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## Racial capitalism and firearm violence: Developing a theoretical framework for firearm violence research examining structural racism

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### Abstract

Despite the early promise of centering structural racism in explanatory models of firearm violence, there are noticeable gaps in what's been produced thus far; in particular, a deeper and more serious engagement with long-standing theories of racism is needed to further enrich our understanding of how structural inequalities produce unequal burdens of firearm-related harms. Thus, building on theories and concepts from a range of academic fields and Black philosophical perspectives, we developed a theoretical framework to help explain the role of place-based structural racism on firearm violence disparities. A central component of our framework is the concept *racial capitalism*, which contends that racial exploitation and the accumulation of assets depend on and reinforce one another. In this article, we present our framework and highlight how two processes related to racial capitalism—racialized dispossession and racialized spatial stigma—are connected with geographic disparities in firearm violence. We also present the results of an ecological cross-sectional study that reveals a potential key association between racial capitalism and firearm violence disparities on the neighborhood-level. We used a structural intersectionality approach and descriptive epidemiological methods to highlight and quantitatively describe spatial firearm violence disparities that could potentially be linked to the varying exposure of two dimensions of racial capitalism—historical redlining and contemporary racialized subprime mortgage lending.

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CRediT authorship contribution statement

**Mudia Uzzi:** Writing – review & editing, Writing – original draft, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Shannon Whittaker:** Writing – review & editing, Writing – original draft. **Michael H. Esposito:** Writing – review & editing, Writing – original draft. **Lorraine T. Dean:** Writing – review & editing, Writing – original draft. **Shani A. Buggs:** Writing – review & editing, Writing – original draft. **Keshia M. Pollack Porter:** Writing – review & editing, Writing – original draft.

We found that sustained disadvantaged census tracts (tracts that were historically redlined and experienced higher contemporary subprime lending) experienced the highest burden of firearm violence in Baltimore City between 2015 and 2019. Our research suggests that racial capitalism could potentially be a root cause of firearm violence disparities. A theoretical framework based on racial capitalism can inform the development and usage of indicators and analytic methods for racism-related firearm violence research. Moreover, this framework can identify factors to prioritize in equity-based violence prevention policies and programs.

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## 1. Introduction

There is increasing interest in examining the relationship between structural racism and firearm violence (Giles et al., 2020; Pollack and LaVeist, 2012; Rexing et al., 2020). Structural racism refers to “the totality of ways in which multiple systems and institutions interact to assert racist policies, practices, and beliefs about people in a racialized group” (Bailey et al., 2017; Dean and Thorpe, 2022). Two structural racism-related factors that have been of particular interest to injury prevention scholars are historical redlining and present-day racial segregation. During the Great Depression in the 1930s, the governmental agency Home Owners’ Loan Corporation (HOLC) developed the practice of redlining using HOLC grades to “spatially mark” neighborhoods based on their desirability for investment (Hillier, 2003). Through historical redlining, most neighborhoods with low-income housing stock and large populations of working-class people, immigrants, Black people, and other people of color were systematically classified as undesirable for investment (Nelson et al., 2020). The practice of historical redlining often had long-lasting effects on the level of resources, wealth, and quality of services within redlined neighborhoods (Aaronson et al., 2021). Recent redlining studies have shown that neighborhoods that were classified as “declining” or “hazardous” for investment have higher rates of present-day firearm violence compared to neighborhoods with better classifications (Jacoby et al., 2018; Mehranbod et al., 2022; Spitzer et al., 2023). Within the context of segregation, scholars have examined the relationship between racial segregation and firearm violence at different levels (e.g., city level, zip code level, census tract level) and utilize different dimensions of racial segregation (e.g., measures of racial concentration, evenness) (Kim, 2019; Krieger et al., 2017; Krivo et al., 2021). These segregation studies present a common trend that higher rates of racial residential segregation are also associated with increased levels of firearm violence (Kim, 2019; Krieger et al., 2017; Krivo et al., 2021). Historical redlining and racial residential segregation are two emblematic examples of the challenging social processes that have plagued many urban Black neighborhoods for decades. Segregated Black neighborhoods that were historically redlined have been socially, physically, and economically devalued and disinvested in, which has had a profound negative impact on multiple present-day health and social outcomes (Swope et al., 2022; Uzzi et al., 2023).

While there has been a growing amount of research investigating the relationship between structural racism and firearm violence, there are several gaps within the existing literature. First, the research in this nascent field has primarily consisted of studies that examined a single dimension of structural racism within their models (Jacoby et al., 2018; Kim, 2019; Krieger et al., 2017; Krivo et al., 2021; Mehranbod et al., 2022; Schleimer et al.,

2022; Spitzer et al., 2023). However, measures of structural racism based on a single dimension may not fully capture the complex and intertwined social processes that support and promote racism (Dean and Thorpe, 2022). Structural racism scholars recommend that multiple structural racism indicators be used when assessing the relationship between structural racism and an outcome of interest (Adkins-Jackson et al., 2022; Dean and Thorpe, 2022; Jahn, 2021). Second, while racial segregation is a useful indicator in approximating contemporary racial stratification from a spatial perspective, it only describes patterns of racism and does not capture the operationalization of racism via systems and institutions. Finally, there is a lack of theoretical and conceptual framing in the existing literature about how different forms of structural racism are linked to firearm violence within urban communities.

As interest in studying structural racism and firearm violence grows, there is a need to advance existing research by introducing a theoretical framework related to structural racism, structural economic inequality, and violence within urban communities that is based on a concept called *racial capitalism*. Racial capitalism captures how racism and capitalism mutually work together to shape people and the neighborhoods they live in (Dantzer et al., 2022; Robinson et al., 1983). Existing literature has established the profound manner in which racial and economic factors impact the risk of firearm violence within urban communities (Kim, 2019; Krieger et al., 2017; Lee and Ousey, 2007; Pino et al., 2023; Schleimer et al., 2022; Uzzi et al., 2023). Consequently, we believe that racial capitalism should be a guiding concept that undergirds a theoretical framework on urban firearm violence. In this article, we present a theoretical framework to describe the relationship between racial capitalism and firearm violence. The remainder of the introduction section will outline what racial capitalism is and describe how racial capitalism undergirds our framework constructs. Baltimore City is an important place to examine the relationship between racial capitalism and firearm violence for several reasons. Firearm violence is a major public health problem in Baltimore City. Over 7000 shootings occurred in Baltimore City between the death of Freddie Gray in 2015 and the end of 2023 (Open Baltimore). Moreover, Baltimore City recently experienced its highest homicide rate on record at 57 per 100,000 people, and between 2015 and 2022, Baltimore City had eight consecutive years with over 300 homicides (Open Baltimore). There is a great need to investigate potential structural drivers of firearm violence in Baltimore City given the numerous forms of historical and contemporary racism that have impacted Black residents and communities. In 1910, the Baltimore City Council passed *Baltimore City Ordinance 610*, making it the first city in the nation to pass a law to enforce racial residential segregation (Boger, 2009; Power, 1983). Moreover, in the intervening years between the passage of this ordinance and today, public and private institutions on the local and national levels have enacted and engaged in both overt and insidious racist policies and practices, which ultimately have had a negative impact on the social and economic well-being of Black residents and communities in Baltimore City (Brown, 2021; Pietila, 2012).

### 1.1. Racial capitalism

Racial capitalism is a concept that posits that the accumulation of capital is mutually constituted with racialized exploitation and expropriation (Robinson et al., 1983). The

concept was first conceived by South African anti-apartheid activists and scholars in the 1970s and popularized in the United States by Black studies scholar Cedric Robinson as a response to debates within the sociology field about the role of racism with inequality (Levenson and Paret, 2022; Robinson et al., 1983). Robinson and other scholars of the Black radical tradition viewed racism and capitalism as inseparable, which was in opposition to the prevailing ‘Europeanist’ view of capitalism as ‘colorblind’ (Dantzler et al., 2022; Robinson et al., 1983). In the intervening years, scholars from different fields have engaged with the concept of racial capitalism to extend, challenge, and revise prevailing theories and methods within their respective fields (Dantzler et al., 2022; Dantzler, 2021; Fortner, 2021; Laster Pirtle, 2020; Mustafa and Dawson, 2021; Petteway, 2022; Rodríguez, 2020; Whitley, 2022). Recently, public health researchers have shown interest in integrating racial capitalism in their work, largely in response to the COVID-19 pandemic (Laster Pirtle, 2020; McClure et al., 2020; Petteway, 2022). For example, Laster Pirtle (2020) suggests that racial capitalism is a fundamental cause of the inequities related to the COVID-19 pandemic in the United States for several reasons, including that it shapes access to resources and replicates historical patterns of inequity (Laster Pirtle, 2020).

Racial capitalism can operate on different socioecological levels of influence; our theoretical framework focuses on racial capitalism within the community/neighborhood level. The existing literature from the fields of urban sociology and Black geographies—an academic subfield of geography that centers blackness in the study of spatial formation—is particularly useful in delineating the community and spatial nature of racial capitalism (Dantzler et al., 2022; Gilmore, 2002; Hawthorne, 2019; Pulido, 2017). The interaction of race, place, and violence has played a foundational role in U.S. economic growth. Chattel slavery, along with the genocide of Indigenous peoples and subsequent dispossession of their native lands, are embedded in America’s social, economic, and political fabric (Bledsoe and Wright, 2019; Gilmore, 2002). Moreover, emerging research from urban sociology and Black geographies describes the influence of racial capitalism on processes that assist in the maintenance of continual private profit accumulation and socioeconomic inequality within cities (Bledsoe and Wright, 2019; Card, 2020; Dantzler, 2021; Rucks-Ahidiana, 2021). In particular, the concepts of race, racialization, and differentiation inform urban processes that shape the social and economic development (or lack thereof) of urban spaces (Bledsoe and Wright, 2019; Card, 2020; Dantzler, 2021; Rucks-Ahidiana, 2021). This emerging research has informed our study’s conceptual framework that links structural racism to firearm violence. In particular, our study’s theoretical and conceptual framework incorporates two major themes of spatialized racial capitalism: 1) racialized spatial stigma and 2) racialized dispossession.

