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Emergency Department visits for depression following police killings of unarmed African Americans

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ABSTRACT

Previous literature on racism and adverse mental health largely focuses on individual-level exposures. We investigate whether and to what extent structural racism, as measured by police killings of unarmed African Americans, affect a severe and acute mental health outcome among African Americans: depression-related Emergency Department (ED) visits. We used police killings of unarmed African Americans as our exposure and depression-related ED visits (per 100,000 population) as our outcome. We examined the relation across 75 counties from five US states between 2013 and 2015 (2700 county-months). Linear fixed effect analyses controlled for time-invariant county-factors as well as the number of hospitals and arrests for violent crimes (per 100,000 population). Police killings of unarmed African Americans correspond with an 11% increase in ED visits per 100,000 population related to depression among African Americans in the concurrent month and three months following the exposure ($p < 0.05$). Researchers and policymakers may want to consider prevention efforts to reduce racial bias in policing and implement surveillance of fatal police encounters. These encounters, moreover, may worsen mental health and help-seeking in the ED among African Americans not directly connected to the encounter.

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Disclosures

The authors of this paper do not report any financial disclosures.

Ethics approval

The University of California, Irvine, institutional review board deemed this study exempt owing to the use of publicly available, deidentified data.

Data availability

The county-level datasets used for the analysis and the statistical code are available from the corresponding author. All authors, external and internal, had full access to all of the data (including statistical reports and tables) in the study and can take responsibility for the integrity of the data and the accuracy of the data analysis.

1. Introduction

Since 2015, police in the United States have killed approximately 5400 individuals (*Fatal Force, 2020*; Mapping Police Violence, 2020). Annually, about 1000 people die from police shootings (*Fatal Force, 2020*; Mapping Police Violence, 2020). Police are almost 3.5 times more likely to kill African Americans than whites (Mapping Police Violence, 2020; Ross, 2015). Additionally, African Americans have almost 1.5 times the likelihood of being unarmed when killed compared to whites (*Fatal Force, 2020*; Mapping Police Violence, 2020). The recent video footage of George Floyd's death, while being subdued by police officers, has brought much media and popular attention to this issue.

Various forms of institutional oppression toward African Americans have persisted over the course of US history. After the Civil Rights movement, origins of Critical Race Theory (CRT) emerged to transform the ideas of race, racism, and power (Moore et al., 2018). Established in the legal field during the 1980s, CRT asserts that institutions perpetuate racial inequality, for African Americans, through social, economic, and

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legal disparities (Moore et al., 2018). Additionally, it distinguishes itself from progressive, color-blind, and civil rights approaches as they rely on the current legal system (Ford and Airhihenbuwa, 2018). Scholars argue that although acts of prejudice play a role in racial domination, social institutions shape the system of racial domination (Bonilla-Silva, 2015). The cycle subsequently continues as individuals abide by social institutions rooted in racism (Bonilla-Silva, 2015). As with historical acts of lynching, police killings of unarmed African Americans remain features of a racialized America that has normalized such patterns of oppression (Moore et al., 2018). Theorists and empirical scholars have argued that police killings of unarmed African Americans serve as an indicator for structural racism (Mesic et al., 2018; Ross, 2015).

Mesic et al. (2018) report that, across states, structural racism strongly predicts the black-white disparity in unarmed police shootings. Ross (2015) further finds that racial bias occurs in police killings more often in urban counties. Research also suggests that individuals of color can experience racism vicariously, wherein individuals indirectly experience racism targeted at other persons of color (Truong et al., 2016). Several studies suggest that African Americans and other racial/ethnic minorities experience vicarious racism frequently (Dominguez, 2008; Mason et al., 2017).

One study examined the relationship between vicarious racism and mental health after the highly publicized police killing of Trayvon Martin (Mason et al., 2017). Their research indicates that racial identity sensitized African Americans to race-related violence toward other African Americans which positively correlated with depressive symptoms (Mason et al., 2017). A separate ecological study finds that counties with police killings of unarmed African Americans correspond positively with self-reported adverse mental health days (stress, depression, emotional problems) among African Americans a few months after the killings (Bor et al., 2018).

