Visualising Racial Inequity

Racism, Segregation, Poverty & Domestic Violence Rates Among Black Women in Chicago

Emily Bradley

Table of Contents

Acknowledgments

I have received a great deal of support throughout this process. No one does anything alone, and I am extremely grateful for all the people in my life who have helped me along the way.

I would first like to thank my supervisor, Tom Felle, for his guidance, feedback, and expertise throughout each stage of this project. His support throughout the entire Digital Media programme has been invaluable to me, and I have learned a great deal from him throughout the year.

I would also like to thank Robert Nelson and his team on the "Mapping Inequality" project for making shapefiles and scans of historical redlining maps freely available for others to use. And I would be remiss if I did not express gratitude to the pioneering Black women scholars and experts in this area, singling out Kimberlé Crenshaw in particular for her influential work on intersectionality and race theory.

My family has offered endless support and encouragement throughout this process, and their reminders to approach this project "bird by bird" have helped me immensely. My mother, Mimi Lillich, is an inspiration in her own right, and her invaluable insight and practical advice helped guide me along the way. My father, Brian Bradley, is the most enthusiastic supporter anyone could ever ask for. And my sister, Margaret Bradley, patiently listened to me and provided essential comic relief throughout this project. I am so lucky to have such a wonderful and supportive family.

I would also like to thank numerous friends who have provided valuable feedback on iterations of the data visualisations, reviewed drafts of my dissertation, and let me talk about this depressing topic all summer. Lastly, I would like to thank my boyfriend, Oliver Milne, who checked my math, found my typos, and supported me along the way.

List of Illustrations

Introduction

Amid the lockdowns to stem the spread of COVID-19, domestic violence rates are spiking (Bosman). And in the wake of protests against police violence after George Floyd's death, more white Americans are reckoning with systemic racism in the criminal justice system and more broadly in society (Harmon and Burch). Black women experience domestic violence at a significantly higher rate than white women, but many efforts to reduce domestic violence are designed for white women. And Black women's lives are deeply affected by systemic racism, but anti-racism activism largely focuses on Black men. "Because of their intersectional identity as both women and of color within discourses that are shaped to respond to one or the other, women of color are marginalized within both" (Crenshaw 1244). Decades of social science research have documented the disproportionately high rate of domestic violence in Black communities and its relationship to poverty, neighbourhood disadvantage, and racism, but these findings have been relegated to academic journals.

This data visualisation project aims to expose this neglected issue by depicting racial disparities in Chicago domestic violence rates with an interactive exploration showing how racism, segregation, and poverty endanger Black women. I conducted quantitative statistical analysis comparing the location of domestic violence crimes, racial and economic census data, and historical maps of segregation to develop a visual narrative exposing racial inequity. Analysis showed a strong positive correlation between the geographic distribution of concentrated domestic violence and the level of Black segregation and poverty. A positive correlation between high levels of present-day domestic violence and historical segregation was only partially supported. The statistical reliability of the analysis was weakened by missing and unreliable data. The results of this analysis have implications for data-collection strategies as well as efforts to decrease domestic violence, racial inequity, and poverty in Black communities.

Literature Review

Domestic Violence

Domestic violence, also referred to as intimate partner violence, is abusive behaviour in a relationship used to maintain control and power over an intimate partner (Black et al. 37). It takes many forms—physical violence, emotional abuse, sexual violence and coercion, reproductive coercion, financial abuse, coercive control, and digital abuse—with abusers often inflicting multiple types of abuse on their victims ("Abuse Defined"; Black et al. 37). A recent Centers for Disease Control (CDC) analysis of survey data showed nearly one in three women (30.4 percent) in America have experienced physical intimate partner violence, nearly one in 10 (9.4 percent) were raped by an intimate partner, and nearly half (48.4 percent) experienced psychological aggression from an intimate partner in their lifetime (Black et al. 15).

