Risk of Police-Involved Death by Race/Ethnicity and Place, United States, 2012–2018

Frank Edwards, PhD, Michael H. Esposito, MA, and Hedwig Lee, PhD,

Objectives. To estimate the risk of mortality from police homicide by race/ethnicity and place in the United States.

Methods. We used novel data on police-involved fatalities and Bayesian models to estimate mortality risk for Black, Latino, and White men for all US counties by Census division and metropolitan area type.

Results. Police kill, on average, 2.8 men per day. Police were responsible for about 8% of all homicides with adult male victims between 2012 and 2018. Black men's mortality risk is between 1.9 and 2.4 deaths per 100 000 per year, Latino risk is between 0.8 and 1.2, and White risk is between 0.6 and 0.7.

Conclusions. Police homicide risk is higher than suggested by official data. Black and Latino men are at higher risk for death than are White men, and these disparities vary markedly across place.

Public Health Implications. Homicide reduction efforts should consider interventions to reduce the use of lethal force by police. Efforts to address unequal police violence should target places with high mortality risk. (*Am J Public Health.* Published online ahead of print July 19, 2018: e1–e8. doi:10.2105/AJPH.2018.304559)

Police violence is a persistent feature of US social life.[1,2] Civilian risk of death resulting from interactions with law enforcement is estimated to be many times greater in the United States than in similar countries.[3]

Race plays a powerful role in explanations of police-involved killings in the United States. Scholars and social movements have argued—as evidenced by the deaths of Michael Brown, Sandra Bland, Renee Davis, Philando Castille, Tamir Rice, Laquan McDonald, Daniel Covarrubias, Eric Garner, Charleena Lyles, and many others—that routine violence against people of color is a defining feature of US criminal justice.[4] Empirical studies have shown that people of color are, and have historically been, at greater risk for experiencing police-involved harm than are Whites.[2,5,6]

We used novel data and methods to estimate police-involved mortality risk in the United States. We contribute to the project of explicating racial disparities in police-involved deaths by describing the role of place. Police practices are contingent upon the social environments in which agencies are embedded.[7,8] As such, we predicted that mortality risk and inequalities in risk would be, like other police-related outcomes, tightly coupled with race and geography.[9–11]

To provide risk estimates, we utilized data from Fatal Encounters, an independent source of data on police-involved deaths[12]—which addresses known shortcomings of official data[13,14]—as well as Bayesian multilevel methods that produce reasonable estimates of uncertainty when predicting relatively rare events. We produced estimates of police-involved mortality risk by race for Black, Latino, and White men by US Census Division and county urbanization with data from 2012 through early 2018.

We found that the risk of being killed by police, relative to White men, is between 3.2 and 3.5 times higher for Black men and between 1.4 and 1.7 times higher for Latino men. We also showed that this risk varies dramatically across places. Although risk is high in the large urban metropolitan areas typically associated with police homicide, we showed that the risk of police homicide is also significant in smaller and rural metropolitan areas, which have received scant attention from researchers.

METHODS

Past work on police-involved mortality has been limited by the absence of systematic data. Criminal justice data—primarily collected through the Bureau of Justice Statistics' Arrest-Related Deaths program or the Federal Bureau of Investigation's Supplementary Homicide Report—are widely acknowledged to undercount the true number of deaths involving police in the United States.[13,15–17] To circumvent these limitations, researchers often use data from the National Center for Health Statistics' mortality files, the National Violent Death Reporting System, and emergency department surveys.[13,18–20] Though these sources offer greater coverage than do systems that rely on voluntary reporting by police (who have no incentive to report), they still suffer from underreporting and limited geographic coverage.

ABOUT THE AUTHORS

Frank Edwards is with the Bronfenbrenner Center for Translational Research, College of Human Ecology, Cornell University, Ithaca, NY. Michael H. Esposito is with the Department of Sociology, University of Washington, Seattle. Hedwig Lee is with the Department of Sociology, Washington University in St Louis, MO.

Correspondence should be sent to Frank Edwards, Bronfenbrenner Center for Translational Research, Beebe Hall, Cornell University, Ithaca, NY 14853 (e-mail: fedwards@cornell.edu). Reprints can be ordered at http://www.ajph.org by clicking the "Reprints" link.

This article was accepted May 12, 2018.

doi: 10.2105/AJPH.2018.304559

In response to the shortcomings of official data, journalists, activists, and researchers have begun collecting data that count police-involved deaths through public records and media coverage. These methodologies have been endorsed by the Bureau of Justice Statistics as producing high-quality data on police-involved mortality, and the Bureau has proposed a redesign of the Arrest-Related Deaths Program that mirrors these efforts.[14]

We relied on data from 1 of these nontraditional sources, Fatal Encounters, which seeks to document all episodes of fatal police–civilian interactions in the United States.[12] Fatal Encounters is a public, Web-based data source. The sample universe is inclusive of any reported death that occurred during an encounter with police before formal admission into a detention facility. It includes homicides, suicides, and accidental deaths. All cases are fact-checked against published accounts before being added to the public data set.

Cases in Fatal Encounters are identified from news reports and public records. The Fatal Encounters research team has conducted systematic media searches for deaths involving police in all US states between 2000 and 2018, along with open records requests in select jurisdictions, from which all variables in the data are derived. Researchers also rely on obituaries for additional demographic information about victims, such as age and race/ethnicity.