The above work, while suggestive, is limited in the following ways. First, much literature on racism and adverse mental health focuses on individual-level exposures rather than structural racism (DeVylder et al., 2018; Gee and Ford, 2011). Individual-level exposures include internalized or personally-mediated racism which encompass accepting negative messages about one's own worth and acts of prejudice, respectively (Jones, 2000). Structural racism, however, captures dimensions of racism embedded in social, legal, and economic institutions (Jones, 2000). Although examination of individual-level factors has advanced knowledge of health inequities, it ignores the broader ecological context of racism embedded in societal institutions (Gee and Ford, 2011). Additionally, facets of structural racism may have a stronger relation to population health given its widespread influence on vulnerable communities (Gee and Ford, 2011).

Second, previous ecological literature finds that police killings of unarmed African Americans correspond positively with adverse mental health days (Bor et al., 2018). It does not, however, examine whether the exposure precedes increases in help-seeking for psychiatric conditions. Additionally, scholars suggest that African Americans lead all other race/ethnicities in chronic depression, with over 56% experiencing prolonged depressive symptoms (Williams et al., 2007). We do not know whether exogenous shocks, such as police killings of unarmed African Americans, may further exacerbate population-level depressive symptoms, requiring emergency assistance.

We address these limitations and extend previous work by examining whether police killings of unarmed African Americans correspond positively with Emergency Department (ED) visits related to depression among African Americans. We examine 331,171 outpatient ED visits related to depression in 75 counties from five states between 2013 and 2015. Results from our study may hold particular relevance to understanding the ecology of unarmed African American police killings as it relates to ED visits for depression among African Americans.

2. Methods

2.1. Study population

We retrieved our dependent variable, psychiatric ED visits for depression among African Americans (per 100,000 population), from the Statewide Emergency Department Database (SEDD). The SEDD is made available for purchase by the Agency for Healthcare Research and Quality (AHRQ) under the Healthcare Cost and Utilization Project (HCUP) (Introduction to the HCUP State Emergency Department Databases, 2020). States that participate in HCUP provide information on over 99% of all outpatient ED visits through SEDD. This high-quality database enjoys widespread use in psychiatric epidemiological research (Bruckner et al., 2019; Bruckner et al., 2020; Singh et al., 2019). We selected states included in SEDD that uniformly report county identifiers, race/ethnicity per ED visit, and month of visit, allowing longitudinal analysis over the study period of interest at the county-month resolution. These inclusion criteria yielded the following state-years: Arizona, Kentucky, North Carolina, New Jersey and New York, from 2013 to 2015 (i.e., 36 months per state).

2.2. Study measures

We retrieved psychiatric ED visits pertaining to depression using visit-level diagnoses based on ICD 10 codes for all types of depression and mood disorders (Appendix Table A.1) (CCS for ICD-10-PCS, 2019). We aggregated a total of 331,171 depression-related ED visits among African Americans, by county-month, and converted these counts to population prevalence estimates (per 100,000 population) using race-specific population denominators obtained from the US Census Bureau's Population Estimates database (US Census Bureau, 2016).

We retrieved data on police killings of unarmed African Americans from the Mapping Police Violence (MPV) database, by county-month for the study regions and time period (Mapping Police Violence, 2020). The MPV database contains information on police killings obtained from crowdsourcing reports (media and others), which overcomes the limitations of under-reported administrative datasets (Mapping Police Violence, 2020). Police killings reported in the MPV undergo validation through triangulation with official police records, news reports, social media references, and obituaries. The reliability of these data are further evidenced by their utilization in extant research (Bor et al., 2018; Mesic et al., 2018). In keeping with prior work that utilizes the MPV dataset, we specified, as our exposures, 0- to 3-month lags of whether one or more police killings of African Americans occurred in a county-month (binary indicator; 1 = Yes, 0 = No). We also obtained information on police killings of armed African Americans from the MPV, to utilize as a sensitivity test, by county-month (binary indicator; 1 = Yes, 0 = No). Given that metropolitan counties account for over 96% of police killings of unarmed African Americans in our data, we restricted our analysis to metropolitan counties (Appendix, Table A.2). These restrictions yield a final analytic sample of 75 counties over 36 months (i.e. 2700 county-months from 2013 to 2015).

