


Is There Evidence of Racial Disparity in Police Use of Deadly Force? Analyses of Officer-Involved Fatal Shootings in 2015–2016

Social Psychological and
Personality Science
1-10
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DOI: 10.1177/1948550618775108
journals.sagepub.com/home/spp


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Abstract

Is there evidence of a Black–White disparity in death by police gunfire in the United States? This is commonly answered by comparing the odds of being fatally shot for Blacks and Whites, with odds benchmarked against each group’s population proportion. However, adjusting for population values has questionable assumptions given the context of deadly force decisions. We benchmark 2 years of fatal shooting data on 16 crime rate estimates. When adjusting for crime, we find no systematic evidence of anti-Black disparities in fatal shootings, fatal shootings of unarmed citizens, or fatal shootings involving misidentification of harmless objects. Multiverse analyses showed only *one* significant anti-Black disparity of 144 possible tests. Exposure to police given crime rate differences likely accounts for the higher per capita rate of fatal police shootings for Blacks, at least when analyzing all shootings. For unarmed shootings or misidentification shootings, data are too uncertain to be conclusive.

Keywords

deadly force, police use of force, officer-involved shootings, fatal shootings, race bias, racial disparity, Black Lives Matter

One of the most pressing topics capturing public attention is racial disparity in officer-involved shootings. From Black Lives Matter to media reporting, widespread attention has been drawn to the possibility that Black citizens are more likely to be fatally shot by police officers than White citizens, given each group’s representation in the overall population. In this article, we argue for more reasonable benchmarks to compare fatal shooting rates across racial groups, allowing for a new understanding of whether racial disparity exists in fatal officer-involved shootings.

In dealing with this sensitive topic, it is important to be clear at the outset about the scope of this work. The central contribution of this article *is to test whether there is evidence of racial disparity in officer-involved fatal shootings at the national level*. This has no implications for the department, officer, or event level (see Goff & Kahn, 2012; Goff, Lloyd, Geller, Raphael, & Glaser, 2016). We do not provide quantitative answers to any questions beyond this one, such as the causes of racial differences in criminal behavior or whether disparities exist in any policing behaviors other than the use of deadly force.

In testing whether “police have one trigger finger for whites and another for Blacks” (Takagi, 1974, p. 30), we proceed in two sections. First, we question the traditional benchmark used to study racial disparity and describe why claims of racial bias based on this benchmark can be misleading. Second, we show that analyses based on more appropriate

benchmarks reveal no evidence of systematic anti-Black disparity in police fatal shootings at the national level.

Calculating Racial Disparity in Fatal Police Shootings

The most common means of testing for racial disparity in police use of deadly force is to compare the odds of being fatally shot for Blacks to the odds of being fatally shot for Whites (Brown & Langan, 2001; The Counted, 2016; Gabrielson, Jones, & Sagara, 2014; Takagi, 1974). Calculating the odds for each group involves comparing the group’s raw shooting numbers against each group’s overall representation in the population. Blacks represent ~13% of the U.S. population; if Blacks represent more than ~13% of U.S. citizens shot, this is taken as evidence of racial disparity. Such a calculation answers the question: “*given the population proportions of each race*, are Blacks more likely to be fatally shot than Whites?”

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Adjusting for overall population values means that one has made the decision that the relevant pool of individuals against which occurrence of the event should be compared is the entire population. This implies that we expect groups to be shot in accordance with their overall population proportions. In the general form, this is exactly the approach taken whenever proportional representation is studied by comparing a group's representation in some domain (e.g., percentage of women in STEM) to the group's representation in the overall population (e.g., women as 51% of the overall U.S. population).

The problem with benchmarking an outcome against population proportions is that this carries with it a critical assumption: The opportunity for the event to occur is equally likely for every person within each group. In terms of understanding racial disparities in death by police gunfire, adjusting raw shooting values by population proportions necessarily requires that *White and Black citizens are equally likely to occupy situations in which deadly force is used*.

If this assumption does not hold, then adjusting raw fatal shooting data for overall population values is in error. If different groups are more or less likely to occupy those situations in which police might use deadly force, then a more appropriate benchmark as a means of testing for bias in officer decision making is the number of citizens within each race who occupy those situations during which police are likely to use deadly force. One cannot experience a policing outcome without exposure to police, and if exposure rates differ across groups, then the correct benchmark is on those exposure rates.

This argument is supported by an analysis of the contexts in which fatal police shootings actually occur. The data are clear that officers do not use deadly force equally across all police–citizen interactions. Deadly force use is strongly tied to crime-related contexts, with the modal police shooting being one in which suspects pose a potentially deadly threat (Binder & Fridell, 1984; Binder & Scharf, 1980; Fyfe, 1980, 1981; Geller & Karales, 1981; Koper, 2016; Selby, Singleton, & Flosi, 2016; White, 2006). A recent analysis of a national police shooting database similar to the one used here indicates that less than 1% of fatal shootings are by accident and almost 85% involve armed citizens (Nix, Campbell, Byers, & Alpert, 2017). If police are more likely to use deadly force in crime-related situations, then in order for the adjustment by population size to be valid, it must necessarily be true that Blacks and Whites are involved in crime to the same extent.

Insofar as Blacks and Whites have different police exposure rates, a more correct benchmark to calculate racial disparity in fatal police shootings is not population proportions but instead rates of police exposure (which differ across groups; Barnes, Jorgensen, Beaver, Boutwell, & Wright, 2015). In the context of police shootings, exposure would be reasonably approximated by rates of criminal involvement for Blacks and Whites; the more group members are involved in criminal activity, the more exposure they have to situations in which police shootings would be likely to occur.