Fatal Encounters' data collection method depends on the production and accessibility of public records and media reports, and is thus subject to negative bias in count estimates. Cases of police homicide are missing from the data set if they were not recorded by news outlets. Places that lack a robust media infrastructure may systematically underreport cases. Cases are also missing from Fatal Encounters if they were reported by a news organization, but that news organization did not publish a story on the Internet. This feature of the data leads to a significant undercount of deaths in earlier years in the data. Despite these limitations, Fatal Encounters records far more cases than are documented in official data or similar public efforts.

Sample

Our analysis included all police-involved homicides with adult male victims recorded in Fatal Encounters between January 1, 2012, and February 12, 2018. Although a number of children (318), women (889), and transgender people (7) were killed in interactions with the police over this period, adult men died in police interactions at a dramatically higher rate (8581). The relative rarity of deaths involving children, women, or transgender people makes estimating geographically resolved figures for these groups difficult. As such, we focused our estimates on adult male mortality.

We focused exclusively on homicides caused by police, without regard to the legality or justifiability of killings. We sought to include only those cases in which a death was the direct result of police use of force during an interaction between officers and civilians. In addition to excluding all cases reported to be suicides (n = 810 [9.5%] cases), we evaluated each cause-of-death category included in the data to ensure that cases matched our inclusion criteria. For each category, we evaluated the narratives of a randomly selected 20% of the sample. If deaths in these random samples were the result of actions by the decedent, we excluded deaths in that category from the analysis. We classified as police homicides all cases in which the cause of death was identified as asphyxiation, beating, a chemical agent, a medical emergency, a Taser, or a gunshot. We excluded 1476 nonsuicide cases, 1337 of which were deaths attributable to a vehicular collision (most often during a chase). Other causes excluded include deaths from falls, drowning, drug overdoses, stabbings, fire or smoke inhalation, and cases in which the cause of death was indeterminate. Our final sample comprised 6295 adult male victims of police homicide. We provide a sensitivity analysis that evaluated the impact of our exclusion criteria in Figure A (available as a supplement to the online version of this article at http://www.ajph.org).

Measures

We produced county-level estimates of adult male police-involved mortality risk by race/ethnicity, Census division, and metropolitan area type. We standardized all reported rate estimates to deaths per 100 000 men in the population per year.

Race and ethnicity. To measure race/ethnicity, we relied on a victim's recorded race/ethnicity in Fatal Encounters when available and a Bayesian imputation method for predicting race/ethnicity when data were missing.

Whereas public records often record a victim's perceived race/ethnicity, news reports often do not do so directly, following Associated Press style.[21] Fatal Encounters codes race/ethnicity on the basis of both written descriptions of a victim's race/ethnicity and subjective perceptions of photographs published in original news reports, published mugshots, or obituaries. Values recorded in the data included African American/Black, Asian/Pacific Islander, European-American/White, Hispanic/Latino, Middle Eastern, Native American/Alaska Native, and race unspecified. The data did not record multiple racial or ethnic classifications. Note that the photo classification method, along with the singular race/ethnicity variable in the data set, likely undercounts Black Latinos.

Of the cases we analyzed, 470 (7.5%) were recorded as "race unspecified." To maximize our coverage of cases and minimize potential bias from listwise deletion, we relied on a method for predicting race/ethnicity developed by Imai and Khanna.[22] This method uses Bayes's rule to calculate the probability of a victim's race/ethnicity conditional on the victim's surname, age, and gender by using geolocated demographic data.

We adopted a conservative approach that prioritizes avoiding false classification of a victim's race/ethnicity. By setting a 5% false-positive classification rate on predictions generated using the complete data, we obtained a true-positive rate of 50% for White cases, 57% for Black cases, 91% for Latino cases, 65% for Asian cases, and 38% for other racial/ethnic groups when applied to the observed data. Given our conservative approach, 156 of the 470 cases (33%) remained unclassified by our imputation model. We provide more detail on these methods, as well as sensitivity analyses that exclude missing cases, in Figures A and B (available as supplements to the online version of this article at http://www.ajph.org).

Demographic data. For risk denominators, we constructed 2011 to 2015 average county-level estimates of the total population

of men aged 18 years and older, as well as estimates of the adult male population for African Americans (of any ethnicity), non-Latino Whites, and Latinos (of any race) with 5-year American Community Survey data from 2011 to 2015, accessed through the Integrated Public Use Microdata Series National Historical Geographic Information System.[23]

Geographic classifications. We specified place by using 2 measures. The first, Census division, groups states into 9 categories, defined by the US Census Bureau, based on similarities in physical and cultural geography.[24] The second, metropolitan area type, used the National Center for Health's Urban–Rural Classification Scheme[25] to sort all US counties into 6 categories, based on population size and membership in a Metropolitan Statistical Area. We provide a map of Census divisions and a table of urban–rural classification criteria in Figure C and Table A (available as supplements to the online version of this article at http://www.ajph.org).

In using this approach, which groups counties by division and metropolitan area type, we aimed to maximize our ability to identify meaningful geographic variation with relatively sparse data. Although states within these divisions are not uniform in the configuration of social forces that predict policing practices, our approach provides insight into how both region and urbanicity contribute to mortality risk. We provide estimates of police homicide risk at the state level in Figure D (available as a supplement to the online version of this article at http://www.ajph.org).

