



## Review

# Association between Neighborhood and Racial Composition of Victims on Fatal Police Shooting and Police Violence: An Integrated Review (2000–2022)

Hossein Zare <sup>1,2,\*</sup> , Nicholas S. Meyerson <sup>1</sup>, Paul Delgado <sup>3</sup>, Michelle Spencer <sup>1</sup>, Darrell J. Gaskin <sup>1</sup> and Roland J. Thorpe, Jr. <sup>4</sup>

- <sup>1</sup> Department of Health Policy and Management, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD 21205, USA; nmeyers3@jh.edu (N.S.M.); mspenc35@jhu.edu (M.S.); dgaskin1@jhu.edu (D.J.G.)  
<sup>2</sup> Global Health Services and Administration, The School of Business, University of Maryland Global Campus, Adelphi, MD 20774, USA  
<sup>3</sup> Center for Health Sciences, College of Osteopathic Medicine, Oklahoma State University, Tulsa, OK 74107, USA; pdelgad2@jhu.edu  
<sup>4</sup> Department of Health, Behavior, and Society, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD 21205, USA; rthorpe@jhu.edu  
\* Correspondence: hzare1@jhu.edu



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**Abstract:** Police violence is a multidimensional issue that requires consideration of the violent events and how these events reflect systemic oppression. Violence and policing practices are influenced by race and ethnicity, place/neighborhood, structural inequality, and racism. We performed an integrated literature review to critically evaluate the current evidence, focusing on the racial composition of communities and neighborhoods and its association with police-involved violence and fatal shootings between 2000 and 2022. We used Scopus and Web of Science to include peer-reviewed articles in English that studied racial/ethnic differences in police-involved violence in the United States between January 2000 and February 2022. We excluded prior systematic reviews, meta-analyses, and articles on drug-related arrests. Using a PRISMA approach from 651 identified articles, we included 37 articles. Our findings showed that racial/ethnic minorities are disproportionately stopped, experience a higher probability of arrest, and are more commonly subjected to police-involved fatal shootings. Victims are more likely to live in neighborhoods with lower income and distressed communities of color, higher poverty ratios, and the highest levels of criminal violence. Citizens reporting of negative interactions with police is strongly associated with race/ethnicity. Maintaining the highest standards of professional practice consistent with the law and protections guaranteed by the Constitution may reduce police violence. In addressing police violence, policymakers not only need to consider the multidisciplinary nature of vulnerability to address the needs of vulnerable populations and create a collaborative environment but also to control police violence. Considering community-based approaches, encouraging training to interact with minority individuals, and adjusting the racial composition of the police officers by the racial composition of communities are other strategies; more importantly, prioritizing strategies to reduce social inequality and structural racism are crucial.

**Keywords:** police violence; racism; neighborhoods; arrests; fatal shooting; systematic review; inequality; vulnerability

## 1. Introduction

The video-recorded death of George Floyd at the hands of police has increased tension between communities of color (non-White populations) and police departments across the nation. This killing along with other more recent killings of unarmed Black men (Rummler 2020) by police highlights the systemic problem of police violence and racism in law enforcement that has plagued communities of color. Racial/ethnic disparities in

police violence and brutality exceed what is covered by the media. Despite representing 13% of the general population, (United States Census Bureau 2020) between 2013 and 2018, Black individuals comprised 27.5% of victims in police-involved fatal shootings (Siegel et al. 2019). These problems make it difficult for police departments to effectively serve communities of color. Moreover, violent crimes have increased in communities where police violence has incited protests and initiated calls for police reform (Mesic et al. 2018; Rummeler 2020). Exposure to media further shapes citizens' perceptions of police misconduct, creating concerns about police behaviors and practices (Arnio 2021), and thus resulting in a climate of distrust between citizens and the police that makes it challenging for communities to address violent crimes (Roh and Robinson 2009).

Studies have shown that Blacks and Hispanics are more likely than non-Hispanic Whites to be subject to more intensive law enforcement practices (Arnio 2021; Lautenschlager and Omori 2019; Siegel et al. 2019). Explanations for such racial/ethnic disparities have focused on the minority threat hypothesis (Roh and Robinson 2009), which suggests a higher likelihood of social control (i.e., policing) among those living in lower-income and distressed communities of color (Bonner 2014), with higher rates of poverty, higher residential segregation (Sytsma 2015), and higher levels of violent crime.

Lastly, neighborhoods undergoing gentrification experience social disorganization that has resulted in a higher number of crimes reported with Black suspects being arrested, often lacking probable cause (Lanfeer et al. 2018). The majority of Black neighborhoods are more likely to be labeled as crime-ridden regardless of the actual crime rate. Moreover, Black individuals experience a disproportionate number of frisks where no contraband is found (Hannon 2020). In communities of color, the racial composition of police departments is often not reflective of the community they serve (Tillyer 2018). As a result, Black individuals are more likely to be fatally shot by police of opposite/different races (Tregle et al. 2019) and are 3.23 times more likely than White individuals to be killed (Schwartz and Jahn 2020).

The combination of low-income, socio-economically disadvantaged neighborhoods with a high proportion of the non-White population creates areas with the most vulnerable population—groups of people more likely to suffer from structural violence. Structural violence includes social, economic, and political processes and can produce social inequality (CHERC 2022). The complexity of vulnerability makes it hard to implement a collaborative approach to address vulnerability (Keay and Kirby 2018). Scholars have acknowledged the significance of vulnerability in police violence. Vulnerability is twofold: (1) Some theorists posit that cognitive bias, specifically implicit racial bias, influences an officer's behavior. The "associations between blackness on the one hand and violence and dangerousness on the other, compound African Americans' exposure to police violence" (Carbado 2015). (2) Other theorists argue that vulnerability is exhibited by the frequency of police contact and repeated interactions. Regardless of orientation, disadvantaged populations are in a position of vulnerability, perpetuating their risk of being victims of police violence. Carbado's provisional model of causes draws attention to several factors that leave racial/ethnic minorities vulnerable to repeated police interactions (Carbado 2015). Repeated interactions heighten the risk of police violence in several ways: (1) it entrenches stereotypes of racial/ethnic minorities as criminals, (2) increases the likelihood of arrest and/or involvement in the criminal justice system, and (3) strains police-community relations and cooperation (Carbado 2015).

The issues mentioned above highlight the importance of addressing police behaviors, looking at residents' experiences with police, and understanding the role of neighborhood contexts, the racial composition of police departments, and the racial composition of the population. Our research has shown that no comprehensive study on deep literature has been published. The purpose of the present integrative review was to critically evaluate the current evidence focusing on the racial composition of communities and neighborhoods and its association with police behaviors on the rates of arrests, fatal shootings, the occurrence of violence, and stop-and-frisk. Based on this review, we include recommendations for policy solutions to reduce police violence in communities of color.