Method

We present an analysis of the odds of being killed by police gunfire for Blacks versus Whites, benchmarked against measures of criminal activity for each race. Data on fatal police shootings are compiled across a 2-year period, 2015–2016, taken from The Guardian's online database (The Counted, 2016). This database is more complete than official federal databases; police departments underreport to the federal government by ~50% (Davis & Lowery, 2015; Klinger, Rosenfeld, Isom, & Deckard, 2016; Nix et al., 2017; White, 2016). We analyze all fatal shootings, fatal shootings in which citizens were unarmed and not aggressing against police, and fatal shootings involving misidentification of a harmless object for a weapon.

We ask whether Blacks or Whites are more likely to be fatally shot when benchmarking fatal police shooting data on three classes of criminal report data from 2015 to 2016: murder/nonnegligent manslaughter, violent crime, and weapons violations. These three categories of crime are the most aggressive in terms of interpersonal violence and, as such, are appropriate proxies for exposure to those situations during which police may be more likely to use deadly force. (See Online Supplemental Material #1 for detail on calculating these values across data sets.) We ask, *given each group's involvement in criminal activity*, is there evidence of racial disparity in fatal shootings of Black versus White citizens?

As actual crime rates cannot be known for certain, they must be approximated or inferred from some measure. We estimate criminal activity of Blacks and Whites from four sources: (1) the Federal Bureau of Investigation's (FBI's) Summary Report System (SRS), (2) the FBI's National Incident-Based Reporting System (NIBRS), (3) the Bureau of Justice Statistics' National Crime Victimization Survey (NCVS), and (4) the Centers for Disease Control's (CDC) WONDER database.

The SRS and the NIBRS are federal databases of incidents submitted by law enforcement to the FBI, with the SRS submitted in summary format and the NIBRS in detailed format. Both data sets record offender race and distinguish (on most measures) reported incidents that resulted in arrest from those that did not. The NCVS is a nationally representative self-report survey of criminal victimization, which includes victim reporting of offender race. The CDC classifies deaths by a range of assaults. Given that homicide victims are overwhelmingly (~90%) killed by a same-race offender (Cooper & Smith, 2011; Harrell, 2007), the CDC data can be used to estimate fatal assaults by Black and White offenders.

Perhaps the most critical decision across our analyses is the use of these data sets as proxies for actual criminal involvement. If these data are themselves subject to racial bias, such that Black citizens are overrepresented in these data sets relative to their actual criminal activity, then the denominator in the odds calculation for Black citizens will be artificially high, masking real anti-Black disparity in police shootings.

Online Supplemental Material #2 explains at length why biased policing is unlikely to impact our results. Here, we

simply list the five reasons and refer the reader to the Online Supplemental Material for details: (1) Estimates of Black and White criminal activity in the CDC and NCVS are uncontaminated by police bias, yet both yield results consistent with the SRS and NIBRS data sets; (2) racial disparities are the same overall for *reported offenses* and *arrests*, which is not consistent with a biased policing explanation; (3) the nature of homicide investigation and, especially, data from uncleared homicides argue against a biased policing explanation; (4) data on weapons violations, the measure most subject to officer discretion, show a pattern *opposite* what biased policing would predict; (5) the number of incorrect homicide arrests due to biased policing that would be required to reverse our findings is extremely large, and there is not convincing evidence that such large numbers of incorrect arrests exist. Given these reasons, the results presented below are not adequately explained by a “biased policing” explanation for why groups might differ in their exposure to deadly force contexts.

Results

Odds ratios are calculated by comparing the odds of being fatally shot for Blacks *given* Black crime rates with the odds of being fatally shot for Whites *given* White crime rates. Odds are calculated using the data in Table 1 by benchmarking the average 2015 and 2016 fatal police shooting data (within race) on the average 2015 and 2016 crime data (within race).¹

All Fatal Police Shootings

We first reproduce the well-known finding that Blacks are more likely to be fatally shot than Whites *given* population proportions. Between 2015 and 2016, 1,051 Whites and 510 Blacks were killed by police gunfire. Benchmarking these fatal police shooting data on 2015–2016 U.S. Census population values, the odds ratio for Blacks relative to Whites is 2.5, indicating that the odds were 2.5 times higher for Blacks to be killed by police compared to Whites given their population proportions.

When fatal police shootings are benchmarked against crime data rather than population proportions, a different picture emerges. Figure 1 presents the odds of being fatally shot by police *given* homicide (left panel), violent crime (center panel), and weapons violation (right panel) rates for Blacks and Whites. When fatal shooting data are benchmarked against the number of murder/nonnegligent manslaughter reports and arrests, the odds ratio obtained when benchmarking against population proportions flips completely. The odds were 2.7 times higher for Whites to be killed by police gunfire relative to Blacks given each group’s SRS homicide reports, 2.6 times higher for Whites given each group’s SRS homicide arrests, 2.9 times higher for Whites given each group’s NIBRS homicide reports, 3.9 times higher for Whites given each group’s NIBRS homicide arrests, and 2.5 times higher for Whites given each group’s CDC death by assault data.