## 1.2. Racialized spatial stigma

The first racial capitalism process related to our theoretical framework is racialized spatial stigma. Keene and Padilla (2014) define spatial stigma as “negative representations of space” (Keene and Padilla, 2014). The concept of spatial stigma was informed by existing social science literature that described how symbolic meanings are attached to places (Duncan and Kawachi, 2018; Wacquant, 2007). Within the context of American urban environments, the social construction of place is often informed by race (Gilmore, 2002;

Hawthorne, 2019; Lipsitz, 2007). Low-income and working-class Black neighborhoods are frequently regarded as “bad neighborhoods.” For example, a study by Sampson and Raudenbush (2004) found that the perception of neighborhood disorder varied based on a neighborhood’s racial composition (Sampson and Raudenbush, 2004). Black neighborhoods with the same levels of disorder as White neighborhoods were perceived as having more disorder compared to those White neighborhoods (Sampson and Raudenbush, 2004). Research literature from Black geographies and urban sociology extends our understanding of spatial stigma as it foregrounds the role of racial capitalism in spatial stigma. This scholarship emphasizes the mutual significance of the *symbolic* along with the *material* in the maintenance of spatialized racial capitalism (Gilmore, 2002; Hawthorne, 2019). Within urban environments, there is a mutual dependence between racist ideology and neoliberal economic ideology to ensure continual capital accumulation for “rent-seeking” and ‘profiteering’ private actors (Ashton, 2012; Dantzer, 2021; Immergluck et al., 2020). Ruth Wilson Gilmore, a prominent Black geographies scholar, contends that “Capitalism requires inequality and racism enshrines it” (Card, 2020). The combined spatial and racial stigmatization of Black urban neighborhoods has been a powerful tool to justify many urban processes and practices including de facto and de jure segregation, the devaluation of housing in Black neighborhoods, and urban decline in American cities (Dantzer, 2021; Immergluck et al., 2020). Several studies of racial capitalism scholarship have interrogated how prominent institutions and individuals (including politicians, the police, the media, and universities) have used racialized spatial stigma and associated perceptions of “racial threat” to gain money, land, and power (Akbar, 2018; Gomez, 2012; Loyd and Bonds, 2018; Mollett and Faria, 2018; Phinney, 2022; Riley et al., 2024; White et al., 2021). For example Brown (2021) highlights the role that the Federal Highway Administration (FHA) played in creating and shaping White suburbs and “Black ghettos” in Baltimore City through the construction of superhighways in the 1940s and 1950s (Brown, 2021). This led to the development of wealthy White neighborhoods with exclusionary zoning in the suburbs surrounding Baltimore City while simultaneously shaping demonized urban areas in the city where low-income Black Baltimoreans were concentrated. The racialized stigmatization of Black neighborhoods ultimately led to the usage of eminent domain by the FHA to build federal highways. The FHA’s usage of eminent domain resulted in the dispossession of Black Baltimoreans’ homes and the displacement of Black Baltimorean families. The FHA’s work has rarely been beneficial to Black Baltimore residents and has often led to the destruction of Black Baltimore neighborhoods, including the construction of a 1.3 mile 6-lane expressway fragment in Baltimore City called “Highway to Nowhere” (Phillips de Lucas, 2020). This highway fragment was once the site of several bustling Black neighborhoods.

### 1.3. Racialized dispossession

The second process of racial capitalism related to our theoretical framework is racialized dispossession. Urban sociologist Prentiss Dantzer offers an insightful overview of racial capitalism and racialized dispossession specifically. Dantzer (2021) describes dispossession as “the explicit taking of both physical land and property and the erasure of symbolic forms of occupation” (Dantzer, 2021). Dantzer and other urban sociology scholars argue that within urban spaces, dispossession is an intentional process driven by those with economic

and political power (Dantzer, 2021; Gilmore, 2002; Mollett and Faria, 2018). These scholars notably contend that the process of dispossession has a “racial character,” where residents and neighborhoods within a city are “racially marked” (Dantzer, 2021; Gilmore, 2002; Mollett and Faria, 2018; Rucks-Ahidiana, 2021). This allows for private and public institutions to use different modalities to both exploit and (de)value the assets of residents and neighborhoods on a racialized basis (Dantzer, 2021; Rucks-Ahidiana, 2021). Modalities for dispossession have included real estate (e.g., redlining, foreclosures), city planning (e.g., exclusionary zoning) and government policy (e.g., eminent domain) (Bledsoe and Wright, 2019; Dantzer, 2021; Fields and Raymond, 2021; Fullilove and Wallace, 2011; Markley et al., 2020; Saegert et al., 2011). The dispossession of assets in Black neighborhoods has been a particular issue in Baltimore City. In the book *The Black Butterfly*, Lawrence Brown describes how various practices, such as redlining, blockbusting, urban renewal, and subprime mortgage lending (i.e., expensive mortgage loans that have higher interest rates) have extracted wealth and resources from Black neighborhoods (Brown, 2021). Neighborhood housing instability has been an issue for both middle-class and low-income Black Baltimore neighborhoods due to banks intentionally targeting Black borrowers across economic class with subprime mortgages (Massey et al., 2016; Rugh et al., 2015). As a result of the high levels of racialized subprime mortgage lending, Black neighborhoods were more likely to have higher foreclosure rates compared to other neighborhoods (Mallach and Harrison, 2021; Rugh and Massey, 2010). Researchers estimate that by 2012, Black borrowers in Baltimore City had lost at least \$2 million in home equity due to the subprime mortgage crisis (Rugh et al., 2015).

#### 1.4. Investigating the relationship between racial capitalism and firearm violence

In this article, we present the results of a descriptive epidemiological study that takes a structural intersectionality approach to highlight an example of the relationship between racial capitalism and firearm violence. Structural intersectionality is an emerging research approach within intersectionality literature that highlights the impact of intersecting systems of oppression on population health through the examination of social inequities within large-scale institutions (Homan et al., 2021). This structural approach is in alignment with the theoretical framing of interlocking systems of oppression by early intersectionality scholars (Collins, 2019; Combahee River Collective, 1977; Crenshaw, 1990) and extends beyond commonly used intersectionality analytical approaches that only examine the intersection of individual-level social statuses. One major benefit of a structural intersectionality approach is that it provides researchers the opportunity to better understand and explore how the social context of systems of oppression—such as structural racism and classism—can vary by time and place (Homan et al., 2021). Subsequently, scholars can identify the indicators related to social contexts and assess potential relationships between these indicators and health/social outcomes.

To incorporate a structural intersectionality approach in our study, we identified two indicators of racial capitalism 1) historical redlining and 2) subprime mortgage lending. These racial capitalism indicators will highlight two intersecting systems of oppression—structural racism and structural economic inequality—across time and within Baltimore City. As mentioned previously, historical redlining was a practice in the 1930s that



“spatially marked” neighborhoods based on their desirability for investment (Hillier, 2003). To operationalize redlining, we utilized HOLC grades from Baltimore’s 1937 “residential security map” (i.e., redlining map). Subprime mortgage lending is the practice of providing mortgage loans that have higher interest rates and are more expensive to pay off than standard mortgage loans (Mayer and Pence, 2008). The Home Mortgage Disclosure Act (HMDA) characterizes subprime mortgage loans as home loans with an interest rate of three percentage points over the United States Treasury Department benchmark (Mayer and Pence, 2008). To operationalize subprime mortgage lending, we used Baltimore City HMDA data from 2004 to 2006. In the existing literature, the years 2004–2006 are widely accepted as the peak years of the subprime lending era (Hall et al., 2015; Hyra et al., 2013; Rugh et al., 2015). Using data from the height of the subprime lending era in our analysis allows for an examination of the racial capitalist nature of subprime mortgage lending at its most unrestrained state.

We are interested in examining the interaction of redlining and subprime lending for several reasons. First, both subprime lending and redlining capture the two components of racial capitalism that form the basis of our conceptual framework: racialized spatial stigmatization and racialized dispossession. Second, we were interested in utilizing a “life-course” approach to study structural racism and firearm violence (Adkins-Jackson et al., 2022; Kuh et al., 2003). This approach involves examining a neighborhood’s trajectory of racial capitalism over a wide span of time (i.e., 1930s to mid-2000s). Different neighborhoods in Baltimore may have seen their relative level of racial capitalism increase, decrease, or remain the same over this period. In capturing this change in racial capitalism over time, we will be able to assess the enduring impact of housing-based structural racism and racial capitalism on firearm violence spatial disparities in Baltimore City. We also intentionally chose the time points of our two dimensions of structural racism. Both the 1930s and the 2000s are what spatial life-course scholars would consider to be important transitional points in the developmental history of neighborhoods in our study (Cummins et al., 2007; Lekkas et al., 2017; Pearce, 2018). A transitional point in the context of our study is a time period where experiencing racism would have a disproportionate or significant influence on a neighborhood’s long-term development and subsequent risk of firearm violence. When considering the manifestations of spatialized racism and racialized capitalism in the U.S., the 1930s and 2000s were critical periods for multiple reasons. First, both the 1930s and 2000s were temporally proximate to two of the most significant financial crises in America’s history (i.e., the Great Depression and the Great Recession). Second, both the 1930s and 2000s were time periods where public and private institutions were heavily engaged in the housing market (Immergluck, 2011; Reid et al., 2017). Private banks, through their predatory inclusionary lending, and HOLC, via its federally-backed loans, had the potential to enact both racialized dispossession and racialized spatial stigma towards Black neighborhoods in a powerful and almost unfettered manner (Hillier, 2003; Reid et al., 2017; Swan, 2020; Taylor, 2019). Finally, to get a better understanding of the interaction among different dimensions of racism, we are interested in capturing processes where multiple institutions enact spatialized racism. This is aligned with emerging best practices of structural racism measurements that capture the broad and systemic ways in



which multiple institutions interact together to reinforce disparities in health and social outcomes (Adkins-Jackson et al., 2022; Brown and Homan, 2022; Dean and Thorpe, 2022).