Domestic violence has a profound impact on victims' physical and emotional health. Black et al. found women who experienced domestic violence had significantly higher rates of health problems including post-traumatic stress disorder, asthma, irritable bowel syndrome, chronic pain, diabetes, and headaches compared to women with no history of abuse (61). The effects of domestic violence are not limited to victims alone—individuals who witnessed domestic violence as children had higher rates of childhood trauma and reported higher rates of adulthood depression and alcohol and drug use (Dube et al. 14). Max et al. estimated the cumulative annual cost of domestic violence against women in America, including lost productivity from injury and premature death as well as health care expenses, exceeded €4.9 billion (USD $5.8 billion) (259).

Although domestic violence affects victims of all races, genders, sexual orientations, and socioeconomic status, decades of research have consistently found Black women and other women of colour experience disproportionately high rates of domestic violence compared to white women (Richie 26; Gillum 39; Benson and Fox 4). More than four in 10 Black women (43.7 percent) and American Indian/Alaska Native women (46 percent), more than half of multiracial women (53.8 percent), and more than one in three Hispanic women (37.1 percent) report experiencing some form of domestic violence in their lifetime (Breiding et al. 27). This compares to one in three white women (34.6 percent) reporting lifetime experience of domestic violence (Breiding et al. 27).

Women living in poverty are much more likely to experience domestic violence than women with higher socioeconomic status, and Black women are more likely to live in poverty than white women (Benson and Fox 4; Semega et al. 13; Browne and Bassuk 261). United States census data showed that in 2018, more than one in five Black households (20.8 percent) lived in poverty compared to fewer than one in 10 white households (8.1 percent) (Semega et al. 13). Higher rates of domestic violence were found in couples with financial distress, economic strain,

and unemployment (Benson and Fox 1–2; Rennison and Planty 436). In addition to individual economic distress, neighbourhood-level disadvantage also has strong links to higher prevalence and severity of domestic violence (Benson and Fox 115). Many studies have found that after controlling for individual and neighbourhood-level socioeconomic variables, racial disparities in domestic violence rates decrease or disappear, indicating that high poverty in Black communities is a larger contributor to elevated domestic violence rates than cultural or racial factors (Rennison and Planty 440; Benson and Fox 5; Sokoloff and Dupont 48; Benson et al. 338).

Housing Discrimination, Segregation & Poverty

The contextual effect of neighbourhood-level disadvantage on domestic violence is salient in the context of historical segregation. As part of an effort to stabilise the housing market in the wake of the Great Depression, the United States government directed the Home Owners' Loan Corporation (HOLC) to create city maps (see fig. 1) documenting the risk level for lending in different areas (Aaronson et al. 1). Race, ethnicity, and immigration status were included as risk variables, which resulted in Black neighbourhoods being rated as "hazardous" and marked in red on the map; this led to a policy called redlining that denied borrowers credit based on their neighbourhood demographic characteristics rather than their ability to pay a loan (Aaronson et
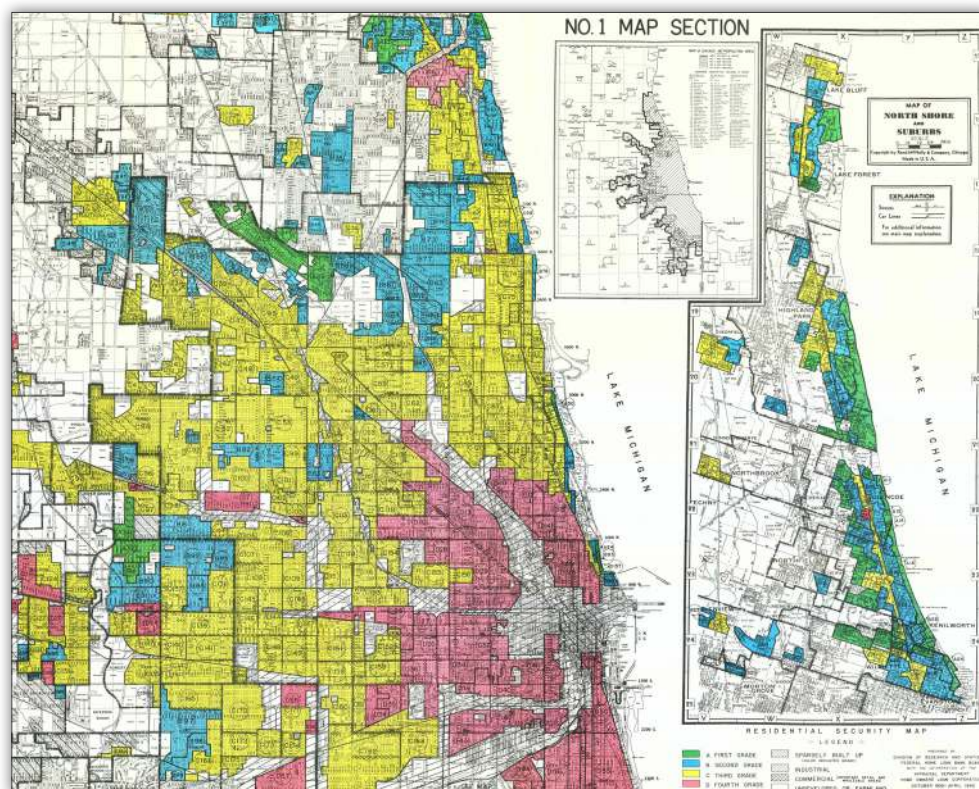