Crime rates may confound our analysis in that greater incidence of violent crime (e.g. homicide, assault) may correspond with higher ED visits for depression as well as heightened police activity and police killings in a county (Stockdale et al., 2007). To control for this plausible endogeneity, we retrieved data on violent crimes reported per county-month from one of the most extensively used, publicly available, crime statistics repository in the US – the Uniform Crime Records (UCR) database (Gove et al., 1985; Jackson, 1990; Maltz and Targonski, 2002). The UCR is made available through the Federal Bureau of Investigation's UCR Program, and provides information on arrests for violent crimes by nearly all law enforcement agencies at the county-level, per month (Federal Bureau of Investigation, 2015). We converted monthly arrest counts to population prevalence estimates (per 100,000 population) and utilized this arrest rate as a control variable in our analysis.

2.3. Analysis

We test whether ED visits for depression (per 100,000 population) among African Americans increase within 0–3 months following police killing of unarmed African Americans (Ordinary Least Squares regression model described in Appendix Figure A.2). We include as a covariate the number of EDs, or reporting hospitals, within a county to account for changes over time in ED visits following closure or opening of EDs. We also include monthly arrests for violent crimes (per 100,000 population) to control for heightened crime or police activity during that county-month. Our model incorporates county, month, and year indicator variables. Additionally, we include state-specific linear time trends which control for unobserved factors trending linearly over the study period.

Our model specification (Appendix Figure A.2) controls for several sources of potential confounding. First, we include county fixed effects. The use of county fixed effects forces within-county identification of the relation between outcome and exposure and accounts for time-invariant attributes of a county that may correspond with police killings as well as depression-related ED visits. Second, we included indicators for month in order to control for seasonality in depression-related ED visits. Previous literature finds seasonal patterns in psychiatric ED visits such as increased visits at the beginning of each calendar year (Halpern et al., 1994; Halpern and Mechem, 2001). We also specified year fixed effects to control for year-specific factors (e.g. policy changes such as the Affordable Care Act) that may correspond with an increase or decrease in depression-related ED visits. Third, we include arrests for violent crimes (per 100,000 population) to control for heightened criminal or police activity. Scholars suggest heightened crime corresponds with adverse mental health symptoms and may also correspond with increased police killings (Dustmann and Fasani, 2016; White et al., 1987).

We also conducted two sensitivity tests. First, we re-estimated Equation 1 and specified 0- to 6-month lags of the exposure to examine the potential of an extended elevation of ED visits for depression or any seasonality. Second, we used as the exposure (X) a binary indicator of police killings of armed African Americans (0- to 3-month lags, other covariates specified identical to Equation 1). This additional analysis gauged whether police killings of armed African Americans correspond with depression-related ED visits. This sensitivity test examined whether any changes in depression-related ED visits observed in the main analysis also correspond with an exposure that reflects (relatively) lower racial targeting of African Americans. We conduct all analyses in Stata SE version 16.0.

3. Results

ED visits for depression (per 100,000 population) among African Americans average about 100 per county per month, with the highest (mean) rates observed for Kentucky, and lowest for New York (Table 1). Out of a total of 26 county-months with police killings of unarmed African Americans, New York state accounts for 13 (i.e. 50%) and Kentucky reports zero.

Fig. 1 shows the ED visits for depression (per 100,000 population) over time, averaged per county, per month in our study sample. This upward trend aligns with secular increase in ED visits for psychiatric conditions reported in the literature (Kalb et al., 2019). The sharp increase in ED visits around March 2015 arises from increase in number of (new) hospitals included in the SEDD from that period onwards (based on monthly counts of hospitals reporting to SEDD). Fig. 2 shows the monthly trend in occurrence of police killings of unarmed African Americans. Within our study region, we observe an average of 5–7 months per year (2013–2015) with at least one police killing of an unarmed African American.

Table 2 presents the results from OLS fixed effects regression analyses predicting log-transformed ED visits for depression (per 100,000

Table 1
Descriptive attributes of study covariates across 75 counties (5 states: AZ, KY, NJ, NY, NC), over 36 months (2013–2015).