In addition to the conceptual reasons stated above, we chose to use racialized subprime mortgage lending from 2004 to 2006 as we were interested with incorporating a sufficient temporal lag between the subprime lending era and the outcome period (2015–2019) to capture the accumulation of the negative physical and social environment impacts potentially associated with racial capitalism via subprime lending. A major factor associated with a neighborhood's negative physical and social features is vacant homes and hypervacancy (i.e., a phenomenon where “abandonment, vacant homes, and vacant lots are a dominant feature of a neighborhood's physical landscape”) (Mallach, 2018). There was an extended time period of high foreclosure levels during and following the subprime lending crisis which contributed to a vacancy and hypervacancy crisis in Maryland, and Baltimore City specifically (Harrison and Immergluck, 2023; Rugh et al., 2015; Rugh and Massey, 2010). The rate of foreclosures in Maryland reached its peak in 2010 and the foreclosure rate did not reach pre-subprime lending era levels until the mid-2010s (Mallach and Harrison, 2021; Maryland Foreclosure Task Force, 2012).

A conceptual model visualizing our view of the relationship between racial capitalism and firearm violence is in Fig. 1. In the conceptual model, we propose that the processes of racialized spatial stigma and racialized dispossession interact with one another and are connected to firearm violence via neighborhood environmental factors (i.e., neighborhood built and social environment). This conceptual model is informed by theories and concepts from a range of fields, including sociology, geography, legal studies, and criminology. Existing literature suggests that racial capitalism processes like dispossession and spatial stigmatization may impact the neighborhood built and social environment (Brown, 2021; Gonzalez and Mutua, 2022; Rothstein, 2017; Taylor, 2019). Furthermore, previous studies have examined the relationship between neighborhood environmental factors and firearm violence. These studies have shown that neighborhoods with higher levels of neighborhood environmental factors like foreclosure, vacant housing, and lower levels of collective efficacy have an increased risk for firearm violence (Branas et al., 2013; Cui and Walsh, 2015; Sampson et al., 1997).

The objective of this journal article is to present a novel theoretical framework that offers a conceptualization of the relationship between racial capitalism and firearm violence within the context of neighborhoods in the United States. Moreover, we present a descriptive epidemiological study that assesses selected components of this framework. In our study we describe how two forms of past and present housing-based racial capitalism—redlining and racialized subprime mortgage lending—are potentially related to firearm violence in Baltimore City. We hypothesize that the burden of firearm violence will be highest in neighborhoods that experienced high sustained levels of racial capitalism.

## 2. Methods

We performed an ecological cross-sectional study of firearm violence in Baltimore City, Maryland. We excluded 54 of Baltimore City's 200 census tracts from our analyses. Of the

54 tracts excluded, 49 tracts were excluded because a majority of the tract's land mass was not covered by one HOLC grade, and three tracts were excluded because of a major spatial mismatch between the year 2000 census tract geographies (linked to subprime lending data) and the year 2010 census tract geographies (linked to redlining and firearm violence data). Two additional tracts were excluded as they did not contain residential zoning. Our final dataset included 146 census tracts. The primary outcome was the 2015–2019 firearm violence data (nonfatal shootings and fatal shootings) provided by the Baltimore Police Department. A total of 4875 shootings (3432 nonfatal and 1443 fatal) were geocoded and aggregated to the census tract level. To calculate the firearm violence rate, we divided the total number of firearm violence incidents in a census tract by its total population in the 2019 5-year US Census Bureau's American Community Survey (ACS). We scaled our rates to annualized rates per 10,000 residents (the size of a large neighborhood).

For historical redlining, we dichotomized the HOLC grades from the 1937 Baltimore residential security map (Nelson et al., 2020). We operationalized our redlining construct based on whether the census tract's HOLC grade would be considered desirable (or not) for home loans and investment. Census tracts with high HOLC grades of 'A' and 'B' (areas that were viewed by HOLC assessors as being the 'best' and 'still desirable' for investment) were defined as having no redlining. Conversely, census tracts with low HOLC grades of 'C' and 'D' (areas that were viewed by HOLC assessors as being 'definitely declining' and 'hazardous' for investment) were defined as having high redlining.

For subprime mortgage lending, we generated tract-level Index of Concentration at the Extremes (ICE) scores, using mortgage loan-level data from the Home Mortgage Disclosure Act (HMDA) database from 2004–2006 (Avery et al., 2007). To generate a tract's ICE score, within a geographic area, we tabulated the difference in the number of borrowers in the tract that were most advantaged by race and loan status (non-Hispanic White borrowers with prime loans—i.e., loans with cheaper, competitive rates) from the number of borrowers in the tract that were most disadvantaged by race and loan status (non-Hispanic Black borrowers with subprime loans) and this number was divided by the total number of loans disbursed within the tract. Our study's ICE scores can be viewed as a proxy for area-level racial capitalism by banks and other lending institutions due to racialized subprime mortgage lending. We utilized racialized subprime mortgage lending ICE scores due to our interest in the way that race and mortgage loan status intersect to influence neighborhood-level disparities in dispossession and stigma. Census tracts with an ICE score above the median split were defined as having high ICE scores (greater advantage and lower racialized subprime lending), and tracts with scores below the median split were defined as having low ICE scores (greater disadvantage and higher racialized subprime lending).

We used a cross-classification method of the redlining and subprime lending variables to generate four intersectional groups that describe the different neighborhood trajectories of racial capitalism in Baltimore City (Fig. 2): 1) Sustained advantaged (census tracts that were not historically redlined and experienced lower racialized subprime lending); 2) Sustained disadvantaged (tracts that were historically redlined and experienced higher racialized subprime lending); 3) Contemporary advantaged (tracts that were historically

redlined and experienced lower racialized subprime lending); 4) Previous advantaged (tracts that were not historically redlined and experienced higher racialized subprime lending).

We used three measures of additive interaction (joint disparity, excess intersectional disparity, and the attributable proportion of excess intersectional disparity) to describe neighborhood-level firearm violence disparities (Bauer et al., 2021; Jackson et al., 2016). The joint disparity describes the difference in average annual firearm violence rate during the study period (2015–2019) when comparing the sustained disadvantaged tracts and sustained advantaged tracts. The excess intersectional disparity describes the magnitude to which the intersection of redlining and racialized subprime lending contributes to the joint disparity outcome (as opposed to the contribution of redlining alone or subprime lending alone). The attributable proportion of excess intersectional disparity describes the proportion of firearm violence within sustained disadvantaged tracts that can be explained by the intersection of redlining and subprime lending. The results of our additive interaction measures were derived from calculations that used the firearm violence rate averages of our intersectional groups (Jackson et al., 2016). We used a bootstrapping procedure to compute estimated confidence intervals for each additive interaction measure. We performed descriptive additive interaction calculations to identify potential health inequities in firearm violence and did not adjust for other factors (Bauer et al., 2014). Scholars of intersectionality research have reported that additive interaction measures have greater public health relevance in comparison to other interaction scales as additive interaction analyzes absolute effects (Bauer et al., 2014; Jackson, 2021; Jackson et al., 2016).

### 3. Results

Of the study's 146 census tracts, 34% were classified as sustained disadvantaged, 16% were sustained advantaged, 32% were contemporary advantaged, and 18% were previous advantaged. A map of Baltimore City's intersectional groups is in Fig. 3. As shown in the map, the tracts tend to cluster by intersectional group. The sustained disadvantaged tracts (in purple) tend to cluster in east and west Baltimore, while the sustained advantaged tracts (in yellow) tend to cluster in north and northeast Baltimore. Moreover, the contemporary advantaged tracts (in green) tend to cluster around the Baltimore harbor and downtown area, while the previous advantaged tracts (in blue) tend to cluster in north-west Baltimore. In Table 1, we present a selection of the firearm violence and socioeconomic descriptive statistics of the intersectional groups to highlight the similarities and differences between the groups. The mean yearly average total shooting rate was 19 per 10,000 residents (range 0–81 per 10,000 residents). For the four intersectional groups, the mean annualized total shooting rates per 10,000 residents were as follows: sustained disadvantaged: 42, previous advantaged: 18, contemporary advantaged: 12 and sustained advantaged: 5.

Within existing literature, these socioeconomic indicators have commonly been associated with structural racism and/or firearm violence (Branas et al., 2013; Jones-Webb and Wall, 2008; Krivo et al., 2021; Marineau et al., 2024; Rowhani-Rahbar et al., 2019). Of the four intersectional groups, the sustained disadvantaged group was the most vulnerable on key socioeconomic indicators, including, vacant housing percentage, poverty, college-educated percentage, and median household income. We used a map (Fig. 4) to display the high

burden of total shootings in sustained disadvantaged tracts (highlighted in red). These tracts, which cluster in east and west Baltimore, tend to have higher total shooting rates (darker gray color) in comparison to other tracts.