A similar pattern emerges when we benchmark fatal police shooting data by violent crime arrests, with Whites (mostly) more likely to be killed. Odds were 1.3 times higher for Whites to be killed given SRS violent crime arrests, 4.8 times higher for Whites given NIBRS violent crime reports (on the more severe definition), 2.7 times higher for Whites given NIBRS violent crime arrests (more severe definition), and 1.4 times higher for Whites given NIBRS violent crime reports (less severe definition). For NIBRS violent crime arrests (less severe definition), odds were 1.02 times higher for Blacks. Regarding the NCVS data, according to the more severe violent crime definition, odds were 1.03 times higher for Whites, but according to the less severe definition odds were 1.2 times higher for Blacks.

Finally, a consistent anti-White pattern exists when benchmarking on weapons violation data. Here, given each group’s violation of weapons laws, odds were 1.5 times higher for Whites given SRS weapons violation arrests, 1.7 times higher for Whites given NIBRS incident reports, 1.6 times higher for Whites given NIBRS arrests, and 1.1 times higher for Whites given NCVS weapon reports.

In sum, in nearly every case, Whites were either more likely to be fatally shot by police or police showed no significant disparity in either direction. Although Blacks have greater odds of being fatally shot given population proportions, Whites overall were more likely to be fatally shot given each group’s involvement in those situations where the police may be more likely to use deadly force.

Fatal Police Shootings of Unarmed Citizens, With No Citizen Aggression

The analyses presented thus far include all deaths by police gunfire, including, for instance, armed citizens or citizens physically attacking police officers. An important question is whether officers are more likely to show racial disparity in deadly force against *unarmed citizens* who are *not physically aggressing* against them. To this end, we repeat the above analyses while restricting the data set to those citizens who were unarmed and not fighting with police when killed. (Online Supplementary Material #3 details the categorization procedures.)

Between 2015 and 2016, 62 Whites and 40 Blacks were killed by police gunfire while unarmed and not aggressing against police. We first reproduce the standard finding that odds were 3.3 times higher for unarmed Black citizens to be killed by police gunfire *given* population proportions.

However, consistent with the analyses on all fatal shootings and as shown in Figure 2, none of the benchmarks on crime revealed substantial anti-Black disparity in fatal police shootings of unarmed citizens. Odds were 1.9 times higher for Whites to be killed by police gunfire relative to Blacks given each group’s SRS homicide reports, 1.8 times higher for Whites given SRS homicide arrests, 1.9 times higher for Whites given NIBRS homicide reports, 2.0 times higher for Whites given NIBRS homicide arrests, and 1.8 times higher given CDC data.

Table 1. Raw Data Used in All Analyses.

Data source	Blacks		Whites	
	2015	2016	2015	2016
SRS reported: murder/non-negligent manslaughter	5,620	6,095	4,636	5,004
SRS arrested: murder/non-negligent manslaughter	4,347	4,935	3,908	4,192
SRS arrested: violent crime	140,543	153,341	232,180	241,063
SRS arrested: weapons violation	44,284	51,898	63,967	69,414
NIBRS reported: murder/non-negligent manslaughter	2,507	2,804	2,104	2,330
NIBRS arrested: murder/non-negligent manslaughter	1,509	1,566	1,151	1,254
NIBRS reported: violent crime—more severe	67,143	67,925	28,473	30,953
NIBRS arrested: violent crime—more severe	11,655	12,331	9,189	9,780
NIBRS reported: violent crime—less severe	498,843	519,702	753,658	790,684
NIBRS arrested: violent crime—less severe	141,152	146,223	294,204	308,286
NIBRS reported: weapons violation	41,952	47,959	52,051	59,507
NIBRS arrested: weapons violation	12,720	14,945	17,034	18,821
NCVS reported: violent crime—more severe	103	66	212	125
NCVS reported: violent crime—less severe	289	183	696	472
NCVS reported: weapons violation	66	44	131	84
CDC: homicide death	9,173	9,995	8,007	8,668
Number killed by police gunfire	261	249	526	525
Number killed by police gunfire, unarmed and not aggressing	17	23	28	34
Number killed by police gunfire, reaching for/holding harmless object	9	10	8	18

Note. SRS = Summary Report System; NIBRS = National Incident-Based Reporting System; NCVS = National Crime Victimization Survey; CDC = Centers for Disease Control and Prevention. Raw data used in analyses. Web addresses for the locations of these databases can be found in Supplemental Material #7 or the first author's analysis script for this manuscript.

Benchmarking against violent crime did not yield strong support for any substantial anti-Black disparity. Odds were 1.04 times higher for Blacks given SRS violent crime arrests, but odds were 3.5 times higher for Whites given NIBRS violent crime reports and 2.0 times higher for Whites given NIBRS arrests (more severe definitions). Odds were also 1.02 times higher for Whites given NIBRS violent crime reports (less severe definition). On the other hand, odds were 1.4 times higher for Blacks given NIBRS arrests (less severe definition), 1.3 times higher for Blacks given the more severe NCVS definition, and 1.6 times higher given the less severe NCVS definition.

Finally, benchmarking on weapons violation data revealed little disparity. Odds were 1.1 times higher for Whites given SRS weapons arrests, 1.2 times higher for Whites given NIBRS weapons violation reports, and 1.2 times higher for Whites given NIBRS weapons violation arrests. However, odds were 1.3 times higher for Blacks given NCVS weapons reports.

Overall, the data provide little evidence of systematic anti-Black disparity in officers' decisions to shoot unarmed, nonaggressing citizens. Officers either showed no meaningful disparity in either direction or, if anything, an overall pattern of anti-White disparity.