## 2. Materials and Methods

To conduct this integrative review, we followed the steps proposed by Moher et al. (Moher et al. 2009)—Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)—which includes identification, screening, eligibility, and including articles for analysis. The literature searches were conducted in February 2022 for publications between January 2000 and February 2022.

### 2.1. Inclusion Criteria

For studies to be included, they had to meet the following criteria: peer-reviewed article, published in English, published between the years 2000 and 2022, included police-involved violence as the substantive focus, and included racial/ethnic differences of police-involved violence and neighborhood characteristics—at least as a substantive focus. We examined all systematic reviews and meta-analyses obtained in our search and subsequently conducted a citation search of their references. We identified any relevant studies not retrieved by our initial electronic search. We made no exceptions to any populations.

### 2.2. Exclusion Criteria

The following articles were excluded: conducted outside of the US, focused on drug arrests, nonempirical, or with an outcome outside the relevance of this study.

We excluded systematic reviews, meta-analyses, or studies that focused on irrelevant outcome measures (e.g., trauma symptoms, obesity, and sexually transmitted infections), and articles that measured elements of police use of force, such as the use of restraints, verbal commands, or threats to use weapons.

### 2.3. Data Sources and Search Strategy

We conducted a broad, literature search through two electronic databases: SCOPUS and Web of Science. We also hand-searched the references in meta-analyses and systematic reviews. Table 1 lists the databases and respective search strategies, and Figure 1 reports the study selection process using the PRISMA flow diagram (Moher et al. 2009).

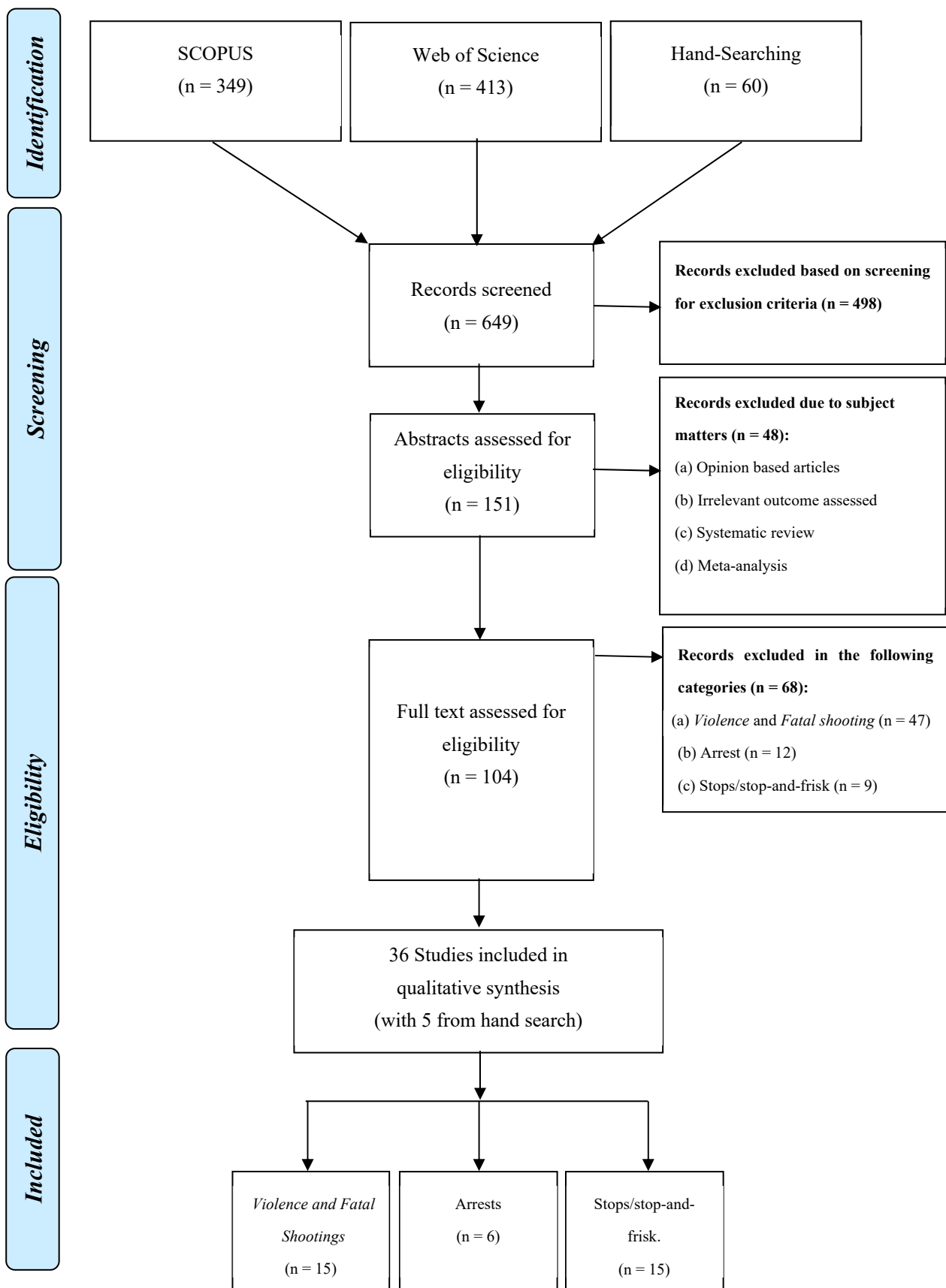
**Table 1.** The search strategy was used for each electronic database.

Electronic Database	Search Strategy
Scopus	TITLE-ABS-KEY (("police-involved violence" OR "policing") AND ("race" OR "ethnicity" OR "racial") AND ("community violence" OR "arrest" OR "crime" OR "shooting")) AND PUBYEAR AFT 1999 AND LANGUAGE (English) AND (LIMIT-TO(AFFILCOUNTRY, "United States"))
Web of Science	(TS = (("police-involved violence" OR "policing") AND ("race" OR "ethnicity" OR "racial") AND ("community violence" OR "arrest" OR "crime" OR "shooting")) AND PY = (2000–2022) AND CU = USA) AND LANGUAGE: (English)

Our search yielded 651 unique citations (591 articles from the initial electronic search and 60 articles from the manual citation search (hand-searching) of references in meta-analyses, and systematic reviews) after duplicates were removed. We excluded 547 articles by screening the titles and abstracts using the study eligibility criteria; after removing duplicates, 104 articles were selected for full-text review of eligibility. Finally, 36 articles were selected for qualitative synthesis.