With regards to our measures of additive interaction (Table 2), the joint disparity of total shootings was 37 per 10,000 residents, meaning that a sustained disadvantaged tract of 10,000 residents had on average 37 more shootings a year compared to a similarly populated sustained advantaged tract. The excess intersectional disparity for total shootings was 17 per 10,000 residents. This suggests that in a sustained disadvantaged census tract of 10,000 residents, the intersection of redlining and subprime mortgage lending results in an excess of 17 shootings a year. Moreover, we found the attributable proportion of excess intersectional disparity was 40%, indicating that two-fifths of the overall total shooting rate in sustained disadvantaged census tracts potentially could be linked with the intersection of redlining and racialized subprime lending.

#### 4. Discussion

Our study found that the intersection of historical redlining and racialized subprime lending is related to spatial firearm violence inequities within Baltimore City. There was a large disparity in firearm violence rates when comparing sustained advantaged and sustained disadvantaged census tracts. We found that sustained disadvantaged census tracts are highly burdened with firearm violence. A sustained disadvantaged tract of 10,000 residents had on average, over three more shootings a month compared to a similarly sized sustained advantaged tract. Our study results suggest that the intersection of redlining and subprime mortgage lending specifically could have potentially played a large role in explaining the firearm violence rate gap between sustained advantaged and sustained disadvantaged tracts. Within a sustained disadvantaged neighborhood over one year, there was on average 17 additional shootings (40% more) than what we would expect specifically due to the interplay between historical and contemporary racial capitalism. Moreover, 902 of the 2279 shootings that occurred in sustained disadvantaged tracts between 2015 and 2019 could potentially be associated with the intersection of redlining and subprime mortgage lending. These results suggest that in sustained disadvantaged tracts, the contributors to shootings go beyond the contemporary neighborhood landscape. Our findings also emphasize the importance of considering the trajectory of racial capitalism over an extended amount of time when investigating potential structural determinants of firearm violence inequities.

To our knowledge, this is the first study to explicitly incorporate a racial capitalism theoretical framework to investigate the relationship of intersecting structural factors with neighborhood-level firearm violence. Our results align with previous research that links high redlining and socioeconomic disadvantage with higher violence rates (Jacoby et al., 2018; Krieger et al., 2017; Krivo et al., 2021; Schleimer et al., 2022; Uzzi et al., 2023).

We used a structural intersectionality approach to examine the interplay between two dimensions of racial capitalism (historical redlining and subprime mortgage lending) and spatial disparities of firearm violence in Baltimore City. Through this intersectional approach, we observed a dose-response relationship between exposure to racial capitalism

and average firearm violence rates among our intersectional groups. Our results show that tracts exposed to the highest levels of racial capitalism at the transitional periods of historical redlining in the 1930s and during the height of the 2000s subprime lending era (sustained disadvantaged group) had on average firearm violence rates that were 8 times higher compared to tracts exposed to the lowest levels of racial capitalism at these transitional periods (sustained advantaged group). The contemporary advantaged group and the previous advantaged group had similar average firearm violence rates to each other, which fell in between the rates of the two other intersectional groups.

While our study focused on assessing the relationship between racial capitalism and firearm violence within Baltimore City, our findings can be relevant and generalizable to other cities across the United States. During (and between) our study's two transitional periods—the Great Depression (1930s) and the Great Recession (mid-2000s)—a broad swath of institutions nationwide engaged in structural racist practices that promoted unfettered racial capitalism (Aaronson et al., 2021; Fields and Raymond, 2021; Whittaker et al., 2023). The institutions engaged in racial capitalism included public actors—e.g., HOLC implementing redlining; private actors—e.g., banks engaging in predatory subprime mortgage lending and foreclosures; and, non-profit actors—e.g., universities engaging in land-banking of land in low-income Black neighborhoods (Gomez, 2012; Rothstein, 2017; Taylor, 2019). Previous nationwide studies have outlined adverse social, economic and health-related outcomes that historical redlining and subprime mortgage lending has had on Black communities (Graetz and Esposito, 2023; Hyra et al., 2013; Mujahid et al., 2021). As a result of these and other racial capitalist practices, Black people and Black neighborhoods across the country have experienced the racialized dispossession of their assets and have been subjected to intense racialized spatial stigmatization. To adequately challenge racial capitalism, it is imperative that we address the underlying systems and forces of racial and economic exploitation, target the formal and informal interconnections between institutions that enact racial capitalist processes and policies as well as engage with community-led advocacy efforts to transform the built and social environment of neighborhoods disadvantaged by racialized processes (Creary, 2021; Gee and Hicken, 2021). There are several community-based organizations in Baltimore City that are leading the effort to challenge housing-based racial capitalism, including Black Women Build Baltimore, the Black Butterfly Project, Parity Homes, and the Stop Oppressive Seizures Fund (SOS Fund).

Our study limitations should be noted. First, there was a census tract geography mismatch among our different datasets as our data spanned two decennial censuses (2000 and 2010). We aggregated redlining and firearm violence data using Baltimore City's 2010 census tract geography and the subprime mortgage lending data was linked to the 2000 census tract geography. Census tract boundaries often change between each decennial census. While most of Baltimore City's census tract boundaries remained the same between 2000 and 2010, there were three census tract boundaries that changed significantly, and so we excluded them from our analysis. Future intersectional spatial analyses could use a range of areal interpolation methods to resolve issues of geography mismatch (Walker, 2022). A second issue is that there was a significant number of mortgage loans in our HMDA dataset that did not have the race category filled out and therefore were classified as unknown race (around 15%). For loans to be included in our subprime ICE scores,

they had to be from Black borrowers or White borrowers. We do know that unknown borrowers had a high percentage of subprime loans (54%). If the actual race of unknown borrowers were biased to be White borrowers or Black borrowers, this could impact our results and the interpretation of our findings. Finally, given that we conducted a descriptive epidemiological study, we only investigated selected components of our conceptual model (e.g., racialized dispossession, racialized spatial stigma, and firearm violence). Future studies could incorporate neighborhood environmental factors such as vacant housing to investigate the full conceptual model. This line of research could help specify the relationship between racial capitalism and firearm violence, particularly how the relationship between racialized social processes and firearm violence is mediated or moderated by the built and social environment.

Overall, we used an intersectional approach to illustrate how two interlocking processes related to structural racism—redlining and subprime mortgage lending—are related to firearm violence inequities in Baltimore City. Our theoretical framework highlighted the role of racial capitalism in structuring neighborhoods and producing spatial inequities of firearm violence in Baltimore City. Our study is part of a growing number of studies that simultaneously examine redlining along with contemporary social categories of advantage/oppression (Graetz and Esposito, 2023; Lynch et al., 2021; Swope et al., 2022; Uzzi et al., 2023). This represents a progression in the field of structural racism research and is aligned with the emerging consensus on best practices for structural racism measurement. To further extend research on racial capitalism and firearm violence, we need to delineate the causal pathways between these two constructs. The additive interaction measures used in our study are primarily descriptive. This type of research is mainly interested in identifying violence inequalities and revealing real-world risks of firearm violence. Future research studies can extend our descriptive epidemiological research by utilizing spatio-temporal regression modeling to determine causal pathways between multiple dimensions of structural racism (racial capitalism) and firearm violence. Our theoretical understanding of the relationship between structural racism and firearm violence will also improve with greater delineation of its causal pathway.

Similar to Uzzi et al. this study took a descriptive epidemiological analytic approach to investigate the relationship between structural racism and neighborhood-level firearm violence outcomes (Uzzi et al., 2023). This study extends on Uzzi et al. as it examines both fatal and nonfatal shootings and utilizes a contemporary measure of structural racism that captures the operationalization of racist ideology within housing-related institutions (i.e., predatory lending by banks to Black Americans in the form of subprime mortgage lending). Moreover, this study incorporates a theoretical framework that explains how racial capitalism could potentially shape spatial firearm violence inequities. Engaging with theories of racism is incredibly important within firearm violence research as theoretical frameworks on the causes of violence often drive the types of policy solutions implemented within neighborhoods. As prominent sociologist Darnell Hawkins notes, “social theory and public policy are inextricably linked” (Hawkins, 1993). There are several examples of past debunked theories of violence based on frameworks that have pathologized Black Americans—e.g. research on superpredators and the Black underclass. These theoretical frameworks led to and substantiated policies such as the stop and frisk, zero-tolerance



policing, and the three-strikes law which have largely had harmful and traumatic impacts on Black people and Black communities throughout the US (Edwards et al., 2019; Jackson et al., 2019; Theall et al., 2022). With the renewed interest in structural racism and firearm violence, researchers have the opportunity to engage with Black philosophical perspectives and academic scholarship from a range of fields, including history, ethnic studies, urban sociology, legal studies, Black criminology, and Black geographies to establish robust theoretical, methodological, and analytical frameworks for research on racial capitalism, structural racism, and firearm violence. Utilizing theoretical frameworks informed by philosophical perspectives from scholars of color and robust descriptive and inferential analytic approaches, such as additive interaction, mediation, multi-level, or causal decomposition modeling, would allow public health researchers and practitioners to 1) identify and measure the social, structural, and economic forces that influence the diverging trajectories of different neighborhoods; 2) identify sites of intervention for firearm violence prevention solutions; and 3) partner with policymakers, advocates and practitioners to develop and evaluate programs and policies that address the root causes of firearm violence, including structural racism and racial capitalism and prioritize health equity and racial justice.

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## Data availability

The authors do not have permission to share data.