Fatal Police Shootings of Unarmed Citizens Reaching for or Holding an Object

Social psychological research suggests that race effects may be strongest under conditions of ambiguity (e.g., Duncan, 1976;

Kunda & Thagard, 1996), and experiments have shown robust race bias in weapon misidentification (at least for untrained civilians; Correll, Park, Judd, & Wittenbrink, 2002; Payne, 2006). We therefore repeat the odds analyses restricting the data set to those unarmed citizens classified as *reaching for or holding a harmless object* at the time of shooting.

Between 2015 and 2016, 26 Whites and 19 Blacks were shot and killed while reaching for or holding a harmless object. Odds were 3.7 times higher for Blacks relative to Whites to be fatally shot *given* population proportions.

Consistent with the analyses presented above, and as shown in Figure 3, none of the benchmarks on crime rates revealed consistent anti-Black disparity in being fatally shot while reaching for/holding a harmless object. Odds were 1.7 times higher for Whites to be fatally shot given SRS homicide reports, 1.6 times higher for Whites given SRS homicide arrests, 1.6 times higher for Whites given NIBRS homicide reports, 1.8 times higher for Whites given NIBRS homicide arrests, and 1.6 times higher for Whites given CDC data. On all homicide benchmarks, Whites had higher odds of being killed by police gunfire than Blacks.

Benchmarking on violent crime data did not yield consistent anti-Black disparity. Odds were 1.2 times higher for Blacks given SRS violent crime arrests, yet odds were 3.1 times higher for Whites given NIBRS violent crime reports and 1.7 times higher for Whites given NIBRS violent crime arrests (more severe definitions). Odds were 1.1 times higher for Blacks given NIBRS violent crime reports and 1.5 times higher for Blacks given NIBRS violent crime arrests (less

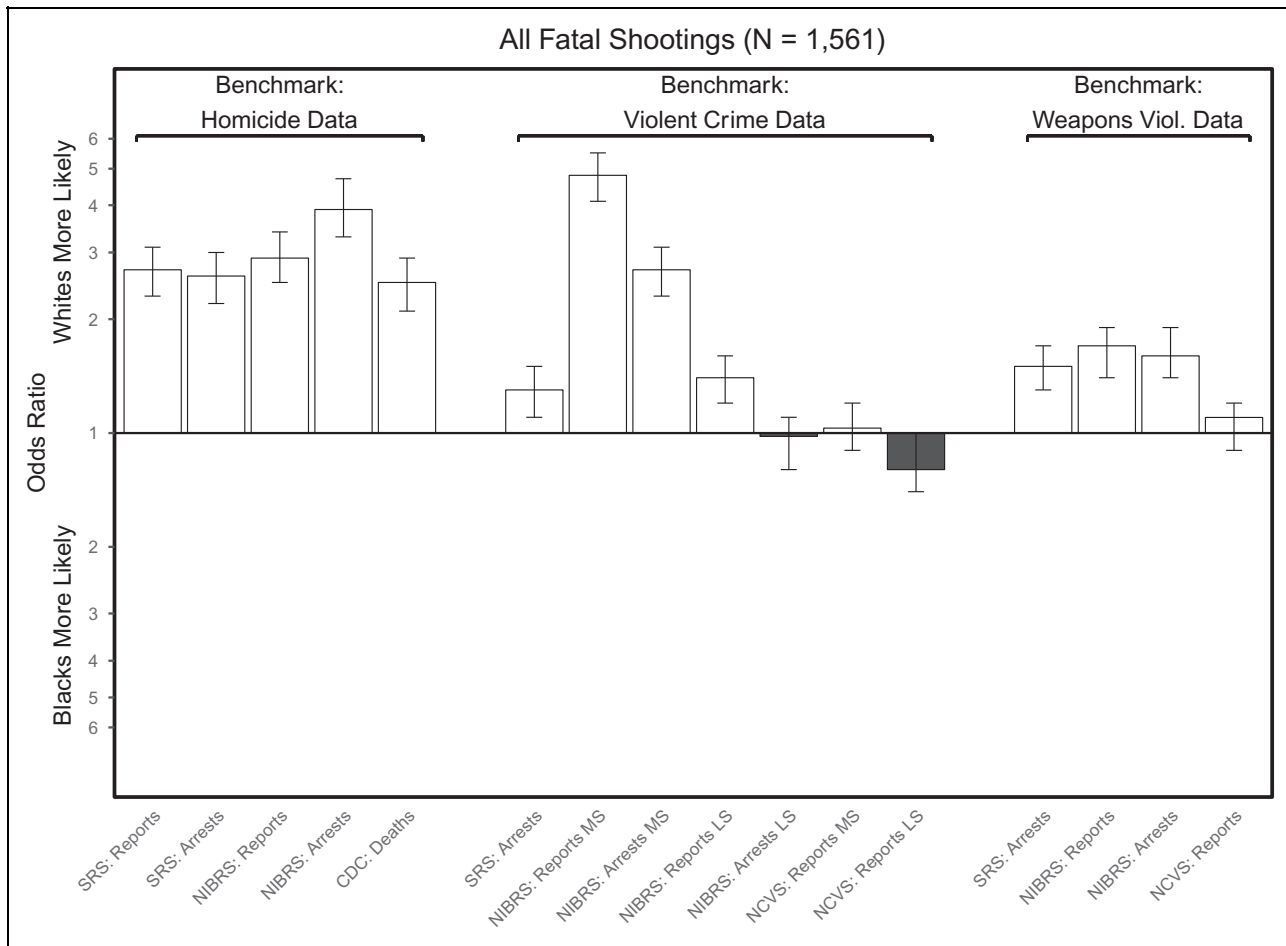


Figure 1. Odds ratios for being killed by police gunfire for *all fatal shootings* averaged over 2015–2016, benchmarked against crime rates averaged over 2015–2016. Crime rates for homicide (left set), violent crime (center set), and weapons violations (right set) are estimated from the Summary Report System, National Incident-Based Reporting System, National Crime Victimization Survey, and Centers for Disease Control data. Estimates above the center line indicate Whites were more likely to be fatally shot; estimates below the center indicate Blacks were more likely to be fatally shot. Error bars represent 95% confidence intervals. LS = less severe; MS = more severe.

severe definitions). In the NCVS data, odds were 1.5 times higher for Blacks given the more severe violent crime definition and 1.8 times higher for Blacks given the less severe definition.