Variables	Statistics
ED visits for depression (per 100,000 population) among African Americans per county-month	**Mean (SD)**
Overall	100.25 (10.10)
Arizona	84.95 (18.28)
Kentucky	128.05 (19.18)
New Jersey	104.82 (11.81)
New York	74.17 (6.10)
North Carolina	102.18 (8.95)
County-months with police killings of unarmed African Americans	**N (%)**
Overall	26 (100)
Arizona	4 (15.38)
Kentucky	0 (0)
New Jersey	5 (19.23)
New York	13 (50.00)
North Carolina	4 (15.38)

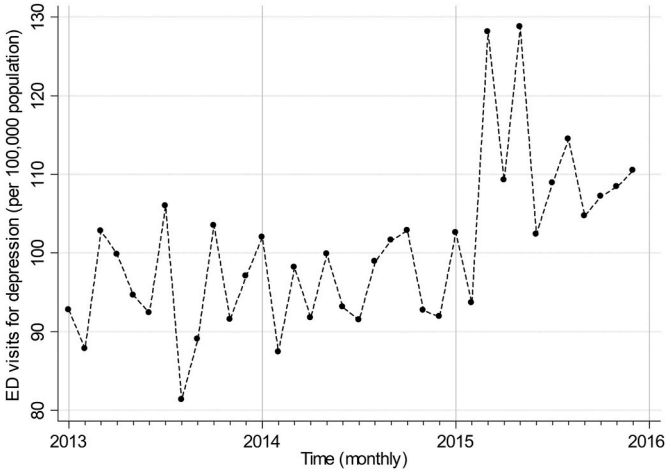

Fig. 1. Trend in ED visits for depression among African Americans (per 100,000 population) across 75 counties (5 states: AZ, KY, NC, NJ, NY), over 36 months (2013–2015).

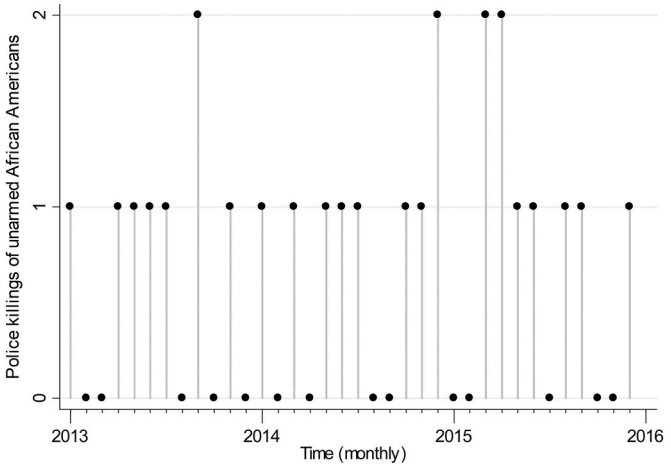

Fig. 2. Monthly police killings of unarmed African Americans over 36 months (2013–2015) aggregated for 75 counties (5 states: AZ, KY, NC, NJ, NY).

Table 2
OLS fixed effects regression results predicting log transformed ED visits for depression (per 100,000 population) among African Americans as a function of 0- to 3-month lags of police killing of unarmed African Americans.

Covariates[a]		Coefficient	SE[b]
Police killing of unarmed African Americans (reference = No)			
	Month lag 0	**0.11***	**0.05**
	Month lag 1	0.05	0.04
	Month lag 2	0.09	0.05
	Month lag 3	**0.11***	**0.04**
Number of EDs/hospitals reporting to SEDD		**0.17***	**0.07**
Arrests for violent crime (per 100,000 population)		80.69	248.30

*Boldface indicates statistical significance: *p < 0.05; **p < 0.01; ***p < 0.001.
[a] County, month, year fixed effects and state-specific linear time trends included but not shown.
[b] Robust standard errors.

population) as a function of 0-, 1-, 2- and 3- month lags of police killings of unarmed African Americans. We use log transformed outcome for analysis as this variable shows a skewed distribution (Appendix, Figure A.1). Regression results indicate an increase of approximately 11% in depression-related ED visits at 0 and 3 months after police killing of unarmed African Americans in a county ($p < 0.05$). Sensitivity tests show that this pattern does not persist beyond exposure lag 3 (Appendix, Table A.3). Depression-related ED visits among African Americans also show no relation to police killings of armed African Americans. This indicates that our findings do not persist without a racism-related indicator of the exposure, the unarmed status of the individual (Appendix, Table A.4).