Statistical Analysis

We estimated Bayesian multilevel negative binomial regression models of police homicides with adult male victims at the county level as a function of metropolitan area type, division, and race/ethnicity. We set model intercept priors based on race-specific estimates of 2005 police-involved adult male mortality produced by Krieger et al.[2] Our models produced reasonable estimates of mortality rates—and uncertainty in mortality rates—by explicitly incorporating previous information about national mortality risk and partially pooling information on mortality risk across counties.[26,27] We report median point estimates, rate ratios, and credible intervals obtained by sampling from model posterior predictive distributions. We further discuss the utility of this Bayesian multilevel approach, and detail sensitivity tests that evaluated the impact of our inclusion criteria and missing data imputation procedure on model estimates in Figures A, B, and E (available as supplements to the online version of this article at http://www.ajph.org).

RESULTS

Fatal Encounters reported 10 057 police-involved deaths in the 6.1 years between January 1, 2012, and February 12, 2018. We identified 6295 adult male victims of police homicide over this approximately 6-year period, for an average of about 1028 deaths per year, or 2.8 deaths per day.

Summaries of Observed Police Homicide Data

Of the 6295 adult male police homicide victims in our sample, 2993 were White, 1779 were Black, 1145 were Latino, 114 were Asian/Pacific Islander, and 94 were American Indian/Alaska Native. During this period, Black men were killed by police at a rate of at least 2.1 per 100 000 population, Latino men were killed by police at a rate of at least 1.0 per 100 000, and White men were killed by police at a rate of at least 0.6 per 100 000.

Table 1 displays summaries of the observed data on police homicides by division and metropolitan type. Large central metropolitan areas had the highest rates of police-involved homicide, with 2236 homicides, or about 1.0 per 100 000 men. Suburban, large fringe metropolitan areas had the lowest rates on average, at about 0.6 per 100 000 men. Among Census divisions, the Mountain states (Montana, Idaho, Wyoming, Nevada, Utah, Colorado, Arizona, and New Mexico) had much higher rates of death than did other divisions over this period, with more than 1.4 per 100 000 men. The Middle Atlantic states (New Jersey, New York, and Pennsylvania) had the lowest observed rates during this period, at about 0.4 police homicides per 100 000 men.

By comparison, there was a total of 63 057 homicides with male victims aged at least 18 years in the United States between 2012 and 2016, or an average annual rate of 12 611.4 homicides per year.[28] We estimated that over this period, police were responsible for about 8% of all US homicides with adult male victims. This ratio varies across geographies. In the Mountain states, police were responsible for about 17% of all homicides, while in the Middle Atlantic states, police accounted for about 5% of all homicides. Police accounted for more than 10% of all homicides in predominantly rural areas (small metropolitan, micropolitan, and noncore) and about 7% of all homicides in large central metropolitan areas.

Model Estimates of Mortality Risk From Police Homicide

Our models estimated, with 95% posterior certainty, that the risk of mortality in interactions with law enforcement for men who are aged at least 18 years in the United States is between 0.8 and 1.0 per 100 000 men per year. For Black men, we estimated a risk of between 1.9 and 2.4 deaths per 100 000 men per year. For Latino men, we estimated a risk of between 0.8 and 1.2. For White men, we estimated a risk of between 0.6 and 0.7. At 2015 population levels, our models predicted that between 970 and 1174 total men will be killed by police per year. We predicted that between 257 and 330 African American men, between 150 and 217 Latino men, and between 460 and 533 White men will be killed by police.

Figure 1 displays the densities of our model-based predictions of police-involved mortality risk by division and race, alongside observed mortality rates. Both the observed data and our model-based predictions show that Black men are at higher risk for police-involved mortality than are White or Latino men across the nation. Across all divisions, the median posterior prediction for Black adult male police homicide mortality is higher than the median rate for White adult males. A substantial proportion of the posterior predictive distribution for Black adult male police-homicide mortality includes exceptionally high mortality rates, as evidenced by long right tails in the prediction densities. The median Black adult male risk is highest, at more than 3 per 100 000 population, in the Pacific (95% credible intervals = 1.6, 6.4) and

TABLE 1—Adult Male Deaths Attributable to Police Use of Force by Metropolitan Area Type and Census Division: Fatal Encounters Dataset, United States, January 1, 2012–February 12, 2018

Census Division	Metropolitan Area Type, No. (Rate/100 000/Year)						Total, No. (Rate/100 000)
	Large Central Metropolitan	Large Fringe Metropolitan	Medium Metropolitan	Small Metropolitan	Micropolitan	Noncore	
East North Central	252 (0.88)	98 (0.35)	110 (0.64)	62 (0.51)	56 (0.41)	37 (0.53)	615 (0.58)
East South Central	68 (1.03)	37 (0.64)	99 (0.95)	78 (1.43)	82 (1.14)	73 (1.07)	437 (1.03)
Middle Atlantic	170 (0.50)	94 (0.27)	83 (0.58)	24 (0.43)	13 (0.26)	7 (0.34)	391 (0.41)
Mountain	257 (1.46)	63 (1.11)	191 (1.48)	120 (1.76)	67 (1.11)	41 (1.29)	739 (1.41)
New England	27 (0.51)	38 (0.31)	38 (0.36)	13 (0.66)	15 (0.57)	14 (0.89)	145 (0.43)
Pacific	680 (1.08)	177 (0.96)	320 (1.35)	111 (1.60)	53 (1.10)	20 (1.13)	1361 (1.15)
South Atlantic	303 (1.06)	348 (0.73)	316 (0.93)	90 (0.65)	90 (0.98)	70 (0.86)	1217 (0.86)
West North Central	102 (1.65)	64 (0.60)	71 (0.88)	54 (0.70)	45 (0.61)	46 (0.59)	382 (0.80)
West South Central	377 (1.25)	129 (0.93)	249 (1.34)	75 (1.06)	97 (1.24)	81 (1.19)	1008 (1.20)
Total	2236 (1.02)	1048 (0.59)	1477 (0.99)	627 (0.93)	518 (0.81)	389 (0.86)	6295 (0.87)

in the West North Central (95% credible intervals = 1.7, 5.1) divisions.