Finally, the weapons violation data revealed a similar mixed pattern. Odds were 1.01 times higher for Blacks given SRS weapons arrests. In contrast, odds were 1.1 times higher for Whites given NIBRS weapons reports and 1.05 times higher for Whites given NIBRS weapons arrests. Odds were 1.4 times as likely for Blacks given NCVS weapon data.

In sum, there was no evidence of systematic anti-Black disparity in fatal police shootings when those decisions are in response to the misidentification of a harmless object or movement by the citizen.

Multiverse Analysis

A multiverse analysis (Steege, Tuerlinckx, Gelman, & Vanpaemel, 2016) repeats a statistical test across all possible data selection, cleaning, or coding choices as a means of quantifying

the degree to which conclusions change based on arbitrary decisions of the researcher. A multiverse analysis was performed by crossing fatal shooting type (all shootings, unarmed shootings, and object misidentification shootings), crime data type (16 crime benchmarks), and year of fatal shooting (2015, 2016, or 2015/2016 averaged). Figure 4 presents these analyses.² Each square represents a *p* value from Fisher’s exact test on whether the odds ratio differs significantly from 1.0. White squares are tests with significant anti-White disparity. Black squares are tests with significant anti-Black disparity. Gray squares are tests with no significant disparity in either direction.

Three conclusions are apparent from these analyses. First and most important, across all three types of shootings, only 1 of the 144 possible tests (0.7%) showed statistically significant anti-Black disparity. Second, the analysis shows the robustness of the conclusions to sampling time frame, as the year chosen makes almost no difference. Third, the small sample sizes in the unarmed and misidentification shootings confirm that there is not enough data to make definitive