Two independent reviewers (N.M. and P.D.) used the eligibility criteria to screen the titles for preselection. In case of disagreement between the two reviewers, we resolved conflicts using consensus and a discussion with a third reviewer (H.Z.).

From this screen, 651 citations were determined to be not relevant to this qualitative synthesis. Abstracts were obtained for the 151 remaining citations. From this second review, 68 citations were determined to be not relevant. In total, 36 studies were determined to meet the inclusion criteria. We used EndNote (EndNote™ 20) to organize the list of references.



**Figure 1.** Distribution of articles used for the qualitative analysis.

Relevant articles were manually reviewed for content analysis. Reviewers assessed and coded data source, location, sample size, study type, key findings, and limitations. During this review, studies were categorized into one of three domains based on the outcome of interest: (1) arrests, (2) violence and shootings, and (3) stops/stop-and-frisk. Reviewers examined the content of the paper rather than the frequency of key terms.

### 3. Findings

Among the selected articles, we identified 24 panel studies, 7 cross-sectional studies, and 5 time-series studies. Appendix A includes the study characteristics of the selected articles. Further, 27 studies used official records (e.g., police department data); 8 studies used crowd-sourced data (e.g., Mapping Police Violence); 1 study used both official records and crowd-sourced data datasets; 1 study used systematic observations. We categorized selected studies into three main categories: (1) number of arrests, (2) incidents of violence and fatal shootings, (3) stops/stop-and-frisk. In the next section, we provide brief findings of our review.

#### 3.1. Association between Neighborhood and Racial/Ethnic Composition of Victims on the Number of Arrests

*Racial/Ethnic Composition of Victims.* Regardless of setting (i.e., national vs. city level), Black individuals were more likely than White individuals to be arrested (Beck 2019; Lanfear et al. 2018; McCormack and Hirschel 2021; Schuck and Rabe-Hemp 2017). These disparities were most pervasive in suburbs, as Black individuals were arrested for quality-of-life offenses (disorderly behaviors in public) 4.5 times more often than White individuals, while in cities, Black individuals were arrested 2.7 times more often than White individuals (Beck 2019). Further, in suburbs with less than 2% Black residents, the Black–White disparity was more pronounced ( $>5\times$  more often), compared with suburbs with greater than 16% Black residents ( $<2\times$  more often) (Beck 2019). A newly published study in Minnesota showed that between 2012 and 2016, the proportion of Black residents in census tracts was correlated with the number of police incidents (Hardeman et al. 2021).

Changes in community demographics may lead to changes in police activity; for example, when White individuals moved into a typical gentrifying community in New York City, police made fewer street stops (9% less) and fewer proactive arrests (11% less) (Beck 2020). Additionally, a national study found that for every 1% increase in the proportion of Black residents, there was a 27% increase in disorder arrests and a 46% increase in arrests for marijuana possession (Schuck and Rabe-Hemp 2017).

*Neighborhood context.* Neighborhood context can influence interactions and police decision making (Klinger 1997; Novak et al. 2002). Police–citizen interactions that occur in disorganized communities (i.e., higher crime rate, a higher proportion of residents in poverty, high levels of residential mobility) are more likely to result in more coercive and severe dispositions (Klinger 1997; Novak et al. 2002; Smith 1984, 1986; Smith et al. 1984). Moreover, this effect does not differentiate by the arresting officer’s race (Brown and Frank 2006). A study conducted in Cincinnati, Ohio, found no significant difference in the association of arrest outcomes and neighborhood disorganization between White and Black officers (Brown and Frank 2006).

The probability of arrest was further influenced by location. Among serious incidents, with a White reporter in a majority White neighborhood, the probability of arrest of a Black suspect was 95% (the highest found in the study). The situation with the lowest probability of arrest (73%) was for nuisance incidents, with a Black reporter, a Black suspect, in a disadvantaged neighborhood (Lanfear et al. 2018).

*Racial/Ethnic Composition of Police Officers.* Individual-level data about police officers have not been included in many nationwide datasets (Holmes 2022); as a result, the impact of the racial composition of police officers on arrests has been rarely reported. A new study published in 2021 showed that “White offender and a Black victim were 4.7% less likely to result in arrest, while comparable incidents with White interracial couples were 13.9% more



likely, and Black interracial couples were 32.2% less likely to result in arrest” (McCormack and Hirschel 2021). Based on our findings, the most important predictors of the number of arrests are the victim’s race/ethnicity, the proportion of Black residents, and place/location.

### 3.2. Association between Neighborhoods and Racial/Ethnic Composition of Victims on Police violence and Fatal Shooting

*Race or ethnicity differences.* The interactions with law enforcement and the mortality risk from police fatal shootings vary by race. The risk of being killed by police, relative to non-Hispanic White men, is between 3.2 and 3.5 times higher for Black men, and between 1.4 and 1.7 times higher for Hispanic men (Edwards et al. 2018). Between 2012 and 2016, police accounted for more than 10% of all fatal shootings in rural areas and about 7% in metropolitan areas (Edwards et al. 2018). Across all census divisions, Black men have the highest risk of being killed by police in the Pacific and West North Central States; for Hispanic men, the risk of mortality by fatal police shooting is greatest in the Mountain States (Edwards et al. 2018).

*Gender differences.* When looking into the gender differences, the death rate among women due to police violence is much lower than among men (Gaston et al. 2021). Nevertheless, we see a race disparity with police officers killing 1.89 Black women for every Hispanic woman and 1.48 Black women for every non-Hispanic White woman (Gaston et al. 2021).

*Neighborhood differences.* Community violence and neighborhood racial and ethnic contexts have been reported as meaningful indicators of shootings by an on-duty officer involved (Arnio 2021). Disadvantaged neighborhoods with high violent crimes often tend to be heavily policed. A one-unit increase in the logged violent crime rate increases the risk of Hispanic men being killed by police 2.31 times more often and the risk of Black men 1.60 times more often. Among women, Hispanic victims are at a higher risk when there is increasing violence at the neighborhood level (Gaston et al. 2021). Compared with the logged violent crime rate, residential instability is a positive predictor of Black civilians being killed by police. A one-unit increase in residential instability increases the risk of police killings by 41% for Black men and 11% for Black women (Gaston et al. 2021). In disadvantaged Black neighborhoods, use-of-force incidents per population appear to be reported at a higher rate with increased severity (Lautenschlager and Omori 2019). In addressing police violence, the fatal shooting local context is an important element to be considered in order to understand police behavior (Arnio 2021).