## References

- Aaronson D, Hartley D, Mazumder B, 2021. The effects of the 1930s HOLC “redlining” maps† [article]. *Am. Econ. J. Econ. Pol* 13 (4), 355–392. 10.1257/pol.20190414.
- Adkins-Jackson PB, Chantarat T, Bailey ZD, Ponce NA, 2022. Measuring structural racism: a guide for epidemiologists and other health researchers. *Am. J. Epidemiol* 191 (4), 539–547. 10.1093/aje/kwab239 [Review]. [PubMed: 34564723]
- Akbar AA, 2018. Toward a radical imagination of law [Article]. *N. Y. Univ. Law Rev* 93 (3), 405–479. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85044004229&partnerID=40&md5=f343fffad1af67e6e8fb3a986eae1836>.
- Ashton P, 2012. ‘Troubled assets’: the financial emergency and racialized risk. *Int. J. Urban Reg. Res* 36 (4), 773–790. 10.1111/j.1468-2427.2011.01077.x [Article].



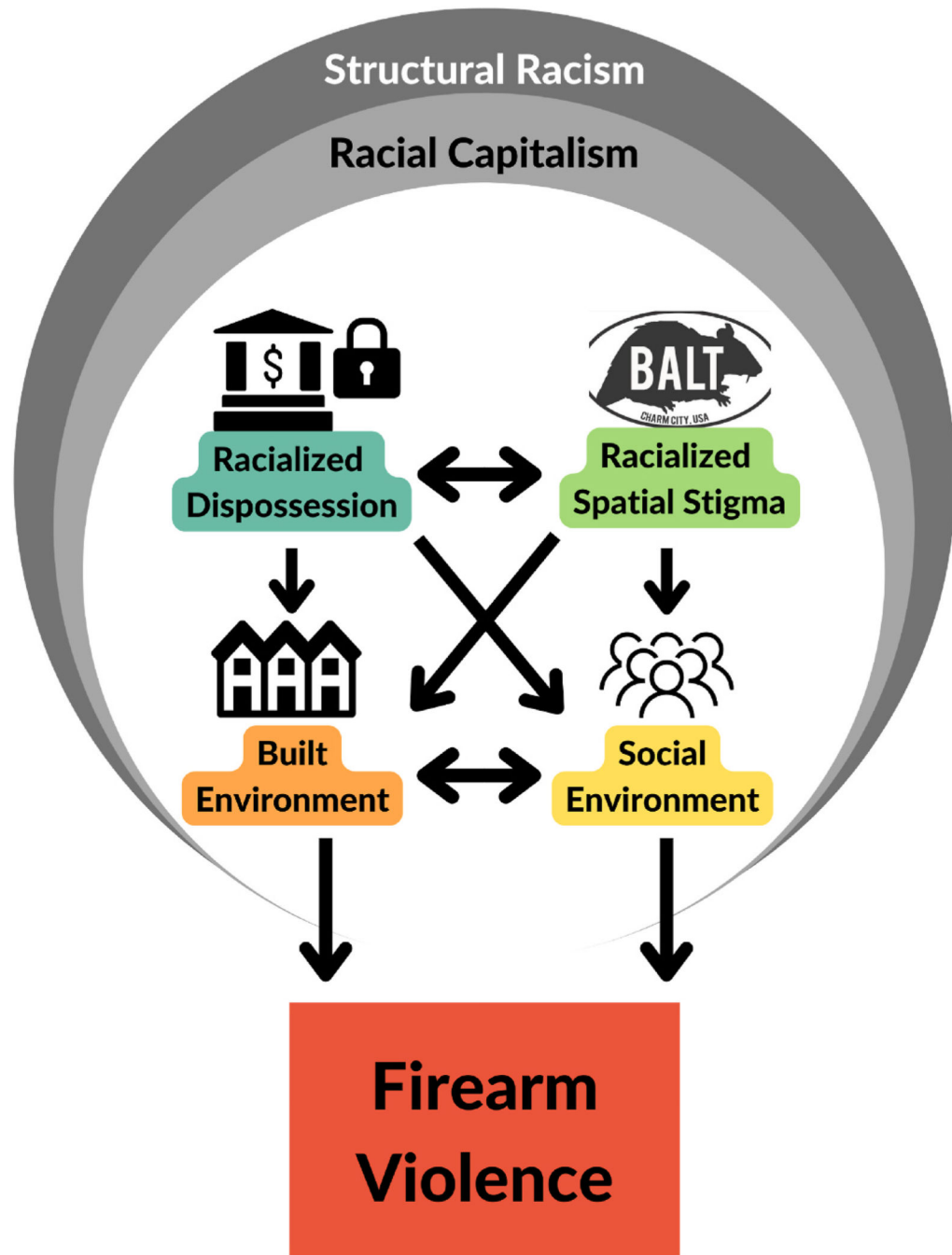
- Avery RB, Brevoort KP, Canner GB, 2007. The 2006 HMDA data. *Federal Reserve Bulletin*, Board of Governors of the Federal Reserve System (U.S.) 93 (Sep), 73–109. 10.17016/bulletin.2007.93.
- Bailey ZD, Krieger N, Agenor M, Graves J, Linos N, Bassett MT, 2017. Structural racism and health inequities in the USA: evidence and interventions. *Lancet* 389 (10077), 1453–1463. 10.1016/s0140-6736(17)30569-x. [PubMed: 28402827]
- Bauer, G., Bowleg, L., Rouhani, S., Scheim, A., Blot, S., 2014. *Harnessing the Power of Intersectionality: Guidelines for Quantitative Intersectional Health Inequities Research*.
- Bauer GR, Churchill SM, Mahendran M, Walwyn C, Lizotte D, Villa-Rueda AA, 2021. Intersectionality in quantitative research: a systematic review of its emergence and applications of theory and methods. *Ssm-Population Health* 14, 100798.
- Bledsoe A, Wright WJ, 2019. The anti-Blackness of global capital. *Environ. Plann. Soc. Space* 37 (1), 8–26. 10.1177/0263775818805102 [Article].
- Boger G, 2009. The meaning of neighborhood in the modern city: baltimore's residential segregation ordinances, 1910–1913. *J. Urban Hist* 35 (2), 236–258. 10.1177/0096144208327915 [Article].
- Branas CC, Rubin D, Guo W, 2013. Vacant properties and violence in neighborhoods. *ISRN public health* 2012. 10.5402/2012/246142, 246142–246142. [PubMed: 23814668]
- Brown LT, 2021. *The Black Butterfly: the Harmful Politics of Race and Space in America*. JHU Press.
- Brown TH, Homan PA, 2022. Frontiers in measuring structural racism and its health effects [Note]. *Health Serv. Res* 57 (3), 443–447. 10.1111/1475-6773.13978. [PubMed: 35468217]
- Card K, 2020. *Geographies of Racial Capitalism with Ruth Wilson Gilmore* Antipode Foundation. <https://www.youtube.com/watch?v=2CS627aKrJI>.
- Collins PH, 2019. *Intersectionality as Critical Social Theory*. Duke University Press.
- Combahee River Collective, 1977. *The Combahee River Collective Statement*.
- Creary MS, 2021. Bounded justice and the limits of health equity. *J. Law Med. Ethics* 49 (2), 241–256. 10.1017/jme.2021.34 [Article]. [PubMed: 34924041]
- Crenshaw K, 1990. Mapping the margins: intersectionality, identity politics, and violence against women of color. *Stan. L. Rev* 43, 1241.
- Cui L, Walsh R, 2015. Foreclosure, vacancy and crime. *J. Urban Econ* 87, 72–84.
- Cummins S, Curtis S, Diez-Roux AV, Macintyre S, 2007. Understanding and representing 'place' in health research: a relational approach. *Soc. Sci. Med* 65 (9), 1825–1838. 10.1016/j.socscimed.2007.05.036. [PubMed: 17706331]
- Dantzer P, Korver-Glenn E, Howell J, 2022. Introduction: what does racial capitalism have to do with cities and communities? *City Community* 21 (3), 163–172. 10.1177/15356841221103978.
- Dantzer PA, 2021. The urban process under racial capitalism: race, anti-Blackness, and capital accumulation. *Journal of Race, Ethnicity and the City* 2 (2), 113–134. 10.1080/26884674.2021.1934201.
- Dean LT, Thorpe RJ Jr., 2022. What structural racism is (or is not) and how to measure it: clarity for public health and medical researchers. *Am. J. Epidemiol* 191 (9), 1521–1526. 10.1093/aje/kwac112. [PubMed: 35792088]
- Duncan DT, Kawachi I, 2018. In: Duncan DT, Kawachi I. (Eds.), *Neighborhoods and Health*, 2 ed. Oxford University Press. 10.1093/oso/9780190843496.001.0001.
- Edwards F, Lee H, Esposito M, 2019. Risk of being killed by police use of force in the United States by age, race-ethnicity, and sex. *Proceedings of the National Academy of Sciences of the United States of America* 116 (34), 16793–16798. 10.1073/pnas.1821204116. [PubMed: 31383756]
- Fields D, Raymond EL, 2021. Racialized geographies of housing financialization. *Prog. Hum. Geogr* 45 (6), 1625–1645. 10.1177/03091325211009299.
- Fortner MJ, 2021. Racial capitalism and city politics: toward a theoretical synthesis. *Urban Aff. Rev.* 10780874211066627 10.1177/10780874211066627.
- Fullilove MT, Wallace R, 2011. Serial forced displacement in American cities, 1916–2010. *Journal of Urban Health-Bulletin of the New York Academy of Medicine* 88 (3), 381–389. 10.1007/s11524-011-9585-2. [PubMed: 21607786]
- Gee GC, Hicken MT, 2021. Commentary-structural racism: the rules and relations of inequity. *Ethn. Dis* 31, 293–300. 10.18865/ed.31.S1.293 [Review]. [PubMed: 34045831]