Figure 1: *1940 Residential Security Map of Chicago*

Chicago map created by the Home Owners' Loan Corporation in 1940 showing poor and Black neighbourhoods shaded in red to indicate it is "hazardous" to offer home loans in these areas.

Credit: Robert K. Nelson et al., Mapping Inequality: Redlining in New Deal America

al. 1). Redlining did not create racial and economic segregation—prior housing discrimination and racism had already concentrated Black residents in disadvantaged areas (D'Ignazio and Klein 50). But the redlining map visualisations used data about pre-existing segregation and disadvantage to codify and officially sanction discriminatory housing practices that exacerbated and concentrated inequality and segregation (D'Ignazio and Klein 50–52).

Extensive research has found relationships between historical redlining and present-day concentrated poverty, segregation, and racial inequity (Aaronson et al. 35; Wilson 557). The effects of HOLC maps on lending practices placed homeownership out of reach for many Blacks, which has contributed to the persistent wealth gap between white and Black families and entrenched poverty in predominantly Black neighbourhoods (Shapiro 67; Wilson 557). Kuhn et al.'s analysis of income data from 1949 to 2016 found that "no progress has been made in reducing income and wealth inequalities between [b]lack and white households over the past 70 years," with the median Black household consistently owning less than 15 percent of the wealth of the median white household over this time period; the authors identified low rates of homeownership among Blacks as a contributor to this large disparity (1–4). There is negligible research examining the relationship between historical redlining and modern rates of domestic violence, but previous scholarship has found positive relationships between historically redlined areas and rates of other types of present-day crime (Jacoby et al. 87).

Intersectional Oppression & Racism

Decades of social science research have documented Black women's striking vulnerability to domestic violence due to the intersecting oppressions of gender, race, and poverty. Although this pattern of high domestic violence rates in impoverished Black communities is strongly supported in scholarship, much mainstream coverage of domestic violence frames narratives as individual incidents without connecting individual cases to systemic sexism, racism, and other sociological factors (Bullock 47; Easteal et al. 104).