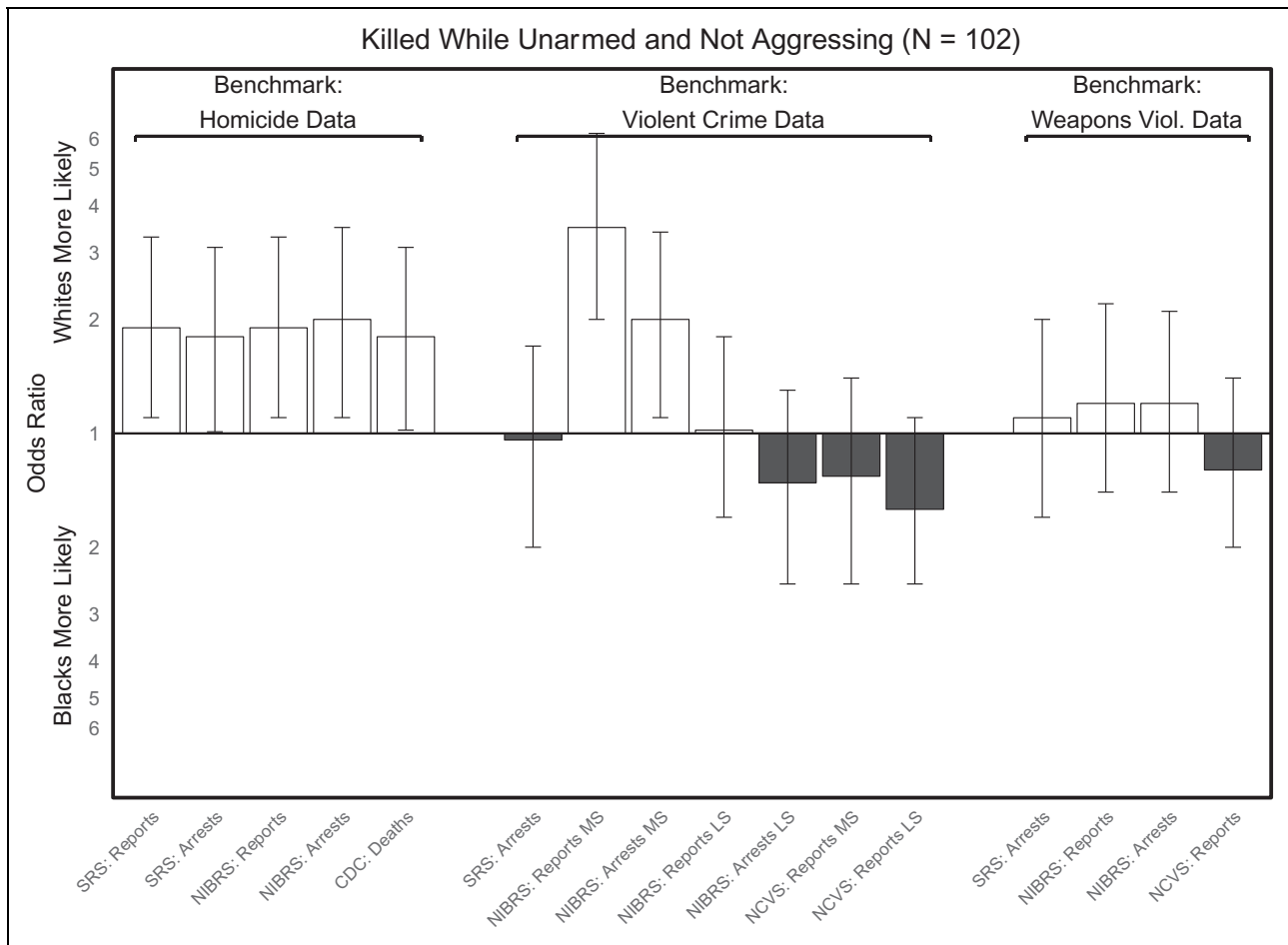


Figure 2. Odds ratios for being killed by police gunfire while *unarmed and not aggressing against the police* averaged over 2015–2016, benchmarked against crime rates averaged over 2015–2016. Crime rates for homicide (left panel), violent crime (center panel), and weapons violations (right panel) are estimated from the Summary Report System, National Incident-Based Reporting System, National Crime Victimization Survey, and Centers for Disease Control data. Estimates above the center line indicate Whites were more likely to be fatally shot; estimates below the center indicate Blacks were more likely to be fatally shot. Error bars represent 95% confidence intervals. LS = less severe; MS = more severe.

statements about subsets of police shootings beyond all fatal shootings.

Discussion

There are many ways to approach the question of race bias in deadly force decisions including experiments (Correll et al., 2002), outcome tests (Ayres, 2002), and analyses that control for variables such as crime (Fryer, 2016; Nix et al., 2017; Ross, 2015), all of which move us closer to understanding officer use of deadly force. (Online Supplemental Material #6 provides a discussion of how our work fits in with this broader literature.)

In this article, we approached the question of racial disparities in deadly force by starting with the widely used technique of benchmarking fatal shooting data on population proportions. We questioned the assumptions underlying this analysis and instead proposed a set of more appropriate benchmarks given a more complete understanding of the context of police shootings. In doing so, a different picture

emerges, one in which exposure to police accounts for the racial disparities in fatal shootings observed at the population level. One important contribution of this research is to examine different types of shootings, allowing us to test predictions derived from the social psychological literature. Yet none of these tests provided evidence of systematic anti-Black disparity. Moreover, the CDC data (as well as the evidence discussed in Online Supplemental Material #2) provide a very strong test of whether biased policing accounts for these results.

The current research is not the final answer to the question of race and police use of deadly force. Yet it does provide perspective on how one should test for group disparities in behavioral outcomes and on whether claims of anti-Black disparity in fatal police shootings are as certain as often portrayed in the national media. When considering all fatal shootings, it is clear that systematic anti-Black disparity at the national level is not observed. When considering any more specific type of shooting, the data are too uncertain to draw strong conclusions at this time.