- Giles A, Bauer MEE, Jull J, 2020. Equity as the fourth 'E' in the '3 E's' approach to injury prevention. *Inj. Prev* 26 (1), 82–84. 10.1136/injuryprev-2019-043407. [PubMed: 31537617]
- Gilmore RW, 2002. Fatal couplings of power and difference: notes on racism and geography. *Prof. Geogr* 54 (1), 15–24. 10.1111/0033-0124.00310.
- Gomez MB, 2012. *Race, Class, Power, and Organizing in East Baltimore: Rebuilding Abandoned Communities in America*. Lexington Books.
- Gonzalez CG, Mutua A, 2022. Mapping Racial Capitalism: Implications for Law. 10.5070/LP62258224.
- Graetz N, Esposito M, 2023. Historical redlining and contemporary racial disparities in neighborhood life expectancy. *SocArXiv* 102 (1), 1–22. 10.1093/sf/soac114.
- Hall M, Crowder K, Spring A, 2015. Variations in housing foreclosures by race and place, 2005–2012. *Ann. Am. Acad. Polit. Soc. Sci* 660 (1), 217–237. 10.1177/0002716215576907.
- Harrison A, Immergluck D, 2023. Housing vacancy and hypervacant neighborhoods: uneven recovery after the US foreclosure crisis. *J. Urban Aff* 45 (8), 1469–1485. 10.1080/07352166.2021.1945930.
- Hawkins DF, 1993. Inequality, culture, and interpersonal violence. *Health Aff.* 12 (4), 80–95. 10.1377/hlthaff.12.4.80.
- Hawthorne C, 2019. Black matters are spatial matters: black geographies for the twenty-first century [Article]. *Geography Compass* 13 (11). 10.1111/gec3.12468. Article e12468.
- Hillier AE, 2003. Redlining and the home Owners' loan corporation. *J. Urban Hist* 29 (4), 394–420. 10.1177/0096144203029004002.
- Homan P, Brown TH, King B, 2021. Structural intersectionality as a new direction for health disparities research [article]. *J. Health Soc. Behav* 62 (3), 350–370. 10.1177/00221465211032947. [PubMed: 34355603]
- Hyra DS, Squires GD, Renner RN, Kirk DS, 2013. Metropolitan segregation and the subprime lending crisis [article]. *Housing Policy Debate* 23 (1), 177–198. 10.1080/10511482.2012.697912.
- Immergluck D, 2011. From minor to major player: the geography of fha lending during the u.s. mortgage crisis [Article]. *J. Urban Aff* 33 (1), 1–20. 10.1111/j.1467-9906.2010.00539.x.
- Immergluck D, Kinder K, Wylly E, Hackworth J, 2020. *Manufacturing Decline: How Racism and the Conservative Movement Crush the American Rust Belt*: by Jason Hackworth. Columbia University Press, 2019, \$30.00/£ 25.00 (paperback). 229 pages; New York. ISBN: 9780231193733. In: Taylor & Francis.
- Jackson DB, Fahmy C, Vaughn MG, Testa A, 2019. Police stops among at-risk youth: repercussions for mental health. *J. Adolesc. Health* 65 (5), 627–632. 10.1016/j.jadohealth.2019.05.027. [PubMed: 31495640]
- Jackson JW, 2021. Meaningful causal decompositions in health equity research definition, identification, and estimation through a weighting framework. *Epidemiology* 32 (2), 282–290. 10.1097/ede.0000000000001319. [PubMed: 33394809]
- Jackson JW, Williams DR, VanderWeele TJ, 2016. Disparities at the intersection of marginalized groups. *Soc Psychiatry Psychiatr Epidemiol* 51 (10), 1349–1359. 10.1007/s00127-016-1276-6. [PubMed: 27531592]
- Jacoby SF, Dong B, Beard JH, Wiebe DJ, Morrison CN, 2018. The enduring impact of historical and structural racism on urban violence in Philadelphia. *Soc. Sci. Med* 199, 87–95. 10.1016/j.socscimed.2017.05.038. [PubMed: 28579093]
- Jahn JL, 2021. Invited commentary: comparing approaches to measuring structural racism. *Am. J. Epidemiol* 191 (4), 548–551. 10.1093/aje/kwab261.
- Jones-Webb R, Wall M, 2008. Neighborhood racial/ethnic concentration, social disadvantage, and homicide risk: an ecological analysis of 10 US cities. *Journal of Urban Health-Bulletin of the New York Academy of Medicine* 85 (5), 662–676. 10.1007/s11524-008-9302-y. [PubMed: 18661242]
- Keene DE, Padilla MB, 2014. Spatial stigma and health inequality. *Crit. Publ. Health* 24 (4), 392–404. 10.1080/09581596.2013.873532.
- Kim D, 2019. Social determinants of health in relation to firearm-related homicides in the United States: a nationwide multilevel cross-sectional study. *PLoS Med.* 16 (12), e1002978 10.1371/journal.pmed.1002978.

- Krieger N, Feldman JM, Waterman PD, Chen JT, Coull BA, Hemenway D, 2017. Local residential segregation matters: stronger association of census tract compared to conventional city-level measures with fatal and non-fatal assaults (total and firearm related), using the Index of concentration at the Extremes (ICE) for racial, economic, and racialized economic segregation, Massachusetts (US), 1995–2010. *Journal of Urban Health-Bulletin of the New York Academy of Medicine* 94 (2), 244–258. 10.1007/s11524-016-0116-z. [PubMed: 28130678]
- Krivo LJ, Lyons CJ, Vélez MB, 2021. The U.S. Racial structure and ethno-racial inequality in urban neighborhood crime, 2010–2013. *Sociology of Race and Ethnicity* 7 (3), 350–368. 10.1177/2332649220948551.
- Kuh D, Ben-Shlomo Y, Lynch J, Hallqvist J, Power C, 2003. Life course epidemiology. *J. Epidemiol. Community Health* 57 (10), 778. 10.1136/jech.57.10.778. [PubMed: 14573579]
- Laster Pirtle WN, 2020. Racial capitalism: a fundamental cause of novel coronavirus (COVID-19) pandemic inequities in the United States. *Health Educ. Behav* 47 (4), 504–508. 10.1177/1090198120922942 [Article]. [PubMed: 32338071]
- Lee MR, Ousey GC, 2007. Counterbalancing disadvantage? Residential integration and urban black homicide. *Soc. Probl* 54 (2), 240–262. 10.1525/sp.2007.54.2.240.
- Lekkas P, Paquet C, Howard NJ, Daniel M, 2017. Illuminating the lifecourse of place in the longitudinal study of neighbourhoods and health. *Soc. Sci. Med* 177, 239–247. 10.1016/j.socscimed.2016.09.025. [PubMed: 27720553]
- Levenson Z, Paret M, 2022. The three dialectics of racial capitalism: from South Africa to the US and back again. *Du Bois Review-Social Science Research on Race*. 10.1017/s1742058x22000212. Article Pii s1742058x22000212.
- Lipsitz G, 2007. The racialization of space and the spatialization of race: theorizing the hidden architecture of landscape. *Landsc. J* 26 (1), 10–23. <http://www.jstor.org/stable/43323751>.
- Loyd JM, Bonds A, 2018. Where do Black lives matter? Race, stigma, and place in Milwaukee, Wisconsin. *Sociol. Rev* 66 (4), 898–918. 10.1177/0038026118778175.
- Lynch EE, Malcoe LH, Laurent SE, Richardson J, Mitchell BC, Meier HCS, 2021. The legacy of structural racism: associations between historic redlining, current mortgage lending, and health. *SSM - Population Health* 14, 100793. 10.1016/j.ssmph.2021.100793 [Article].
- Mallach A, 2018. *The Empty House Next Door: Understanding and Reducing Vacancy and Hypervacancy in the United States*. Lincoln Institute of Land Policy, Cambridge, MA.
- Mallach A, Harrison A, 2021. Leaving the old neighborhood: shifting spatial decisions by black home buyers and their implications for black urban middle neighborhoods in legacy cities. *Housing Policy Debate* 31 (6), 891–923. 10.1080/10511482.2020.1867611.
- Marineau LA, Uzzi M, Buggs SA, Ihenacho N, Campbell JC, 2024. Risk and protective factors for firearm assault injuries among black men: a scoping review of research. *Trauma Violence Abuse* 25 (3), 2468–2488. 10.1177/15248380231217042. [PubMed: 38153002]
- Markley SN, Hafley TJ, Allums CA, Holloway SR, Chung HC, 2020. The limits of homeownership: racial capitalism, black wealth, and the appreciation gap in atlanta. *Int. J. Urban Reg. Res* 44 (2), 310–328. 10.1111/1468-2427.12873.
- Maryland Foreclosure Task Force, 2012. *Maryland Foreclosure Task Force Report*.
- Massey DS, Rugh JS, Steil JP, Albright L, 2016. Riding the stagecoach to hell: a qualitative analysis of racial discrimination in mortgage lending. *City Community* 15 (2), 118–136. 10.1111/cico.12179 [Article]. [PubMed: 30662375]
- Mayer, C.J., Pence, K., 2008. *Subprime Mortgages: what, where, and to Whom?*.
- McClure ES, Vasudevan P, Bailey Z, Patel S, Robinson WR, 2020. Racial capitalism within public health-how occupational settings drive covid-19 disparities. *Am. J. Epidemiol* 189 (11), 1244–1253. 10.1093/aje/kwaa126 [Review]. [PubMed: 32619007]
- Mehranbod CA, Gobaud AN, Jacoby SF, Uzzi M, Bushover BR, Morrison CN, 2022. Historical redlining and the epidemiology of present-day firearm violence in the United States: a multi-city analysis. *Prev. Med* 107207 10.1016/j.yjmed.2022.107207.
- Mollett S, Faria C, 2018. The spatialities of intersectional thinking: fashioning feminist geographic futures. *Gend. Place Cult* 25 (4), 565–577. 10.1080/0966369X.2018.1454404 [Article].