Latino adult male police homicide mortality risk is by far the greatest in Mountain states, where we estimate a median risk of about 1.9 (95% credible intervals = 1.1, 3.2) police homicides per 100 000. Sensitivity analyses replicating our main results at the state level suggest that counties in New Mexico, Arizona, and Colorado are likely driving these highest-in-the-nation Latino adult male mortality risks (Figure D, available as a supplement to the online version of this article at http://www.ajph.org).

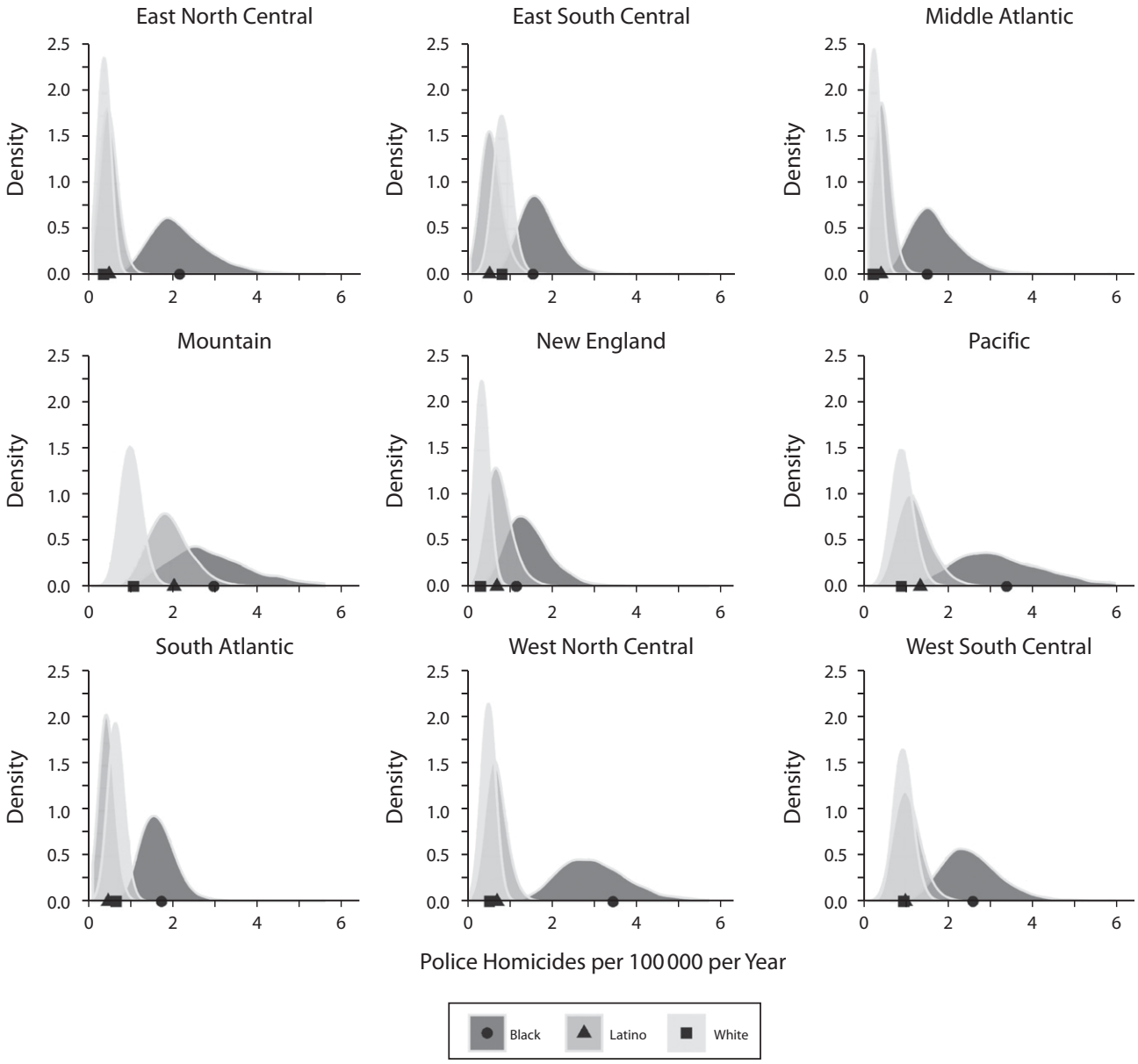
Figure 2 gives predicted and observed rates of police homicide across metropolitan area types. Variation across divisions was more pronounced than variation across urban and rural metropolitan types, particularly for Black men. Large central and medium metropolitan areas had relatively high expected rates of Black adult male police-involved mortality, while noncore and large fringe metropolitan areas had relatively low expected rates of Black adult male police homicide mortality.

