life-Threatening Behav.* 44, 548–559. <https://doi.org/10.1111/sltb.12089>.