The hostile relationship between the criminal justice system and Black communities often deters Black women from reporting domestic violence. Many Black women express reluctance to subject their partners to the racist criminal justice system and feel pressure to express racial solidarity (Richie 45; Crenshaw 1257). Black women who report domestic abuse to the police are more likely to be arrested for defending themselves and more likely to lose custody of their children than white women (Richie 122; Lee 58). Despite the significant disincentives for interacting with the criminal justice system, statistics consistently demonstrate that Black women report domestic violence to the police at a higher rate than white women (Greenfeld et al. 19; Felson et al. 633). This is an area of study warranting much more research, but it is beyond the scope of this project.

Data & Visualisation

Data is commonly conceptualised as numbers on a spreadsheet, but its true definition is much broader—nearly any information that can be quantified or categorised can be analysed as data. As computational and analytical power has increased, data collection has become increasingly ubiquitous and data analysis has become increasingly sophisticated. Data, particularly in numerical and statistical format, is often perceived as objective, but many argue that working with data is an inherently subjective process influenced by the context of its creation (Iliadis and Russo 2; boyd and Crawford 667; D'Ignazio and Klein 18). Critical analysis of the data source, the data itself, and the data's intended purpose are crucial for conducting accurate and ethical analysis (boyd and Crawford 664; D'Ignazio and Klein 18).

Data has always been used to make decisions with wide-reaching impacts, with the demographic and economic data used to create the redlining map of Chicago being a pertinent example for this project. But in the age of Big Data, both data collection and analysis have increased exponentially. The increasing reliance on data to drive policymaking has massive implications for governments, societies, and individuals (Labrinidis and Jagadish 2032). Governmental agencies and public bodies are increasingly making raw data accessible to the public after facing pressure to increase transparency (Janssen et al. 258). Felle highlights the importance of accessible open data as a tool to increase government accountability and ensure transparency in democracies (88).

But raw datasets serve little purpose if they are not critically examined, analysed, and visually represented. Using data visualisation to convey a message is not a new phenomenon. But as data has become more complex and tools for creating such visualisations have become more accessible, the potential for visual storytelling that distils complex datasets into easy-to-understand visuals has exploded. Journalists, researchers, activists, and educators are now using visualisations to breathe life into data, expose and explore patterns, and create compelling data-driven narratives.

Academic scholarship is increasingly recognizing the effectiveness of data visualisation as a messaging tool that helps users understand complex and abstract information (Dunlap and Lowenthal 43). McKenna et al. found users reported higher engagement with stories that contained visuals compared to text-only stories (384). The wide variety of visualisation techniques, narrative approaches, and other variables including aesthetics make it difficult to assess the effectiveness of data visualisations. Some scholars focus on the memorability of a data visualisation (Borkin et al. 2306) or the cognitive load and information-processing speed (Anderson et al. 791) as measures of engagement. But others have found that the factors determining effectiveness and engagement are specific to each user's context and each visualisation's goals (Kennedy et al.).

Multiple studies show interactivity in data visualisations aids comprehension and engagement from users. Oh et al. found that highly interactive data visualisation narratives had significant indirect effects on participants' attitudes about policy change (1762). Segel and Heer identified multiple genres of data visualisation narratives, drawing a distinction between author-driven and

user-driven approaches, and found the most effective data stories paired an author-defined narrative with limited interactive functionality at checkpoints that allow users to explore data within the context of the narrative (145–46). Creating data visualisations as part of data analysis can lead to the discovery of new patterns and new stories in the data, with Emerson et al. noting this is "particularly useful to those seeking to understand structural, systemic violations such as abuses of economic, social, and cultural rights" (174).