- Mujahid MS, Gao X, Tabb LP, Morris C, Lewis TT, 2021. Historical redlining and cardiovascular health: the multi-ethnic study of atherosclerosis [article]. *Proceedings of the National Academy of Sciences of the United States of America* 118 (51). 10.1073/pnas.2110986118. Article e2110986118.
- Mustaffa JB, Dawson C, 2021. Racial capitalism and the black student loan debt crisis. *Teach. Coll. Rec* 123 (6), 1–28. 10.1177/016146812112300601.
- Nelson RK, Winling L, Marciano R, Connolly N, Ayers EL, 2020. *Mapping Inequality: Redlining in New Deal America. American Panorama: an Atlas Of United States History.* University of Richmond: Digital Scholarship Lab.
- Open Baltimore. Baltimore City Part 1 Violent Crime Data. Retrieved March 8, from. <https://data.baltimorecity.gov/datasets/part1-crime-data/explore>.
- Pearce JR, 2018. Complexity and uncertainty in geography of health research: incorporating life-course perspectives. *Ann. Assoc. Am. Geogr* 108 (6), 1491–1498. 10.1080/24694452.2017.1416280.
- Petteway RJ, 2022. On epidemiology as racial-capitalist (re)colonization and epistemic violence. *Crit. Publ. Health* 10.1080/09581596.2022.2107486.
- Phillips de Lucas AK, 2020. Producing the “highway to Nowhere”: social understandings of space in Baltimore, 1944–1974. *Engaging Science, Technology, and Society* 6, 351–369.
- Phinney S, 2022. The policing of Black debt: how the municipal bond market regulates the right to water. *Urban Geogr* 10.1080/02723638.2022.2107257 [Article].
- Pietila A, 2012. *Not in My Neighborhood: How Bigotry Shaped a Great American City.* Rowman & Littlefield.
- Pino EC, Jacoby SF, Dugan E, Jay J, 2023. Exposure to neighborhood racialized economic segregation and reinjury and violence perpetration among survivors of violent injuries. *JAMA Netw. Open* 6 (4). 10.1001/jamanetworkopen.2023.8404. Article e238404.
- Pollack KM, LaVeist T, 2012. Advancing understanding of racial and ethnic inequalities in injury research. *Inj. Prev* 18 (2), 143. 10.1136/injuryprev-2012-040344. [PubMed: 22447811]
- Power G, 1983. *Apartheid Baltimore style: the Residential Segregation Ordinances of 1910–1913*, vol. 42. *Maryland Law Review*, p. 289.
- Pulido L, 2017. Geographies of race and ethnicity II: environmental racism, racial capitalism and state-sanctioned violence. *Prog. Hum. Geogr* 41 (4), 524–533. 10.1177/0309132516646495 [Article].
- Reid CK, Bocian D, Li W, Quercia RG, 2017. Revisiting the subprime crisis: the dual mortgage market and mortgage defaults by race and ethnicity [Article]. *J. Urban Aff* 39 (4), 469–487. 10.1080/07352166.2016.1255529.
- Rexing CJ, Hohl BC, Johnson R, Ramirez M, Carlson KF, Cruz TH, 2020. We must do better science: addressing racism to improve health and safety for all people. *Inj. Prev* 26 (5), 502–503. 10.1136/injuryprev-2020-043941. [PubMed: 32958566]
- Riley T, Schleimer JP, Jahn JL, 2024. Organized abandonment under racial capitalism: measuring accountable actors of structural racism for public health research and action. *Soc. Sci. Med* 343, 116576 10.1016/j.socscimed.2024.116576.
- Robinson CJ, Sojoyner D, Willoughby-Herard T, 1983. *Black Marxism, Revised and Updated Third Edition the Making of the Black Radical Tradition*, 3 ed. University of North Carolina Press [http://www.jstor.org/stable/10.5149/9781469663746\\_robinson](http://www.jstor.org/stable/10.5149/9781469663746_robinson).
- Rodríguez C, 2020. “The whole damn system is guilty”: urban violence, the principal contradiction of racial capitalism, and the production of premature death in Oakland, California [article]. *Crit. Sociol* 46 (7–8), 1057–1074. 10.1177/0896920520923429.
- Rothstein R, 2017. *The Color of Law: A Forgotten History of How Our Government Segregated America.* Liveright Publishing.
- Rowhani-Rahbar A, Quistberg DA, Morgan ER, Hajat A, Rivara FP, 2019. Income inequality and firearm homicide in the US: a county-level cohort study. *Inj. Prev* 25, i25–i30. 10.1136/injuryprev-2018-043080. [PubMed: 30782593]
- Rucks-Ahidiana Z, 2021. Theorizing gentrification as a process of racial capitalism. *City Community* 21 (3), 173–192. 10.1177/15356841211054790.

- Rugh JS, Albright L, Massey DS, 2015. Race, space, and cumulative disadvantage: a case study of the subprime lending collapse [Article]. *Soc. Probl* 62 (2), 186–218. 10.1093/socpro/spv002. [PubMed: 27478254]
- Rugh JS, Massey DS, 2010. Racial segregation and the American foreclosure crisis. *Am. Socio. Rev* 75 (5), 629–651. 10.1177/0003122410380868.
- Saegert S, Fields D, Libman K, 2011. Mortgage foreclosure and health disparities: serial displacement as asset extraction in African American populations. *J. Urban Health* 88 (3), 390–402. 10.1007/s11524-011-9584-3 [Article]. [PubMed: 21643884]
- Sampson RJ, Raudenbush SW, 2004. Seeing disorder: neighborhood stigma and the social construction of “broken windows”. *Soc. Psychol. Q* 67 (4), 319–342. 10.1177/019027250406700401 [Review].
- Sampson RJ, Raudenbush SW, Earls F, 1997. Neighborhoods and violent crime: a multilevel study of collective efficacy. *Science* 277 (5328), 918–924. 10.1126/science.277.5328.918. [PubMed: 9252316]
- Schleimer JP, Buggs SA, McCort CD, Pear VA, De Biasi A, Tomsich E, Shev AB, Laqueur HS, Wintemute GJ, 2022. Neighborhood racial and economic segregation and disparities in violence during the COVID-19 pandemic. *Am. J. Publ. Health* 112 (1), 144–153. 10.2105/AJPH.2021.306540 [Article].
- Spitzer SA, Vail DG, Dey T, Salim A, Jarman MP, 2023. The impact of redlining on modern-day firearm injuries. *Ann. Surg* 278 (5), E1123–E1127. 10.1097/SLA.0000000000005860. [PubMed: 37051903]
- Swan SL, 2020. DISCRIMINATORY DUALISM [article]. *Ga. Law Rev* 54 (3), 868–925. <https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,shib&db=asn&AN=143792738&site=ehost-live&scope=site&authtype=ip,shib&custid=s3555202>.
- Swope CB, Hernández D, Cushing LJ, 2022. The relationship of historical redlining with present-day neighborhood environmental and health outcomes: a scoping review and conceptual model. *J. Urban Health* 99 (6), 959–983. 10.1007/s11524-022-00665-z [Review]. [PubMed: 35915192]
- Taylor K-Y, 2019. *Race for Profit: How Banks and the Real Estate Industry Undermined Black Homeownership*. UNC Press Books.
- Theall KP, Francois S, Bell CN, Anderson A, Chae D, LaVeist TA, 2022. Neighborhood police encounters, health, and violence in A southern city. *Health Aff.* 41 (2), 228–236. 10.1377/hlthaff.2021.01428.
- Uzzi M, Aune KT, Marineau L, Jones FK, Dean LT, Jackson JW, Latkin CA, 2023. An intersectional analysis of historical and contemporary structural racism on non-fatal shootings in Baltimore, Maryland. *Inj. Prev* 29 (1), 85–90. [PubMed: 36301795]
- Wacquant L, 2007. Territorial stigmatization in the age of advanced marginality. *Thesis Elev.* 91 (1), 66–77. 10.1177/0725513607082003.
- Walker K, 2022. *Analyzing US Census Data: Methods, Maps, and Models in R*.
- White K, Stuart F, Morrissey SL, 2021. Whose lives matter? Race, space, and the devaluation of homicide victims in minority communities. *Sociology of Race and Ethnicity* 7 (3), 333–349. 10.1177/2332649220948184 [Article].
- Whitley S, 2022. We call them bandos [article]. *Transgender Studies Quarterly* 9 (2), 266–288. 10.1215/23289252-9612949.
- Whittaker S, Swope CB, Keene D, 2023. Rethinking the effects of gentrification on the health of Black communities in the United States: towards a racialized health framework. *J. Urban Aff* 10.1080/07352166.2023.2268761.