As the violent crime rate of an area increases, police-involved activities may be perceived as an additional threat. A one standard deviation increase in the violent crime rate was associated with nearly a 0.5-point increase in the predicted number of police fatal shootings (Smith 2003). This is especially pronounced when the victim is Black, where an increase in violent crime rate was associated with a 97% increase in the incidence of police-fatal shootings (Holmes et al. 2019). Threat perceptions, however, can differ significantly across races. Among victims of police shootings, an individual is 3.5 times more likely to be Black and unarmed and 1.7 times more likely to be Hispanic and unarmed than non-Hispanic White and unarmed (Ross 2015). Further, victims are as likely to be Black and unarmed as they are likely to be non-Hispanic White and armed (Ross 2015).

These findings offer support for the minority threat hypothesis (Smith and Holmes 2014), which suggests that the percentage of Black and Hispanic residents is positively associated with the number of sustained excessive force complaints.

*Police fatal shootings.* Since 1 January 2015, 6214 people have been killed in police-involved incidents (TSO 2013). Despite representing 13% of the general population (United States Census Bureau 2020), Blacks (3.6 per 100,000) were killed more than twice as frequently as non-Hispanic Whites (1.5 per 100,000) (The Washington Post 2021). As research and media highlighted these disparities, there was considerable contention over how they can be addressed. Moreover, studies tend to disagree on risk factors that relate to police shootings and intervention efforts. Policy implications have typically focused on enhancing

officer training to interact with minority individuals (Siegel et al. 2019). Studies posit that the neighborhood's racial composition is what matters, not the suspect's race (Helms and Costanza 2020; Siegel et al. 2019; Siegel 2020; Smith 1986). For example, for every one-unit increase in the Black and Hispanic population at the county level, the rate of police shootings increased by 1.5 and 1.6, respectively (Helms and Costanza 2020). Similarly, for every one-unit increase in the Black and Hispanic population in census tracts, the rate of police shootings increased by 2.7 and 1.01, respectively (Arnio 2021).

However, results are contradictory at city levels (Holmes et al. 2019; Siegel et al. 2019; Smith 2003). A study conducted in large cities (>100,000 residents) found that the proportion of Black or Hispanic residents was not significantly related to police fatal shootings (Holmes et al. 2019); however, another study, which also considered large cities, found that one standard deviation increase in the proportion of Black residents was associated with a 0.33 point increase in the predicted number of police fatal shootings (Smith 2003). Seemingly, the defined geographic location and severity of police shootings impact the significance of findings. The Black dissimilarity index (fewer Black residents) was associated with a 106.3% increase in the incidence of police fatal shootings (Holmes et al. 2019). With increasing numbers of Black residents in a geographic area, there may be a greater standard of accountability held by the population or the minority threat perception may be reduced (Siegel et al. 2019; Smith and Holmes 2014).

As Siegel et al. (2021) reported, the main predictors of a police shooting in a census tract are "higher levels of economic disadvantage and general firearm violence". The predictors at the city level are different; for example, "lower proportion of Black residents, less overall racial residential segregation, and higher rates of property crime". The main predictors are "a higher gap between the Black and White population in educational attainment" at the state level (Siegel et al. 2021). As reported by Siegel, we see how the economically disadvantaged racial composition of a population and crime rates may define the police behavior and emphasize the importance of all policy-level interventions to control police fatal shootings.

*Police militarization.* A study reported that increasing the size of Black and Hispanic populations in place increased the likelihood of acquiring surplus military equipment, with higher rates among areas with a greater percentage of Black individuals (Ramey and Steidley 2018).

*The racial composition of police officers.* A study has shown that racial conflict shapes police use of fatal force (Gaston et al. 2021). For example, Pyo reported a positive association between the share of Black officers and a reduction in police-involved deaths of Black residents. He estimated that "one unit increase in the percentage of Black officers is associated with decreases in the incident rate ratio (IRR) of police-involved deaths of Black residents by about 2.1 percent" (Pyo 2022). These findings show that addressing police violence considering the racial composition of the place/neighborhood and police department is a meaningful policy to reduce the rate of police fatal shootings, specifically when the victim is of the opposite race.

### 3.3. Association between Neighborhood and Racial/Ethnic Composition of Victims on the Number of Stops or Frisks

*Racial composition of victims.* Traffic stops have been identified as one of the most common sources of contact with police. In 2018, about 20 million Americans experienced police contact as a result of a traffic stop (Harrell and Davis 2020). Research suggests that in crime hot spots, race is often considered when police officers conduct a discretionary search during a stop, and police stop and search made White people feel safer in their neighborhood in comparison with Blacks (Mulaphong and Cheurprakobkit 2021). For example, for every 10% increase in Black or Hispanic residents, there is a 4.2% increase in the odds of an officer drawing his gun during a stop (Kramer and Remster 2018). A similar finding has been reported in New York City hot spots; for example, the percentage of the population that is Black has the highest influence on Black stops (Newberry 2021).

Non-Hispanic White drivers are stopped at a lower frequency than racial/ethnic minority drivers, and Black drivers are targeted at a higher rate, possibly contributing to a disparity in discretionary searches. Among stops conducted closest to crime hot spots, young Black drivers were 2.4 times more likely to experience a discretionary search than similar non-Hispanic White and Hispanic drivers (Briggs and Keimig 2016; Stults et al. 2010). Additionally, traffic stops that resulted in fruitless searches did not find cause to make an arrest and were four times more likely to occur to Black drivers than to White drivers (Baumgartner et al. 2021). A study in New York City reported that implementation of marijuana enforcement highlights the disparities of street-level policing where officers stop Black drivers on suspicion of marijuana possession at a rate of 14.83 per 1000 population, while non-Hispanic White drivers are stopped only 1.96 times per 1000 population (Geller and Fagan 2010). Black drivers have 27% higher odds than Whites of experiencing force applied by an officer (Kramer and Remster 2018).

*Racial composition of police officers.* Consistent with the minority-threat hypothesis, stops that result in searches are greater among Black drivers than among non-Hispanic White drivers (Novak and Chamlin 2008; Zhao et al. 2019). Although officer demographics change across patrol districts, research suggests that search rates are higher among White male officers with fewer years of service when encountering Black drivers. A study conducted in Chicago documented that Black and Hispanic officers made far fewer stops and arrests than White officers, and were less likely to use force, especially against Black civilians (Ba et al. 2021).