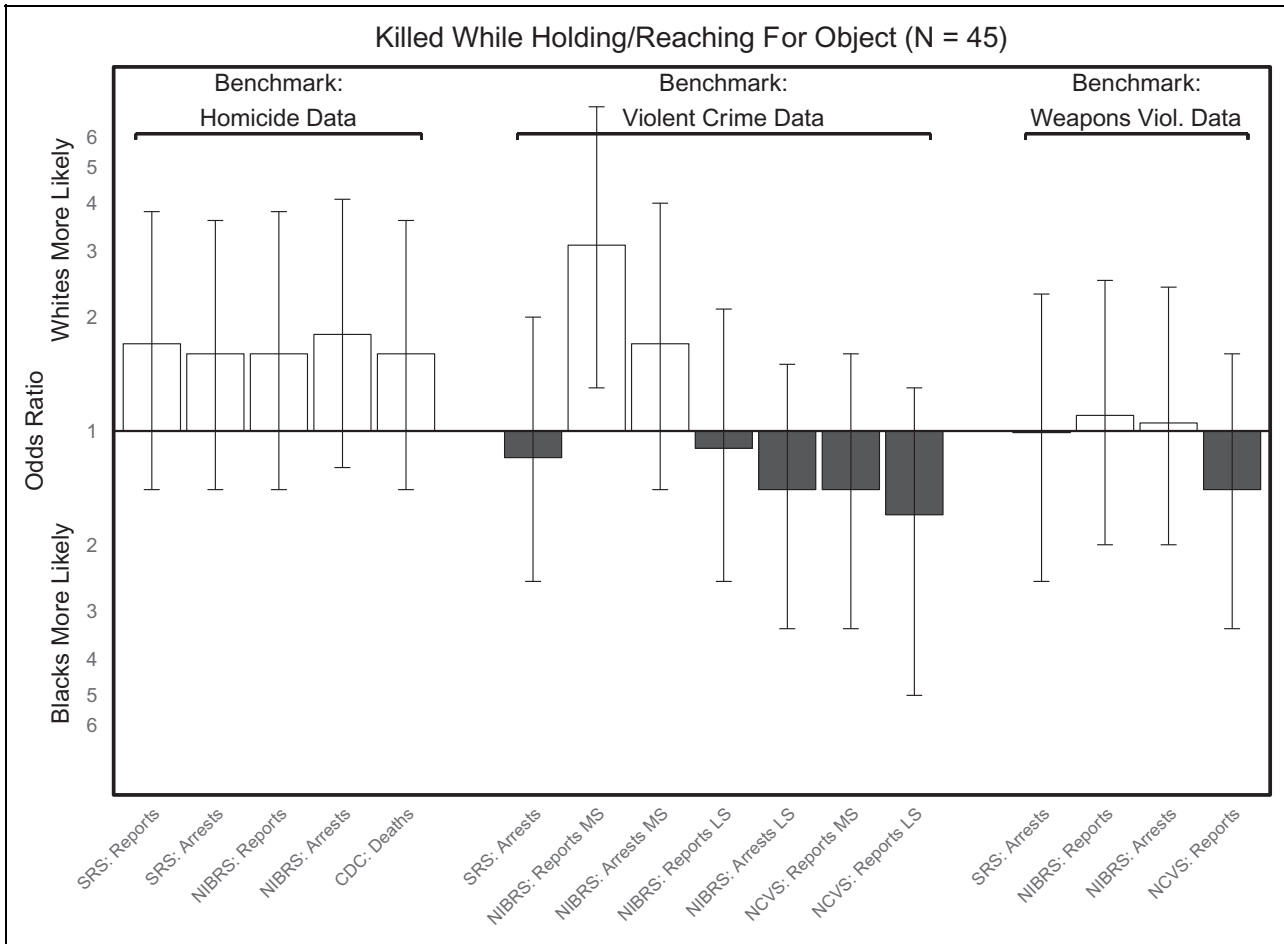


Figure 3. Odds ratios for being killed by police gunfire while reaching for or holding a harmless object averaged over 2015–2016, benchmarked against crime rates averaged over 2015–2016. Crime rates for homicide (left panel), violent crime (center panel), and weapons violations (right panel) are estimated from the Summary Report System, National Incident-Based Reporting System, National Crime Victimization Survey, and Centers for Disease Control data. Estimates above the center line indicate Whites were more likely to be fatally shot; estimates below the center indicate Blacks were more likely to be fatally shot. Error bars represent 95% confidence intervals. LS = less severe; MS = more severe.

The “Most Damning Result” and Implications for Police Reform

In the interests of transparency and allowing readers to evaluate the strength of the evidence presented, we highlight the “most damning result” (Vazire, 2015) that is contrary to the overall conclusion of our work; this would be the finding most supportive of anti-Black disparity. When looking at the raw data for shootings involving object misidentification, there were 26 Whites and 19 Blacks killed. Given population proportions, odds were 3.7 times higher for Blacks to be fatally shot while holding/reaching for a harmless object. Even adjusting for violent crime rates, (nonsignificant) anti-Black disparity was observed.

We do caution the reader that the very small number of these cases translates to high uncertainty. However, if we assume this pattern remains as the data sets grow larger over the years, it may be instructive to ask about the implications of this finding for training interventions and calls for police reform. The data are clear that police exposure rates differ

across racial groups and that exposure is not fully explained by biased policing. Different racial groups are involved in reported criminal activity to different degrees, and officers’ daily policing experience may continually reinforce associations between Blacks and criminal activity. If officers are more likely to misidentify a harmless object in the hands of a Black citizen due to stereotypes, the cause of officers holding those stereotypes may rest with (the very small percentage of) those who are more likely to engage in criminal activity. This suggests that department-wide attempts at reform through programs such as implicit bias training will have little to no effect on racial disparities in deadly force, insofar as officers continue to be exposed after training to a world in which different racial groups are involved in criminal activity to different degrees. This assessment is consistent with other evidence that the effects of such interventions are short lived (e.g., Lai, 2017). A more effective means of reducing racial bias in shootings would be to eliminate racial differences in crime rates. Of course, racial differences in crime rates are

All Shootings N = 1,561			Unarmed Shootings N = 102			Reaching Shootings N = 45			
2015	2016	Both	2015	2016	Both	2015	2016	Both	
0	0	0	0.02	0.03	0.03	1	0.06	0.3	SRS: Homicide Reports
0	0	0	0.05	0.04	0.05	1	0.06	0.4	SRS: Homicide Arrests
0.01	0	0	1	0.89	0.89	0.22	0.85	0.67	SRS: Violent Crime
0	0	0	0.76	0.79	0.78	0.33	0.57	1	SRS: Weapons Violations
0	0	0	0.03	0.03	0.03	1	0.06	0.3	NIBRS: Homicide Reports
0	0	0	0.01	0.02	0.02	0.81	0.04	0.29	NIBRS: Homicide Arrests
0	0	0	0	0	0	0.18	0	0.01	NIBRS: Violent Crime (More Severe) Reports
0	0	0	0.02	0.02	0.02	0.81	0.04	0.29	NIBRS: Violent Crime (More Severe) Arrests
0	0	0	0.88	1	1	0.32	0.7	0.83	NIBRS: Violent Crime (Less Severe) Reports
0.65	1	0.85	0.43	0.2	0.3	0.12	0.69	0.27	NIBRS: Violent Crime (Less Severe) Arrests
0	0	0	0.37	0.59	0.48	0.63	0.45	1	NIBRS: Weapons Violations Reports
0	0	0	0.55	0.6	0.57	0.47	0.45	1	NIBRS: Weapons Violations Arrests
0.79	0.17	0.7	0.53	0.4	0.38	0.12	1	0.38	NCVS: Violent Crime (More Severe)
0	0.01	0.08	0.65	0.05	0.66	0.46	0.4	0.51	NCVS: Violent Crime (Less Severe)
0.85	0.21	0.52	0.53	0.33	0.46	0.12	0.85	0.38	NCVS: Weapons Violations
0	0	0	0.04	0.05	0.05	1	0.09	0.4	CDC: Homicide Deaths

Figure 4. Multiverse analysis across all fatal police shootings (left three columns), fatal shootings while unarmed and not aggressing (center three columns), and fatal shootings while reaching for/holding a harmless object (right three columns). Each square displays the p-value for the Fisher's exact test of whether statistically significant anti-Black or anti-White disparity is observed. White squares represent statistically significant anti-White disparity. Black squares represent statistically significant anti-Black disparity. Gray squares represent no statistically significant disparity in one direction or the other. Rows 1–16 refer to the 16 different types of crime data on which shootings are benchmarked. Top horizontal side of the matrix refers to whether the police shooting data are drawn from 2015, 2016, or the average 2015 and 2016.

multiply determined and result from such a large array of forces that such a change will not be easy or fast.