**Fig. 1.** Conceptual model of racial capitalism and firearm violence.



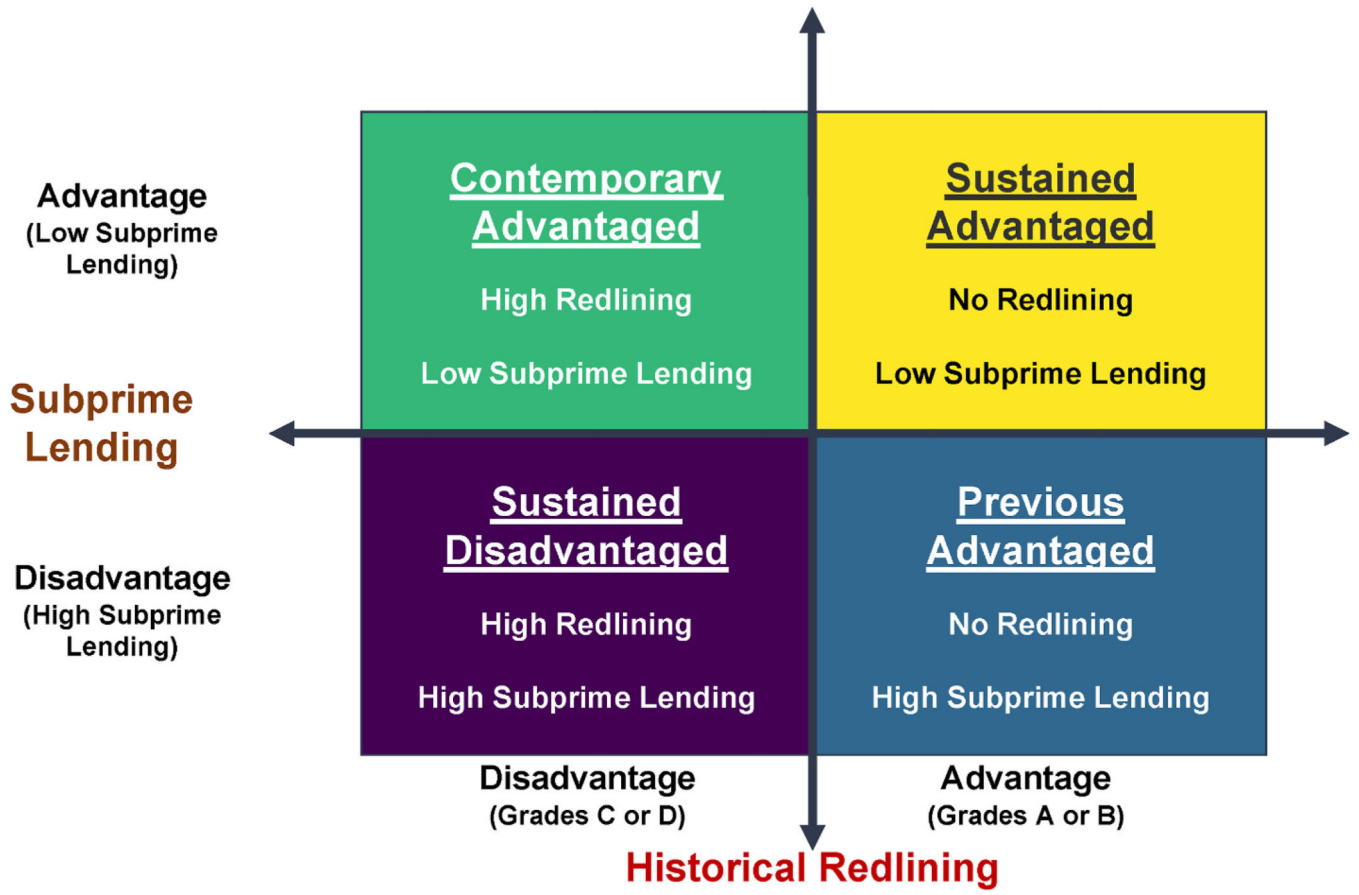
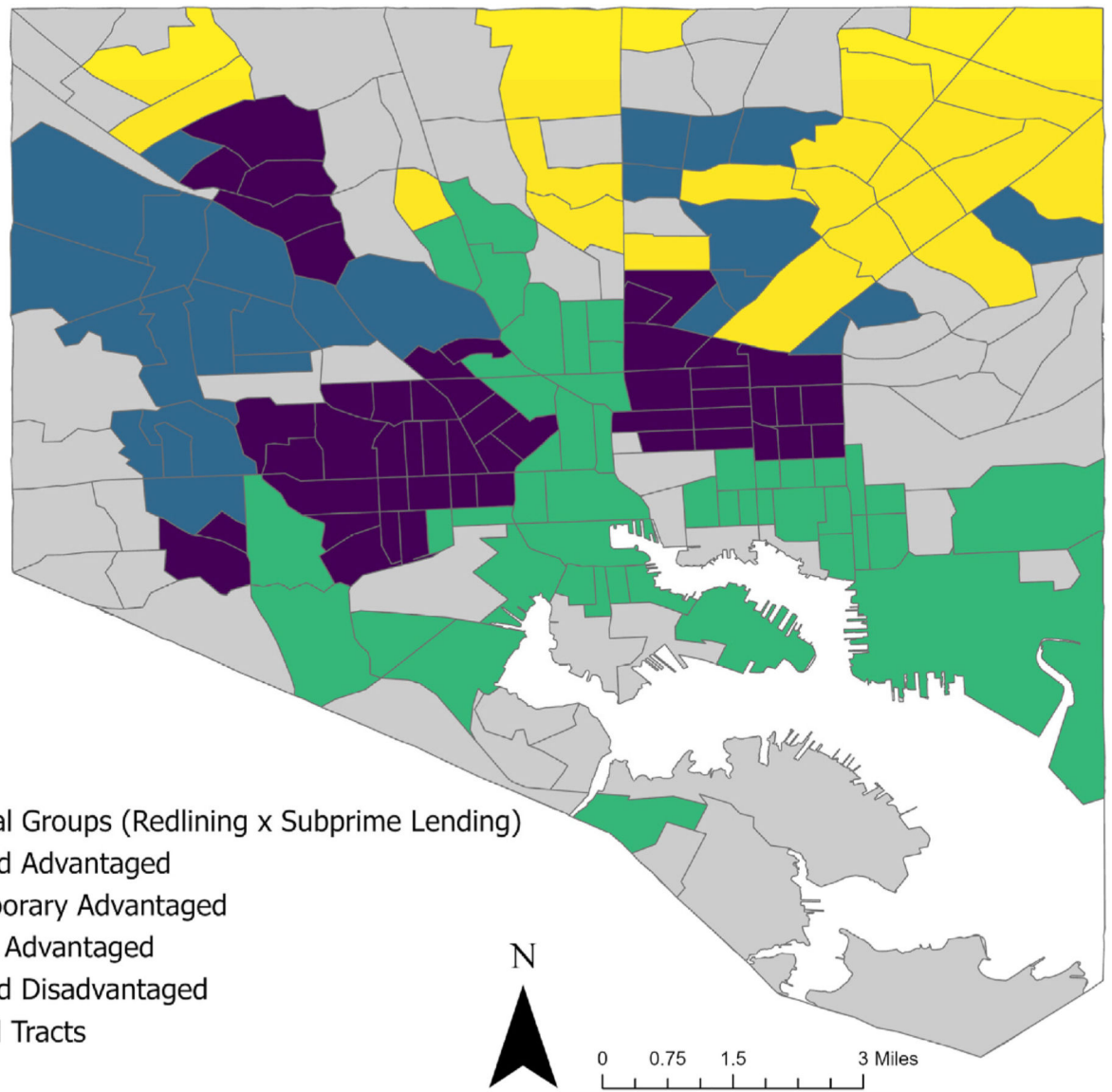


Fig. 2. Description of Intersectional Groups (redlining and subprime mortgage lending).





**Fig. 3.** Map of Intersectional Groups in Baltimore City (Historical Redlining and Subprime Mortgage Lending intersection).



**Fig. 4.** Map of average annual firearm violence rates for Baltimore City census tracts, 2015–2019.

**Table 1**

Descriptive statistics of the four intersectional groups, excluded tracts, and Baltimore City average (Firearm Violence rate and selected socioeconomic indicators).

Variable	Sustained advantaged, N = 24 <sup>a</sup>	Contemporary advantaged, N = 46 <sup>a</sup>	Previous advantaged, N = 26 <sup>a</sup>	Sustained disadvantaged, N = 50 <sup>a</sup>	Excluded tracts <sup>b</sup> , N = 52 <sup>a</sup>	Baltimore City average N = 198 <sup>a</sup>
<b>Firearm Violence Rate</b> <sup>c</sup>	5	12	18	42	11	19
<b>Vacant Housing</b> <sup>d</sup> %	11	17	19	35	13	20
<b>Below Poverty</b> <sup>d</sup> %	11	17	22	35	20	23
<b>College Educated</b> <sup>d</sup> %	40	50	18	11	33	30
<b>Black Residents</b> <sup>d</sup> %	50	30	92	89	55	62
<b>Median Household Income</b> <sup>d</sup> ( $\$$ )	73,742	71,173	45,429	30,822	55,696	53,849

All variables show mean averages.

<sup>a</sup>N= Number of census tracts in the group.

<sup>b</sup>Excluded tracts did not have HOLC grades assigned to them or there was a mismatch in census tract geographies between subprime lending and firearm violence data. Only excluded tracts that contained residential zoning are included in the table.

<sup>c</sup>Mean annualized firearm violence rates per 10,000 residents from 2015 to 2019 Baltimore Police Department data.

<sup>d</sup>Socioeconomic variables are from 5-year 2019 U.S. Census Bureau American Community Survey.

**Table 2**

Intersectional Measures for Historical redlining and Racialized subprime mortgage lending on firearm violence in Baltimore City (2015–2019).

Intersectional Measure	Outcome	95% Confidence Interval
<b>Joint Disparity<sup>a</sup></b>	37	(32–43)
<b>Referent Redlining Disparity<sup>a</sup></b>	7	(3–11)
<b>Referent Subprime Lending Disparity<sup>a</sup></b>	13	(9–18)
<b>Excess Intersectional Disparity<sup>a</sup></b>	17	(9–23)
<b>Attributable Proportion of Excess Intersectional Disparity<sup>b</sup></b>	40%	(24%–53%)

<sup>a</sup>The disparity measures are reported as firearm violence rates per 10,000 residents.

<sup>b</sup>The Attributable proportion measure is reported as a percentage. The Attributable proportion measure equals the Excess Intersectional Disparity firearm violence rate/mean average firearm violence rate for sustained disadvantaged tracts.