White male officers are 2.2 times more likely than other officers to arrest a Black driver and 4.4 times more likely to conduct a fruitless search (Baumgartner et al. 2021). Conversely, Black officers search drivers less than half as often, compared with White officers. Nevertheless, Black officers are nearly four times more likely to conduct a search among Black drivers than among White drivers (Baumgartner et al. 2021; Wilkins and Williams 2008). In White communities, White male officers are more likely to search Black drivers; searches are least likely to occur in stops involving a Black officer and a White driver. It is important to mention that in predominately Black areas, stops of White drivers by White officers are the most likely to result in a search (Rojek et al. 2012).

#### 4. Discussion

We used two electronic databases to conduct this integrated literature review. We included 30 peer-reviewed articles (13 studies at the national level and 17 studies at the state level (e.g., NY, CA, TX)) to provide support regarding the existence of structural racism in police-involved violence. Our findings emphasized the crucial roles of the racial composition of communities and law enforcement officers, and of community neighborhoods.

##### 4.1. Factors Were Associated with Higher Rates of Police Violence

*Victim Race/Ethnicity.* The most important factor reported by almost all reviewed articles was “race/ethnicity”. Blacks and Hispanics were more likely to be stopped, frisked, arrested, and killed by police (Edwards et al. 2018; The Washington Post 2021).

*Community racial/ethnic composition.* Communities’ racial composition was another predictor of police-involved violence. A one-unit increase in the Black population increased the rate of police shootings of Black residents in 1.5 to 2.17 more occurrences, with a similar number of occurrences (1.0 to 1.6) involving the shooting of Hispanic residents. A one percent increase in the proportion of Black residents was associated with a 27% increase in disorder arrests; a 10% increase in the proportion of Hispanic residents was associated with a 4.2% increase in the odds of police drawing their guns (Kramer and Remster 2018).

*Police racial/ethnic composition.* Minority populations are more likely to be arrested and targeted by police of different races. White officers are more likely to charge Black drivers by 2.2 times (Baumgartner et al. 2021), and Black drivers are more likely to be searched by White officers in communities at a higher percentage of a White population (Rojek et al. 2012). Demographic correspondence between government employees and the local people



can lead to more favorable minority groups (Ricucci and Van Ryzin 2017). Police forces with a higher minority composition result in fewer excessive force complaints and fewer fatal encounters with officers (Kennedy et al. 2017). Deploying Black officers instead of White officers yields 12.55 fewer stops of Black civilians per 100 shifts (Ba et al. 2021). In addition to race/ethnicity, an officer's gender is an important element to reduce police force and arrests (Ba et al. 2021) and can "greatly improves racial fairness with limited detriment to the policing effectiveness" (Liberatore et al. 2021).

*Racial and income segregations.* Racial and income disparities are two other predictors of fatal shootings by police. Communities of color living in areas with lower median income, higher poverty ratio, and a higher crime rate suffer more from fatal police shootings. A 10-point increase in economic disparity was associated with a 40% increase in the Black–White fatal police shooting ratio (Mesic et al. 2018). Structural racism has been highlighted through segregation, economic disparity, and employment disparity (Holmes et al. 2019; Johnson et al. 2019).

*Structural inequality.* Furthermore, violence including police violence needs long-term, multilevel interventions at local and nationwide levels to address some structural inequality such as an income gap (Khullar and Chokshi 2018) and wage disparities (Zumbrun 2014). Economically disadvantaged Black and Hispanic neighborhoods continue to experience a disproportionate number of stop-and-frisk practices (MacDonald and Braga 2019). Structural racism can thus be highlighted through segregation, economic disparity, and employment disparity (Holmes et al. 2019; Johnson et al. 2019). For example, a 10-point increase in economic disparity was associated with a 40% increase in the Black–White fatal police shooting ratio (Mesic et al. 2018). Long-standing structural racism proliferates social and health inequities that are reflected in this Black–White disparity (Holmes et al. 2019). As emphasized by the American Historical Association (AHA 2020), policymakers should consider different strategies to prioritize neighborhoods and communities that suffer more from law-enforcement officers who violated norms not only of good policing but of human decency.

*Place of residence and neighborhood deprivation.* Disparities are most pervasive in suburbs and cities than in rural and small cities; the characteristics of neighborhoods influence police decisions to implement social control policies such as more arrests, upgrades in crime classifications, and actions taken on reported crimes (Lum 2011). Black and Hispanic neighborhoods continue to experience a disproportionate number of stop-and-frisk occurrences (MacDonald and Braga 2019). A one-unit increase in residential instability increases the risk of police-involved killing by 41% for Black men and by 11% for Black women (Gaston et al. 2021). Neighborhood context can influence interactions and police decision making (Klinger 1997; Novak et al. 2002). Studies have highlighted that a neighborhood's racial composition is more important than the suspect's race (Helms and Costanza 2020; Siegel et al. 2019; Siegel 2020; Smith 1986). With increases in the number of Black residents, we see higher police-reported crime than with increases in the number of White residents (Lodge et al. 2021).

#### 4.2. Policymakers Debate Which Strategies and Policies to Implement to Reduce Structural Racism

*Neighborhood and community-centered strategies.* Blacks and Hispanics are more likely to be searched, frisked, arrested, and subjected to force (Cooley et al. 2019; Otey 2016). Policymakers may consider neighborhoods as an influence indicator of police interactions with communities. Long-term safety strategies (education, local restorative justice services) may help reduce structural racism (APHA 2020; Webster et al. 2013). The development of these strategies that consider "disparity in racial disparities" is an essential element to address police-involved violence and racial inequality. Demographic changes due to gentrification in a neighborhood are another crucial element that may influence police reaction to communities (Beck 2020). Historically, White, middle-class people typically have few negative interactions with police, and they demand more policing, to keep the environment safe in addition to protecting their properties. As a result, and under

directions and influence of police administrators, city officials, and real estate developers, police may stop and arrest more non-White residents, considering that gentrification's effect on policing and its complicated impact on public safety are important issues to address when assessing the violence in a community.

*Strategies to ensure community safety without reliance on armed law enforcement and gun policy.* Police departments located in areas with a higher rate of Black and Hispanic populations are more likely to use military equipment (APHA 2020). The National Defense Authorization Act of 1990 and 1991 authorized the transfer of excess Department of Defense property to federal, state, and local law enforcement agencies. This program is referred to as the 1033 Program. The ongoing debate between defenders of 1033 programs and social activists (non-defenders) on implementing police militarization against communities of color raises many questions regarding the best approach to utilizing military materials (APHA 2020). Policymakers should consider the association between implementing military materials and community safety and police interactions with minority groups.