Figure 3 illustrates the interactive relationship between racial inequality in police homicide, region, and county metropolitan type. We display the ratio of Black–White and Latino–White adult male police homicide risk by division and metropolitan area type and indicate whether the 95% credible interval for these rate ratios included 1 (equal mortality risk). Black–White mortality risk ratios were bounded above 1 in large central metropolitan areas in the East North Central, Middle Atlantic, New England, and West North Central; large fringe metropolitan areas in the East North Central, Middle Atlantic, and West North Central; in medium metropolitan areas in the East North Central, Middle Atlantic, and West North Central; in small metropolitan areas in the East North Central, Middle Atlantic, and West North Central; and in micropolitan areas in the Middle Atlantic. In each of these division–metropolitan groups, our models estimated a median risk of Black adult male police-involved mortality that was at least 4.3 times greater than White risk. Middle Atlantic large central metros (Essex, Hudson, and Union counties in New Jersey; Bronx, Erie, Kings, Monroe, New York, Queens, and Richmond counties in New York; and Allegheny and Philadelphia counties in Pennsylvania) had a median predicted risk ratio of 8.2 Black adult male police-homicide victims for every White adult male victim. However, their absolute predicted Black adult male mortality risk was lower than that in other division–metropolitan groups. West North Central medium metropolitan areas had the highest estimated Black adult male mortality risk (Table B, available as a supplement to the online version of this article at http://www.ajph.org, provides a full list of estimates).

We estimated Latino adult male police homicide risk to be similar to White adult male risk in the East North Central, Pacific, West North Central, and West South Central. In the East South Central and South Atlantic, our median expectation was for a Latino–White risk ratio of less than 1, and in Middle Atlantic, New England, and Mountain divisions, we predicted a median Latino–White mortality risk ratio of greater than 1 for all metro types. No metropolitan area–division combination had a predicted Latino–White homicide risk ratio with a 95% credible interval that excluded 1.

DISCUSSION

Using novel data and a methodological approach that accounted for uncertainty around estimates of rare events, our study provides new precision in quantifying the risk of police homicide by race and place. We showed that police homicide is more common than previous estimates have suggested.[2] Official statistics, based on the classification of deaths attributable to legal intervention, suggest that police account for about 4% of all homicides with adult male victims.[28] Our estimates suggest that police have instead been responsible for about 8% of all homicides between 2012 and 2016. Because official sources are known to underreport police homicides,[13,17] we recommend that public health scholars and practitioners rely on independent sources of data on police-involved killings, such as Fatal Encounters. Fatal Encounters and other similar public data collection efforts are far more comprehensive and, as such, reveal much higher mortality risk than can be estimated with extant official data.



Note. Density of posterior predictions and observed values (points) are plotted.

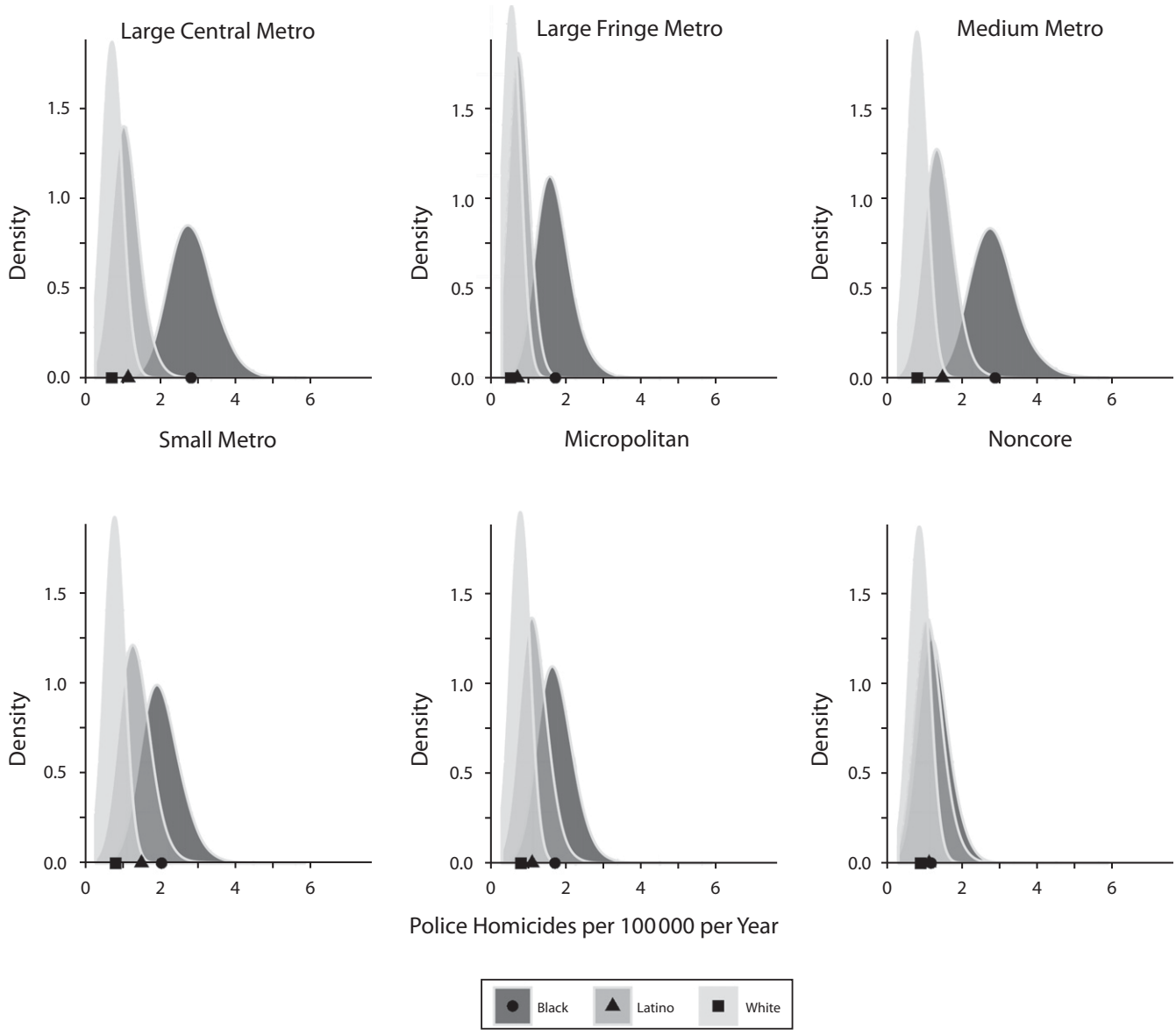
FIGURE 1—Adult Male Police-Involved Mortality Rates (per Year, per 100 000 Population) by Census Division and Race/Ethnicity: Fatal Encounters Dataset, United States January 1, 2012, to February 12, 2018