4. Discussion

Police kill unarmed African Americans at 3.5 times the rate of unarmed whites (Ross, 2015). Vicarious racism has been proposed to play a role in the adverse mental health experienced by African Americans following police killings (Mason et al., 2017; Truong et al., 2016). In this study, we examined the relation between unarmed African American police killings and ED visits for depression (per 100,000 population). We find that unarmed African American police killings correspond with an 11% increase in ED visits for depression per 100,000 population among African Americans in the concurrent month and three months after the police killing.

Strengths of our study include the use of a comprehensive statewide dataset comprising the census of ED visits for depression spanning five states from regions including the Northeast, South, and West (HCUP-US AHRQ, 2020). We used clinically diagnosed ED visits for depression based on ICD-10 codes (CCS for ICD-10-PCS, 2019). The MPV database comprises three of the most comprehensive police killing databases in the country and undergoes further quality control to ensure completeness of the data (Mapping Police Violence, 2020). As opposed to other databases, it also utilizes consistent definitions for armed status (Mapping Police Violence, 2020). Our longitudinal analyses which span three years (36 months) establish precise temporal order (exposure precedes the outcome) and account for county, month, and year fixed effects. These fixed effects control for variations across place and time, as well as seasonality in help-seeking for depression in the ED. We also controlled for other time-varying confounders such as number of hospitals as well as arrest rates for violent crime that may influence the variation in our outcome and exposure. Taken together, our use of high-quality data, longitudinal study design, and fixed effects-based analytic approach offer strong reliability and validity to this study.

Limitations of our study could include residual confounding by unmeasured factors. Such an unmeasured factor would have to correlate positively with ED visits for depression and with police killings of unarmed African Americans, not be captured by county-specific time-invariant fixed effects and also not be accounted for by seasonality (month fixed effects) and temporal changes/trends (year fixed effects, linear time trends). We know of no such factor. Second, prior literature reports that African Americans rely on EDs for psychiatric care at disproportionately higher rates relative to other race/ethnicities (Snowden et al., 2009). Owing to data limitations within the SEDD, we are unable to differentiate between emergent versus routine/non-emergent ED visits in our analysis. We contend that the increase in ED visits for depression observed in our analyses arise from emergent visits as we do not have *a priori* expectations of why routine/non-emergent ED visits would respond, within 0–3 months, to police killings of unarmed African Americans. However, future research may extend the present study and examine differences by emergent versus non-emergent psychiatric ED visits, among African Americans, following this exposure. Lastly, whereas many scholars have used the MPV database in research, data on police killings remain crowd-sourced and likely under-reported given the censuring of official police data provided by states and local departments (Bor et al., 2018; Mesic et al., 2018). Our findings may thus represent the lower bound of the reported association.

In alignment with previous literature, our study suggests that police killings may exacerbate depressive symptoms and adverse mental health among African Americans, provoking an ED visit for depression (Bor et al., 2018). The increase in ED visits for depression in the concurrent month and three months after the police killing underscores the possibility that individuals may experience police killings as traumatic events. In 2007, Carter proposed the Theory of Race-Based Traumatic Stress in which individuals who face racial discrimination experience symptoms similar to post-traumatic stress (Carter, 2007; Comas-Díaz et al., 2019). Symptoms include adverse mental health such as depression and anxiety, in addition to avoidance, reactivity, and cognitive changes (*NIMH - Post-Traumatic Stress Disorder, 2020*). Additionally, post-traumatic stress symptoms usually begin three months after the event occurs (*NIMH - Post-Traumatic Stress Disorder, 2020*). This theory warrants further empirical investigation into whether police killings precede increased diagnosis of post-traumatic stress in African Americans.