But data visualisations' potential for telling stories about social issues is constrained by the data deemed worth recording and the narratives deemed important to tell. These decisions about data are inextricably linked to intersecting systems of power, privilege, and representation (D'Ignazio and Klein 28). Much innovative data visualisation work is being produced in the news media, which has long been a predominantly upper-class, white, and male industry, particularly in leadership positions, and has a history of biased coverage about women, people of colour, and other marginalised groups (Drew 354). *The New York Times* has defined itself as a leader in data visualisation in the United States, but both its leadership and its audience consist primarily of upper-class, college-educated whites (*2019 Diversity and Inclusion Report*; Pew Research Center 38). A 2019 *Times* piece ostensibly about middle-class families only featured households with annual incomes between €63,000 and €338,000 (USD $75,000 and $400,000) ("What Middle-Class Families Want Politicians to Know"). The overall 2018 median household income in the United States was €52,000 (USD $62,000), with white households earning a median income of €57,000 (USD $68,000) compared to only €35,000 (USD $42,000) for Black households (Guzman). Felle has questioned whether publications with resources to create complex data visualisations only reach a technologically informed elite audience rather than democratising access to information (93).

It is important to note that these news organisations are beginning to create more data visualisations tackling issues of race and inequality. Drew's interviews of journalists who worked on news stories about systemic racism indicated that discovering how racism manifested in society led to greater recognition of how racism manifested in the newsroom, and she argues that projects about race can foster changes in news production (355). However, Felle notes that data visualisations about disadvantage and inequality may only reach the affluent audiences of elite news organisations, rather than people directly affected by the issues (93).

Data's perceived objectivity can lead to distorted analysis and visualisation if the information is not critically analysed. D'Ignazio and Klein state that despite the perception of data as neutral, it is a "produc[t] of unequal social relations" and that this context must be acknowledged in analysis (18). Many data visualisations fail to achieve this standard—Zamith's analysis of *New York Times* and *Washington Post* "day-to-day" data visualisations with limited complexity found most coverage relied heavily on institutional data and did not link to the datasets used or include methodological details for transparency (483). Visualisations obscuring their data's source and context are particularly problematic in light of research demonstrating the persuasive power and perceived objectivity of data visualisations (Pandey et al. 2211; Lesage and Hackett 43).

Decisions about what data is worth collecting reflect inequality, which has created large gaps in data about subjugated groups that mirror existing power structures. D'Ignazio and Klein assert that "[t]he phenomenon of missing data is a regular and expected outcome in all societies characterized by unequal power relations, in which a gendered, racialized order is maintained through willful disregard, deferral of responsibility, and organized neglect for data and statistics about those minoritized bodies who do not hold power" (38–39). In a society that devalues the lived experiences of both women and Black people, the absence of detailed data about Black women and domestic violence provides a clear manifestation of this phenomenon and underscores the importance of this project.

Key Themes

Several key themes about domestic violence emerged from the literature review. Poverty and neighbourhood disadvantage show strong relationships to both individual and neighbourhood-level rates of domestic violence. Compared to white women, Black women have higher levels of poverty, are more likely to live in disadvantaged neighbourhoods, and experience domestic violence at higher rates. The large racial disparity in domestic violence rates reduces or disappears after controlling for individual and neighbourhood-level poverty. Present-day poverty, segregation, and racial inequity show strong relationships to historical segregation and redlining policies that locked Blacks out of homeownership.

The primary data theme identified is the assertion that raw data is not neutral or objective—it is subjective information that reflects existing power structures—and acknowledging this context is an essential part of ethical data analysis. Missing data about Black women and other marginalised groups is a manifestation of this concept, indicating societal priorities about whose lives and experiences are valued. The effectiveness of data visualisation as a powerful narrative and persuasive tool, particularly about social issues, also emerged as a major theme. But many data visualisations merely reflect their predominantly white and upper-class creators and audiences without reaching a wider population.