Limitations

Our study is not without limitations. Fatal Encounters offers a more comprehensive set of police-involved deaths than do official sources. However, there are almost certainly cases that do not receive media attention, and coverage of a police homicide may be less likely in places with sparse news coverage. Cases are coded from news reports and public records, which are almost always based solely on statements by police or other government officials. This may bias some variables in the data. Given data limitations, our "Latino" category is an amalgamation of many different groups that represent a range of social experiences. Future work on police-involved deaths—and future data collection efforts—should address this and describe if and how individuals of different Latino backgrounds experience variable risk. Subsequent work should also focus on explaining how other social–locational features—such as gender, age, and skin color—interact with race to affect mortality risk.

Public Health Implications

Police-involved deaths are often interpreted as being driven entirely by individual-level behaviors and choices.



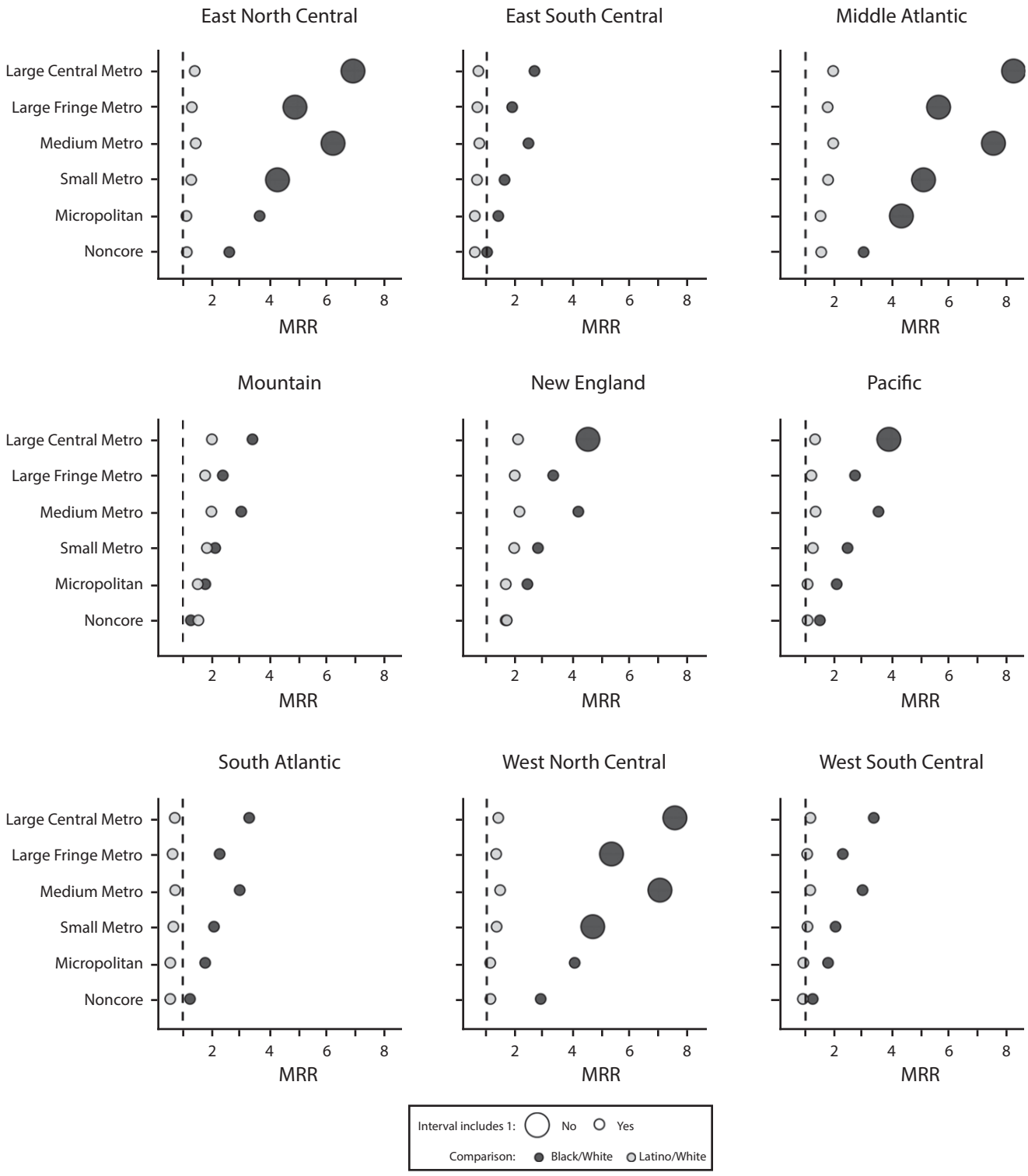
Note. Density of posterior predictions and observed values (points) are plotted.