*Gun politics.* A study reported that lobbying efforts by gun rights advocates such as the National Rifle Association (NRA) have created a dichotomy to frame the gun debate: gun militarism and gun populism (Carlson 2020). Gun militarism justifies aggressive law enforcement of criminals with guns, whereas gun populism promotes gun access among law-abiding citizens (Carlson 2020). Despite gun policies seemingly providing color-blind regulations on who can access, purchase, and carry a gun, racial presumptions in how police departments enforce laws raise considerable concerns (Carlson 2020). Policymakers may consider differential enforcement of gun regulations among racial/ethnic minorities. There is evidence—namely, the case of Philando Castile (Julie Bosman 2017)—that law-abiding Black gun owners are being treated unjustly or have been treated as criminals even with legal permission to own a gun. Efforts to draw attention to cases similar to this may help us return back to trusting communities of color.

*Technology.* Using conducted electrical weapons (aka CEWs or TASERS®) has resulted in higher rates of minority population deaths: 500 deaths from 2001 to 2014 by CEWs, with 90% occurrence in unarmed populations. Using this less-lethal weapon in people with preexisting cardiac conditions or other pretexting conditions may result in death. Policymakers should consider developing policies to limit the use of CEWs specifically on elderly and unarmed targets (Trimel 2021).

Wearing body-worn cameras (BWCs) has significantly reduced officers' use of force. In addition, using the body-worn camera is encouraging and produces evidence, and protects officers from assault and false allegations (Kahn and Martin 2016). There is no agreement, however, on the effectiveness of using the BWCs. A recent study among 142 police departments has shown that BWCs have "negative and small treatment effects on arrest rates and null effects on the racial disparity between numbers of Black and White arrests" (Pyo 2021). These findings imply that officers may become slightly more cautious in the use of arrests after wearing BWCs, but BWCs do not change their overall disparate treatment of Black versus White suspects (Pyo 2021). Similarly in a randomized control trial in the District of Columbia, the authors reported that using BWCs had no significant effect on police use of force (Yokum et al. 2017).

*Training.* Higher policing experience and more training resulted in better outcomes on officers' decisions to use force, specifically their decisions under the influence of unconscious biases—such as the "associations between Black individuals and criminality" (Smith 2015). Officers who spent more time on the force reduced their search rate by 6% points for each year of service. A few states have recently enacted legislation requiring in-service and advanced training standards to be employed; for example, Vermont (The Law Enforcement Act. No. 147), California (Public Employment: Peace Officers: Act No. 2020–322), and Georgia (Office of Public Safety Officer Support: Act No. 569). Policymakers may consider similar policies specifically for states with higher rates of Black and Hispanic populations or states with higher racial segregation.

*Legislations.* Soon after the death of George Floyd, some states passed legislation to increase police departments' accountability, enhance transparency in policing, reduce bias against race, limit the use of unreasonable or deadly force or a chokehold, and encourage training in critical incident stress management for the benefit of public safety officers. By the time of this study, most states have not passed legislation to reduce police violence (NCSL 2021), specifically for states with a higher rate of violence, such as Arizona, Texas, and Florida. With an increase in the use of lethal force toward all populations (Whites and son-Whites) even after an uprising occurs (Cunningham and Gillezeau 2021), there is an urgent need by policymakers to address police violence.

*Addressing vulnerability.* Police violence is a manifestation of a structural problem (Carbado 2015). Police culture can further perpetuate risk. Privilege and immunity afforded by society create a system that automatically justifies violence by officers (Carbado 2015). The systemic racism exhibited through practices—such as broken windows policing, individual-level vulnerability, police culture and training, and a legal system that minimizes officers' accountability—contribute to the cycle of legitimizing police violence. Experts believe that the multidisciplinary and diverse nature of vulnerability requires a collaborative approach from sharing information to collaborating on decisions and coordinating interventions (Keay and Kirby 2018; TSO 2013). Policymakers should facilitate collaboration between organizations at local and national levels to address police violence and understand the needs of vulnerable populations.

*Limitations.* The studies analyzed in the present literature review were retrieved from two academic online databases: Scopus and Web of Science. Our findings are limited to peer-reviewed articles published between 2000 and January 2022 using the search terms identified in Table 1. As we excluded the grey literature, we may have left out some theoretical discussions on the subject. Although we limited publication data, we did not specify the dates of data collection. Historical police practices may no longer be relevant to the current landscape. We did not include any articles outside of the four main subject areas of interest. There is the potential for publication bias leading to fewer studies showing null or negative results. Finally, we did not include studies reviewed in the grey literature.

## 5. Conclusions

Studies reviewed in this integrative review have documented that people of color are more likely than Whites to be searched, frisked, arrested, have force used against them, and fatally shot by police.

Many questions remain around the socio-ecological model, such as the role of individual factors (age, sex, interaction between gender, age, and race of victims), community and neighborhood factors (such as the role of social circles and families, racial segregations, and social vulnerability on the occurrence of violence), societal factors (such as the role of policies, police training, law/regulation on police and peoples' behaviors), and factors associated with law enforcement officers.

Policymakers should seek ways to improve racial justice by slowing down the number of violent occurrences and arrests—specifically fatal shootings by police officers—in areas with high proportions of minority residents. In addressing police violence, policymakers need to consider the multidisciplinary nature of vulnerability to address the needs of vulnerable populations and create a collaborative environment to control police violence. These policies include, but are not limited to, community-based approaches to eliminate structural racism, reduce military materials, and encourage training to interact with racial/ethnic minority individuals. Collecting individual demographic data for police officers and adjusting the racial compositions of the police department are other strategies that may improve the racial disparities on police fatal shootings.

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### Appendix A. Studies of the Association between Neighborhood Characteristics and Racial/Ethnic Differences in Police-Involved Violence, Published between 2000 and 2022