Our study's findings and previous literature on adverse mental health symptoms may not fully capture changes in population-level help-seeking following police killings of unarmed African Americans. While EDs serve as safety-nets, particularly for acute, episodic mental health emergencies, individuals may also opt to seek care in non-ED settings following exposure to ambient stressors. Community Health Centers, primary care physicians, or other mental health professionals may experience increases in African American patients seeking help following police killings. An exploration of other health systems may provide insight into other mental health sequelae and/or potential changes in help-seeking among African Americans. Additionally, individuals may internalize or externalize adversity (Carragher et al., 2015). Those internalizing adversity experience symptoms of anxiety, depression, or somatizations (Carragher et al., 2015). Externalization includes hostility or aggression which may lead to heightened crime, arrest rates, or involuntary psychiatric holds/examinations for danger to self or others (Carragher et al., 2015; Catalano et al., 2005). This speculation warrants further refinement and empirical testing.

In 2014, the UN Committee Against Torture criticized the United States for its failure to evaluate use-of-force by its police following the uncovering of race- and sexuality-based brutality (Ross, 2015). They specifically noted the lack of 1) statistical data on allegations of police brutality; and 2) information on the result of investigations undertaken after those allegations (Ross, 2015). Unlike many official police sources, several current, public-access, crowd-sourced projects do not censure police killing data (Ross, 2015). Investigations regarding police killings and the subsequent acquittals of police officers involved in highly publicized cases have led to public unrest, movements such as Black Lives Matter, and the 2014 President's Task Force on 21st Century

Policing ((President's Task Force on 21st Century Policing Implementation Guide: Moving from Recommendations to Action; Taylor, 2016). Although we know little as to whether these developments or future movements have changed racial bias among policing, the mental health implications of such racial bias remain understudied.

The frequency of police killings, as well as the racial bias associated with these killings, have remained consistent over the past five years (*Fatal Force, 2020*; Mapping Police Violence, 2020). Researchers, community organizations, and policy experts suggest several avenues for preventing police killings of unarmed African Americans including: 1) terminating "broken windows" policing for minor crimes and activities; 2) ceasing profiling based on race/ethnicity and "stop and frisk" procedures; and 3) establishing alternative approaches to mental health crises than policing (*Campaign Zero, 2020*). Researchers also find that implementing consistent supervisory meetings between officers and sergeants corresponds with more measured responses to incidents on the street (Owens et al., 2018).

Video footage of police killings have become widespread through technological improvements such as camera phones, police dashboard/body cameras, and the internet (Harden, 2016). Extensive media coverage of collective traumas (traumatic events that affect an entire society) (Hirschberger, 2018), however, may trigger psychological distress (Holman et al., 2014). A study on the Boston Marathon bombings in 2013 found that repeated media exposure to collective traumas corresponded with higher acute stress (Holman et al., 2014). Additionally, researchers found higher stress levels among those who watched media coverage when compared to those directly exposed (at or near) the bombing (Holman et al., 2014). The field concerned with structural racism and health would benefit from understanding the extent to which media coverage of police killings, or other social and information pathways, adversely affect African Americans.

African Americans have less access to mental health care than do whites and delay seeking care more often than other race/ethnicities (McGuire and Miranda, 2008; Snowden, 1999). When seeking care, African Americans utilize the ED for psychiatric care at a greater rate (Snowden, 1999). Scholars attribute less help-seeking to low access, poor quality of care when accessed, socio-cultural barriers to help-seeking, and racial discrimination within the healthcare system (Snowden et al., 2009). African Americans also have stronger beliefs about racial discrimination in healthcare than do other race/ethnicities and, as a result, prefer African American physicians (Chen, 2005). Other research indicates that increases in health care providers in underserved communities correspond with greater health care access for minorities, decreased discrimination, improved patient-provider communication, and improved patient quality and satisfaction outcomes (Bussing and Gary, 2012). As African American youth suicide rates steadily increase nationwide, increased access to mental health care for this population may be particularly beneficial (Price and Khubchandani, 2019). In addition, given that depression remains a strong risk factor for suicidal ideation and self-harm, further research should evaluate whether elements of structural racism may correspond with suicides among African American youth (Nock and Kessler, 2006).

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.socscimed.2020.113561.

Contributions

AD developed the concept, conducted the analysis, and wrote the first draft. AK and PS assisted with data management, analysis, and drafting the manuscript. TB supervised the project and assisted with analysis and drafting the manuscript.

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