FIGURE 2—Adult Male Police-Involved Mortality Rates (per Year, per 100 000 Population) by County Metropolitan Type and Race/Ethnicity: Fatal Encounters Dataset, United States, January 1, 2012–February 12, 2018

Narratives around fatal interactions between officers and civilians, as reported in the news, often reduce encounters to moments of crisis, such as a case in which police recounted that a victim was "Shot when officers feared he would run over them" or another in which "a man brandishing a cleaver . . . was shot and killed . . . after he refused to surrender to officers."[12] Individualizing narratives, however, masks the broader social forces that lead to distinct geographic and racial inequalities in police homicide risk. Our results suggest that the risk of being killed in a violent interaction with the police depends not only on idiosyncratic circumstances and individual choices but also on the interplay between one's race/ethnicity and the broader contextual environment in which policing occurs.

Our findings have immediate implications for those interested in reducing racial/ethnic disparities in police-involved deaths. Our results highlight that local processes play a powerful role in structuring police–civilian interactions. Developing targeted interventions for sites with particularly high levels of or inequalities in police-involved mortality may serve as a productive framework for reducing them. For researchers, studies that unpack the local conditions that give rise to disparate rates of police-involved mortality can help inform these efforts.[6,16,29]

Our study has broader implications for understanding how contextual environments feature in population health. Previous research has shown that the contextual



Note. MRR = mortality risk ratio. Large points indicate that the 95% posterior prediction interval does not include 1.

FIGURE 3—Adult Male Police Homicide Risk Ratios, by Race/Ethnicity, Census Division, and Metropolitan Type: Fatal Encounters Dataset, United States, January 1, 2012–February 12, 2018

environment is a key input to well-being; where one lives structures access to a mixture of physical resources, such as access to doctors or access to healthy food, and physical risks, such as proximity to power plants or exposure to lead.[30] While spatial context does operate on health through these material factors, our work highlights that social and legal aspects of the spatial environment have profound effects on health as well, particularly for marginalized populations.[31,32] Indeed, our results show that—like other police-related outcomes, which vary across the nation according to local political and social forces[10,33]—police-involved deaths are contingent upon local contextual environments. Structural racism,[1,29] racialized criminal–legal systems,[7,34] anti-immigrant mobilizations,[35] and racial politics[9] all likely play a role in explaining where police killings are most frequent and who is most likely to be a victim. Work that further explicates the role that social and cultural contextual factors play in generating police-involved deaths—as well as other population health outcomes—will further clarify how place matters for health.[7] AJPH

CONTRIBUTORS

All authors contributed to the design and conceptualization of the study. F. Edwards and M. H. Esposito conducted all statistical analyses and drafted the article. H. Lee provided guidance on the study design, data analysis, and interpretation of findings. All authors contributed to the editing and review of the article.

ACKNOWLEDGMENTS

The authors thank D. Brian Burghart and his colleagues for collecting and maintaining the Fatal Encounters data and for providing the authors with details on their data collection methodology. The authors are grateful to Heather Evans, Alexes Harris, and Charles Lanfear for comments on earlier versions of this article.

HUMAN PARTICIPANT PROTECTION

This analysis was conducted by using aggregated publicly available data, and institutional review board approval was not needed.

REFERENCES

1. Alang S, McAlpine D, McCreedy E, Hardeman R. Police brutality and Black health: setting the agenda for public health scholars. *Am J Public Health*. 2017;107(5):662–665.

2. Krieger N, Kiang MV, Chen JT, Waterman PD. Trends in US deaths due to legal intervention among Black and White men, age 15–34 years, by county income level: 1960–2010. *Harvard Public Health Rev*. 2015;3:1–5.

3. Lartey J. By the numbers: US police kill more in days than other countries do in years. *The Guardian*. June 9, 2015. Available at: http://www.theguardian.com/us-news/2015/jun/09/the-counted-police-killings-us-vs-other-countries. Accessed January 3, 2018.

4. Taylor K-Y. *From #Blacklivesmatter to Black Liberation*. Chicago, IL: Haymarket Books; 2016.

5. Miller TR, Lawrence BA, Carlson NN, et al. Perils of police action: a cautionary tale from US data sets. *Inj Prev*. 2017;23(1):27–32.

6. Ross CT. A Multi-level Bayesian analysis of racial bias in police shootings at the county-level in the United States, 2011–2014. *PLoS One*. 2015;10(11):e0141854.

7. Beckett K, Nyrop K, Pfingst L. Race, drugs, and policing: understanding disparities in drug delivery arrests. *Criminology*. 2006;44(1):105–137.