Authors, Publication Year, and Journal	Study Design			Results
	Source	Location	Population	
Arrests				
Beck, 2019, <i>Crime and Delinquency</i>	(1) Uniform Crime Report (UCR), (2) Decennial Census, and (3) American Community Survey	US	1038 suburbs and 50 cities	Blacks were arrested 4.5 times more often than Whites in suburbs and 2.7 times more often in cities. Results suggest that as Blacks become more common in a neighborhood, arrest rates become less unequal. Additionally, more poor families in a suburb were positively associated with more racially disproportionate arrests.
Beck, 2020, <i>City and Community</i>	New York City Open Data Portal	New York City, NY	2038 census tracts	When more White people moved into the typical gentrifying neighborhood, police made fewer street stops (9% fewer) and fewer proactive arrests (11% fewer) but more order maintenance arrests (5% more).
Brown and Frank, 2006, <i>Justice Quarterly</i>	Systematic social observations of street-level officers	Cincinnati, OH	614 encounters	White officers were more likely to make an arrest than Black officers. However, when controlling for other factors, Black officers were more likely to arrest Black suspects than White officers. Community disorganization was not associated with arrest decisions for either Black or White officers.
Lanfear, Beach and Thomas, 2018, <i>Journal of City and Community</i>	Seattle Police Department Records Management System (RMS) incident reports	Seattle, WA	191,604 incidents	Crimes reported by White individuals in changing neighborhoods were more likely to result in the arrest of Black targets. Nonetheless, probable cause was more likely to be found with a Black reporter compared with a White reporter—with the exception of nuisance crimes.
Pyo, 2021. <i>American Review of Public Administration</i>	Uniform Crime Reporting (UCR)	US	142 local police departments from January 2013 to December 2016	To examine the effect of body-worn cameras (BWCs) on police arrest behaviors, the study used the UCR data from 142 local police departments between 2013 and 2016. The study showed that the “total arrest rates decreased to a small extent through the influence of BWC implementation” by decreasing misdemeanor arrest rates in municipalities with high crime rates or a high proportion of non-White residents.
Schuck, and Rabe-Hemp, 2019, <i>Race and Justice</i>	Law Enforcement Management and Administrative Statistics (LEMAS) survey	US	1218 US police departments	Community crime rate was associated with an increase in arrests for disorder, marijuana, drunkenness, and liquor law violations among Blacks. Community disadvantage and instability were associated with an increase in marijuana and liquor law arrests among Blacks.



Authors, Publication Year, and Journal	Study Design			Results
	Source	Location	Population	
Arrests				
Shooting				
Arnio, 2021, <i>Justice Quarterly</i>	Houston Police Department data of on-duty officer-involved shootings	Houston, TX	267 shooting incidents	The racial context (percent Black and percent Hispanic) of neighborhoods was observed to be associated with the propensity for officers to discharge their weapons, controlling for other factors.
Helms and Costanza, 2020, <i>Journal of Ethnicity in Criminal Justice</i>	Killed by Police database	US	3081 US counties	There was a positive association between the population size of Blacks or Hispanics and police killings.
Holmes, Painter, and Smith, 2018, <i>Justice Quarterly</i>	Supplementary Homicide Reports	US	230 cities	A one standard deviation increase in the Black dissimilarity index was associated with a 106.3% increase in the incidence of police fatal shootings. The ratio of minority officers to minority citizens was not related to police fatal shootings.
Johnson et al., 2019, <i>Social Science and Medicine</i>	Fatal Encounters, Killed by Police, and LEMAS	US	1762 fatal police shootings	Areas high in inequality had a 1.6 higher relative odds of police fatal shootings for men of color.
Menifield, Shin, and Strother, 2019, <i>Public Administration Review</i>	Killed by Police database	US	1952 nonaccidental fatal police shootings	There was no evidence that violent crime rates, poverty, or city size influence fatal shootings of racial/ethnic minorities. As the percentage of the Hispanic population increased in an area, victims of fatal shootings were increasingly likely to be Black, compared with White.
Mesic et al., 2018, <i>Journal of the National Medical Association</i>	Mapping Police-Involved Violence	US	50 states	A state racism index was created; for every 10 point increase in this index, the Black–White disparity ratio of police shootings of suspects unknown to be armed increased by 24%.
Pyo, 2022. <i>Urban Affairs Review</i>	Law Enforcement Management and Administration Survey (LEMAS), 2016 LEMAS Body-Worn Camera Supplement (LEMAS-BWCS), Uniform Crime Reporting (UCR)	US	326 US local police agencies	A one-unit increase in the percentage of Black officers was associated with a 2.1 percent decrease in the incident rate ratio (IRR) of police-involved deaths of Black residents. These findings suggest a negative association between the percentage of Black officers and police fatal shootings of Black residents.

Authors, Publication Year, and Journal	Study Design			Results
	Source	Location	Population	
Arrests				
Ross, 2015, <i>PLoS ONE</i>	US Police Shooting Database	US	721 cases	When subjects were armed, Blacks were 2.94 times more likely to be shot and Hispanics were 1.57 times more likely to be shot than Whites. When subjects were unarmed, Blacks were 3.49 times more likely to be shot and Hispanics were 1.67 times more likely to be shot than Whites.
Siegel et al., 2021. <i>Race and Social Problems</i>	Mapping Police-Involved Violence	US	The 75 most populous cities in the database	The study reported three significant predictors of the likelihood of any fatal police at census-tract, city, and state levels including “higher levels of economic disadvantage and general firearm violence” in the census-tract level, “lower proportion of Black residents, less overall racial residential segregation, and higher rates of property crime” at the city level, and “a higher gap between the Black and White population in educational attainment” at the state level.
Siegel, Sherman, Li, and Knopov, 2019, <i>Journal of the National Medical Association</i>	Mapping Police-Involved Violence	US	1354 fatal police shootings	Level of racial residential segregation was a significant predictor of the Black–White disparity in fatal police shooting rates at the city level. In a 5-year period, the overall rate of fatal police shootings was 21.9 per 100,000 for Black people, compared with 6.3 per 100,000 for White people, with an overall ratio of 3.5.
Smith, 2003, <i>Policy Studies Journal</i>	UCR and Supplemental Homicide Reports	US	179 cities	As the proportion of Black citizens increased in a city, the number of police fatal shootings increased. The proportion of minority citizens to officers was not statistically significant.
Ramey, and Steidley, 2018, <i>Criminology</i>	DoD’s Defense Logistics Agency Law Enforcement Support Office 1033 Program	US	11,764 local police departments	Law enforcement participation in the 1033 Program results from higher violent crimes and lower drug arrests. The minority threat also plays a role, as the agencies participating in the 1033 Program are in geographic areas with higher Black and Hispanic populations.