Note that this analysis does *not* blame unarmed individuals shot by police for their own behavior. Instead, it highlights the difficulty of eliminating errors under conditions of uncertainty when stereotypes may bias the decision-making process. This difficulty is amplified when the stereotype accurately reflects the conditional probabilities of crime across different racial groups. One promising solution to this problem can be found in the social psychological literature on person perception and stereotyping. This research has found strong effects of individuating information on people's judgments, and that clear individuating information reduces the influence of stereotypes with relative ease (see, e.g., Jussim, Cain, Crawford, Harber, & Cohen, 2009; Kunda & Thagard, 1996). Community policing and more "on the beat" officers may provide an opportunity for officers to gain individuating information about the public with whom they interact. Certainly, police officers cannot know every citizen in a neighborhood, but the likelihood of having individuating information about a given citizen is higher to the extent that police have had more contact with the public in non-crime contexts.

Further Limitations

We emphasize that we have not addressed any questions concerning why race differences exist in criminal activity, whether

disparity exists in other law enforcement behaviors, or whether disparity exists at other levels (i.e., department, officer, or event). An inherent weakness of our approach is that the data are nationwide, and thus, we are aggregating across lower levels of analysis (individuals, neighborhoods, etc.). Aggregation of data in this way can have potential problems when moving from one level to another (though lower level analyses have reached similar conclusions as those presented here, e.g., Geller & Karales, 1981; Klinger et al., 2016). In the perfect world, we would be able to benchmark police shooting data on crime data at the neighborhood or district level. Although it is possible to locate fatal police shootings at these lower levels, it is not possible to isolate criminal activity at those levels across the United States. On this point, we emphasize that our results are not intended to exonerate or implicate individual officers or departments.

One potential flaw is if *discretionary stops* by police lead to a higher likelihood of being shot in a way not captured by our crime report data sets. If officers are more likely to stop and frisk a Black citizen, for example, then officers might be more likely to enter into a deadly force situation with Black citizens independent of any actual crime rate differences across races. Online Supplemental Material #5 presents some indirect data relevant to this possibility. Here, we simply note that the number of police shootings that start with truly discretionary stops of citizens who have not violated the law is low (~5%) and probably do not meaningfully impact the analyses.

Another potential flaw is that our analysis does not capture whether officers set different thresholds for use of deadly force with Black versus White citizens *for the same behavior*. A Black citizen brandishing a gun may be shot by police, whereas a White citizen may be tased or verbally confronted first. There is some indirect evidence bearing on this possibility. First, Nix, Campbell, Byers, and Alpert (2017) found that among citizens who were not assaulting the police during arrest, Blacks were no more likely to be fatally shot than Whites. Given that non-assault cases are probably the most ambiguous and therefore most likely to be subject to the biasing influence of race on threat perception, this speaks against the threshold argument. Second, we note that cases of immediate threats to the officer or other citizens are the modal case in police shootings. The small number of ambiguous cases make it difficult to draw strong conclusions about race differences. We stress the degree of uncertainty here and note that contradictory evidence does exist (e.g., Nix et al., 2017, report that Blacks were slightly less likely to assault officers than Whites among those fatally shot, though their definition of assault differs from ours).

Conclusion

At the national level, we find little evidence within these data for systematic anti-Black disparity in fatal police deadly force decisions. We do not discount the role race may play in individual police shootings; yet to draw on bias as the sole reason for population-level disparities is unfounded when considering the benchmarks presented here. We hope this research demonstrates the importance of unpacking the underlying assumptions inherent to using benchmarks to test for outcome disparities.

Authors' Note

All data and analysis scripts are available from the first author's website, <http://www.cesariolab.com>.

Acknowledgments

We thank Kingsley R. Browne, Katherine Corker, Fred Oswald, Nick Selby, and Simine Vazire for suggestions and criticisms.

Author Contributions

JC developed the argument and performed the analyses. DJ provided input on the analytic approach and conducted the multiverse analysis. WT provided policing expertise and context. All authors contributed to writing.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Supplemental Material

The supplemental material is available in the online version of the article.

Notes

1. There is debate about the appropriateness here of statistical significance tests and confidence intervals. On the one hand, the odds are not sampling estimates but instead population parameters. On the other hand, it is reasonable to ask whether small deviations from a 1.0 odds ratio are statistically meaningful and it is important to know the uncertainty in these estimates. Therefore, we include confidence intervals on the figures and report statistical significance in the multiverse analysis.
2. In Figure 4, year of shooting and year of crime are always consistent (2015 shootings benchmarked on 2015 crime data, 2016 shootings on 2016 crime data, etc.). For a multiverse crossing different year, see Online Supplemental Material #4.

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Handling Editor: Lee Jussim