8. Epp CR, Maynard-Moody S, Haider-Markel DP. *Pulled Over: How Police Stops Define Race and Citizenship*. Chicago, IL: University Of Chicago Press; 2014.

9. Soss J, Weaver V. Police are our government: politics, political science, and the policing of race–class subjugated communities. *Annu Rev Polit Sci*. 2017;20(1):565–591.

10. Smith BW, Holmes MD. Police use of excessive force in minority communities: a test of the minority threat, place, and community accountability hypotheses. *Soc Probl*. 2014;61(1):83–104.

11. Carmichael JT, Kent SL. The persistent significance of racial and economic inequality on the size of municipal police forces in the United States, 1980–2010. *Soc Probl*. 2014;61(2):259–282.

12. Burghart DB. Fatal Encounters. 2015. Available at: http://www.fatalencounters.org. Accessed February 12, 2018.

13. Krieger N, Chen JT, Waterman PD, Kiang MV, Feldman J. Police killings and police deaths are public health data and can be counted. *PLoS Med*. 2015;12(12):e1001915.

14. Banks D, Ruddle P, Kennedy E, Planty M. Arrest-Related Deaths Program Redesign Study, 2015–2016: preliminary findings. US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics. 2016. Available at: https://www.bjs.gov/content/pub/pdf/ardprs1516pf.pdf. Accessed May 8, 2017.

15. Planty M, Burch AM, Banks D, Couzens L, Blanton C, Cribb D. Arrest-Related Deaths Program: data quality profile. US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics. 2015. Available at: https://www.publicsafety.gc.ca/lbrr/archives/cnmcs-plcng/cn33640-eng.pdf. Accessed May 8, 2017.

16. Klinger D, Rosenfeld R, Isom D, Deckard M. Race, crime, and the micro-ecology of deadly force. *Criminol Public Policy*. 2016;15(1):193–222.

17. Feldman JM, Gruskin S, Coull BA, Krieger N. Quantifying underreporting of law-enforcement-related deaths in United States vital statistics and news-media-based data sources: a capture–recapture analysis [correction in *PLoS Med*. 2017;14(10):e1002449]. *PLoS Med*. 2017;14(10):e1002399.

18. Feldman JM, Chen JT, Waterman PD, Krieger N. Temporal trends and racial/ethnic inequalities for legal intervention injuries treated in emergency departments: US men and women age 15–34, 2001–2014. *J Urban Health*. 2016;93(5):797–807.

19. Kaufman EJ, Karp DN, Delgado MK. US emergency department encounters for law enforcement–associated Injury, 2006–2012. *JAMA Surg*. 2017;152(6):603–605.

20. Barber C, Azrael D, Cohen A, et al. Homicides by police: comparing counts from the national violent death reporting system, vital statistics, and supplementary homicide reports. *Am J Public Health*. 2016;106(5):922–927.

21. Associated Press. *The Associated Press Stylebook and Briefing on Media Law 2017*. New York, NY: Basic Books; 2017.

22. Imai K, Khanna K. Improving ecological inference by predicting individual ethnicity from voter registration records. *Polit Anal*. 2016;24(2):263–272.

23. Manson S, Schroeder J, Van Riper D, Ruggles S. IPUMS National Historical Geographic Information System: Version 12.0. Minneapolis, MN: University of Minnesota; 2017.

24. LaMacchia R, Torrieri N, Davis J, Gregory E. *Geographic Areas Reference Manual*. Bureau of the Census. 1994. Available at: https://www.census.gov/geo/reference/garm.html. Accessed May 8, 2017.

25. Ingram D, Franco S. NCHS urban–rural classification scheme for counties. Washington, DC: National Center for Health Statistics; 2013.

26. Hamra GB, MacLehose RF, Cole SR. Sensitivity analyses for sparse-data problems—using weakly informative Bayesian priors. *Epidemiology*. 2013;24(2):233–239.

27. Dwyer-Lindgren L, Bertozzi-Villa A, Stubbs RW, et al. Inequalities in life expectancy among US counties, 1980 to 2014: temporal trends and key drivers. *JAMA Intern Med*. 2017;177(7):1003–1011.

28. Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying cause of death 1999–2016 on CDC WONDER online database. 2017. Available at: http://wonder.cdc.gov/ucd-icd10.html. Accessed March 12, 2018.

29. Mesic A, Franklin L, Cansever A, et al. The relationship between structural racism and Black–White disparities in fatal police shootings at the state level. *J Natl Med Assoc*. 2018;110(2):106–116.

30. Diez Roux AV. Neighborhoods and health: where are we and where do we go from here? *Rev Epidemiol Sante Publique*. 2007;55(1):13–21.

31. Hatzenbuehler ML, Phelan JC, Link BG. Stigma as a fundamental cause of population health inequalities. *Am J Public Health*. 2013;103(5):813–821.

32. Sampson RJ. The neighborhood context of well-being. *Perspect Biol Med*. 2003;46(3):S53–S64.

33. Bridges GS, Crutchfield RD, Simpson EE. Crime, social structure and criminal punishment: White and nonwhite rates of imprisonment. *Soc Probl*. 1987;34(4):345–361.

34. Asad AL, Clair M. Racialized legal status as a social determinant of health. *Soc Sci Med*. 2018;199:19–28.

35. Flores RD. Do anti-immigrant laws shape public sentiment? A study of Arizona's SB 1070 using Twitter data. *Am J Sociol*. 2017;123(2):333–384.