Authors, Publication Year, and Journal	Study Design			Results
	Source	Location	Population	
Arrests				
Stops/Frisks				
Briggs and Keimig, 2017, <i>Race and Justice</i>	Minneapolis Police Department proactive traffic stops	Minneapolis, MN	39,547 stops	Results indicate that stops of Black drivers were more likely to include a discretionary search than among White drivers with similar characteristics. These disparities increased with distance from a hot spot up to 1 mile, before slightly decreasing; however, disparities remain. Among stops closest to hot spots, young Black drivers were 2.4 more times likely to have a stop including a discretionary search than similar White drivers.
Baumgartner et al., 2020, <i>Policy Studies Journal</i>	Traffic stop data provided by Charlotte-Mecklenburg Police Department	Charlotte, NC	88,056 stops	White male officers were nearly 2 times more likely to conduct a fruitless search than other officers. Black male drivers were nearly 5 times more likely to be searched and 2.5 times more likely to be arrested than other drivers. Eight targeted characteristics were identified: Black, young, male, White officer, low years of service, investigatory stop, high search neighborhood.
Geller and Fagan, 2010, <i>Journal of Empirical Legal Studies</i>	New York Police Department UF-250 forms	New York City, NY	375 Precincts	Officers stopped Blacks on suspicion of marijuana possession at a rate of 14.83 per 1000 population; Hispanics were only stopped 5.41 times per 1000 population, and Whites were stopped only 1.96 times per 1000 population. Black and Hispanic precincts seem to be targeted for marijuana enforcement at levels above what legal justifications and other precinct characteristics would suggest are appropriate.
Hannon, 2020, <i>Race and Justice</i>	Stop and frisk data from Philadelphia police department	Philadelphia, PA	362,237 stops	Blacks were 1.9 times more likely to be frisked than non-Blacks. The odds of being frisked in areas wre violent crime were more pronounced in non-Black tracts.
Kramer and Remster, 2018, <i>Law and Society Review</i>	New York Police Department Stop, Question, and Frisk database	New York City, NY	2 million police stops	Precinct stop rates were not associated with police use of force, except stops that occur in high stop rate precincts when potential lethal force is used. Every 10% increase in percent Black or Hispanic residents was associated with a 4.2% increase in the odds of an officer drawing his gun during a stop.

Authors, Publication Year, and Journal	Study Design			Results
	Source	Location	Population	
Arrests				
MacDonald and Braga, 2019, <i>Justice Quarterly</i>	New York Police Department Stop, Question, and Frisk database	New York City, NY	77 precincts	From 2012 to 2015, stop, question, and frisk (SQF) reports by NYPD officers decreased dramatically, commencing after the Floyd et al. litigation. However, NYPD SQF reports remained higher in areas with higher levels of crime. Nevertheless, the findings suggest that court reforms can be an effective way to reduce racial disparities in SQF reports.
Newberry, 2021, <i>Applied Geography</i>	New York Police Department Stop, Question, and Frisk database	New York City, NY	544,540 stops	Crime was a significant predictor for stops of Black individuals. Gentrification was a significant predictor for stops of Hispanic individuals.
Novak and Chamlin, 2012, <i>Crime and Delinquency</i>	Kansas City Police Department	Kansas City, MO	70 police beats	Search rates increased in areas when the proportion of Black residents was higher. However, this was only true for White motorists. Social control increased when a motorist’s racial characteristics were inconsistent with the neighborhoods’ racial composition.
Roh and Robinson, 2009, <i>Police Quarterly</i>	Houston Police Department traffic stops	Houston, TX	333,760 traffic stops	Consistent with the minority-threat hypothesis, in diverse neighborhoods with greater Black or Hispanic residents, police force was more likely to be deployed. In addition, residents had a higher likelihood of being stopped and of receiving unfavorable police treatment. Racial profiling was also identified when pretextual stops in Black communities were used to investigate more serious offenses. Lastly, Hispanic residents were more likely to be searched by consent.
Rojek, Rosenfeld, and Decker, 2012, <i>Criminology</i>	St. Louis Metropolitan Police Department traffic stops	St. Louis, MO	69,543 traffic stops	In White communities, White officers were more likely to search Black drivers than White drivers. However, in predominately Black areas, stops of White drivers by White officers were the most likely to result in a search.
Stults, Parker, and Lane, 2010, <i>Journal of Crime and Justice</i>	Miami-Dade police department crime reports and US Census data	Miami-Dade, FL	61,000 police stops	Neighborhood racial composition and levels of violence were consistent predictors of stop rates among Black and Hispanics. However, because the majority of Whites in the Miami–Dade area are of Hispanic origin, the race-biased behaviors by police officers against the Hispanic population decreased. This suggests that Hispanic and White stop rates are nearly identical—unlike Black drivers that experience a higher stop rate.
Wilkins and Williams, 2008, <i>Public Administration Review</i>	San Diego Police Department traffic stops	San Diego, CA	168,901 stop forms	Median income of a division was negatively associated with racial disparity in vehicle stops. The proportion of White residents in a division was positively associated with racial disparity in vehicle stops.

Authors, Publication Year, and Journal	Study Design			Results
	Source	Location	Population	
Arrests				
Zhao, Yang, and Messner, 2019, <i>Journal of Crime and Justice</i>	New York Police Department Stop, Question, and Frisk database	New York City, NY	2074 census tract	Racial segregation and the likelihood of interacting with police differed based on the segregation dimension and race of suspects. Segregation increased the odds of the studied policing outcomes, making Blacks and Hispanics more vulnerable populations during police contacts.
Violence				
Ba, Knox, Mummolo, and Rivera, 2021, <i>Science</i>	Chicago Police Department stop and arrest records	Chicago, IL	2.9 million patrol assignments	Compared with White officers, Black officers less often stop, arrest, and deploy force against all civilians, specifically Black civilians. Effects were magnified in majority-Black areas.
Edwards, Esposito, and Lee, 2018, <i>American Journal of Public Health</i>	Fatal Encounters	US	6295 incidents	There was significant variation in expected rates of police fatal shootings across metropolitan area types, particularly among Black men. Large central and medium metropolitan areas had a relatively high expected rate of officer-involved fatal shootings of Black men.
Gaston, Fernandes, and DeShay, 2021, <i>Crime and Delinquency</i>	Mapping Police involved violence and UCR	US	580 counties	Regardless of race, violent crime and social disorganization were positively associated with police fatal shootings of men.
Lautenschlager and Omori, 2019, <i>Justice Quarterly</i>	New York Police Department Stop, Question, and Frisk database	New York City, NY	21,680 observations	Rates and degree of force used were higher and more severe in Black neighborhoods. There was higher low-level policing in poorer neighborhoods and fewer but more severe incidents in middle-income, mixed neighborhoods.
Lodge et al., 2021. <i>BMC Public Health</i>	Newborn Epigenetics Study (NEST)	Durham, North Carolina	2681 parent–child from 2005 to 2011	The study showed broad racial disparities in exposure to crime, e.g., the median White participant was exposed to only 3.6 violent crimes per km <sup>2</sup> within 800 m of residence during gestation, compared with 19.4 for the median Black participant.
Smith and Holmes, 2014, <i>Social Problems</i>	(1) LEMAS, (2) UCR, (3) CensusScope, and (4) US Census	US	218 cities	Findings offer support for the minority-threat hypothesis, which suggests that the percentage of Black and Hispanic residents is positively associated with the number of sustained excessive force complaints. In addition, place effects are contingent on the existence of a very high degree of racial/ethnic segregation.



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