The Project
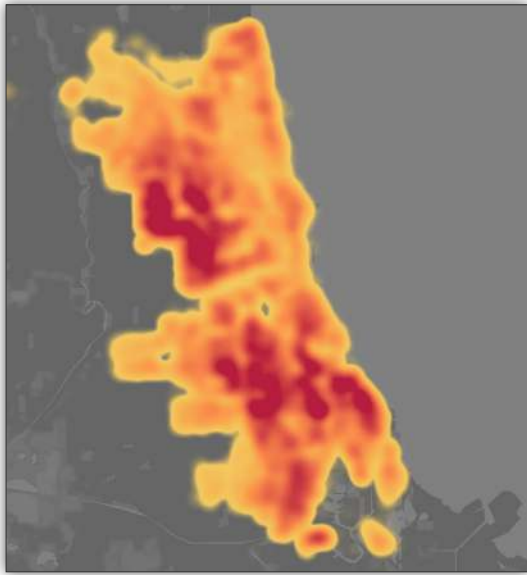
Visualising Racial Inequity

Racism, Segregation & Domestic Violence Rates Among Black Women in Chicago

For an optimal experience, view the data visualisation on a desktop or laptop in full-screen mode.

Research Questions

- What is the relationship between the historical redlining map of Chicago and the geographic distribution of present-day domestic violence crime?

- What is the relationship between the geographic distribution of domestic violence crime and levels of Black segregation and poverty in Chicago?

- What data gaps and flaws emerge in the analysis, and how do they affect the findings and narrative of the story?

Methodology

The methodology used was a quantitative time-series analysis of statistical data from multiple datasets. Long used in social science research, this methodology is increasingly employed by journalists and storytellers to answer questions with data and develop narratives with higher levels of credibility than traditionally sourced pieces (Doig as quoted in Remington). This type of data analysis permits the creation of data-driven narratives that distil large amounts of complex data into easy-to-interpret visualisations (Dunlap and Lowenthal 42).

I analysed two primary data sources: geocoded crime data collected by the Chicago Police Department and demographic data about individual census tracts collected by the United States Census Bureau (Chicago Police Department; "ACS Demographic and Housing Estimates"; "Selected Economic Characteristics"). See the appendix for links to the data used. To map the analysed data, I used a census tract shapefile from the city of Chicago data portal and a shapefile depicting the historical redlining map of Chicago from the "Mapping Inequality" project (City of Chicago; Nelson et al.).

The city of Chicago crime dataset includes all crimes flagged as domestic violence incidents between 1 January 2015 and 30 June 2020 (approximately 232,000 records). The Chicago Police Department records each crime both by the specific offence committed and by its domestic violence classification. This allows for a fuller analysis of all domestic violence crime rather than solely analysing domestic battery and domestic assault incidents, as the data captures homicides, sexual assaults, and other crimes that were marked as domestic violence offences. All records not marked as domestic violence offences were excluded. Data cleaning involved collapsing detailed crime categories into larger groups based on theme (for example, theft and robbery were combined) and excluding a small number of records missing geolocation data (approximately 0.008 percent of the dataset). Excel and Tableau were used for data cleaning, analysis, and visualisation because they provide the user the ability to manipulate and visualise large amounts of data.

Racial and economic data analysed came from the 2018 5-Year American Community Survey (the most recent data available) gathered by the United States Census Bureau. This dataset contains data about the population of individual census tracts, which range from approximately 400 to 20,000 residents (with an average population of approximately 4,000 residents). The census data was cleaned but did not require further modification. Four census tracts with no population were excluded from the analysis. Racial data analysed only includes the three largest racial groups in Chicago: white, Black, and Hispanic. Other racial groups were excluded because their small populations were distributed over large geographic areas that did not permit meaningful analysis.

The data analysed contains significant gaps that do not permit a complete portrayal of the domestic violence racial inequity in Chicago. Many domestic violence crimes are not reported to the police, and incidents that are reported rely on officer discretion for accurate classification; both factors result in a significant undercount of domestic violence incidents. The census data was collected from a multi-year survey of a small sample of residents to represent the population of a census tract. Some of the census data has very high margins of error; this issue will be discussed in the analysis.

Data Analysis

Plotting domestic violence crimes on a map of Chicago shows clear and heavy concentrations on the South and West Sides of the city, which are heavily Black and poor areas. The geographic distribution of domestic violence offences consistently follows this pattern across the five years of crime data analysed and within each individual crime category.
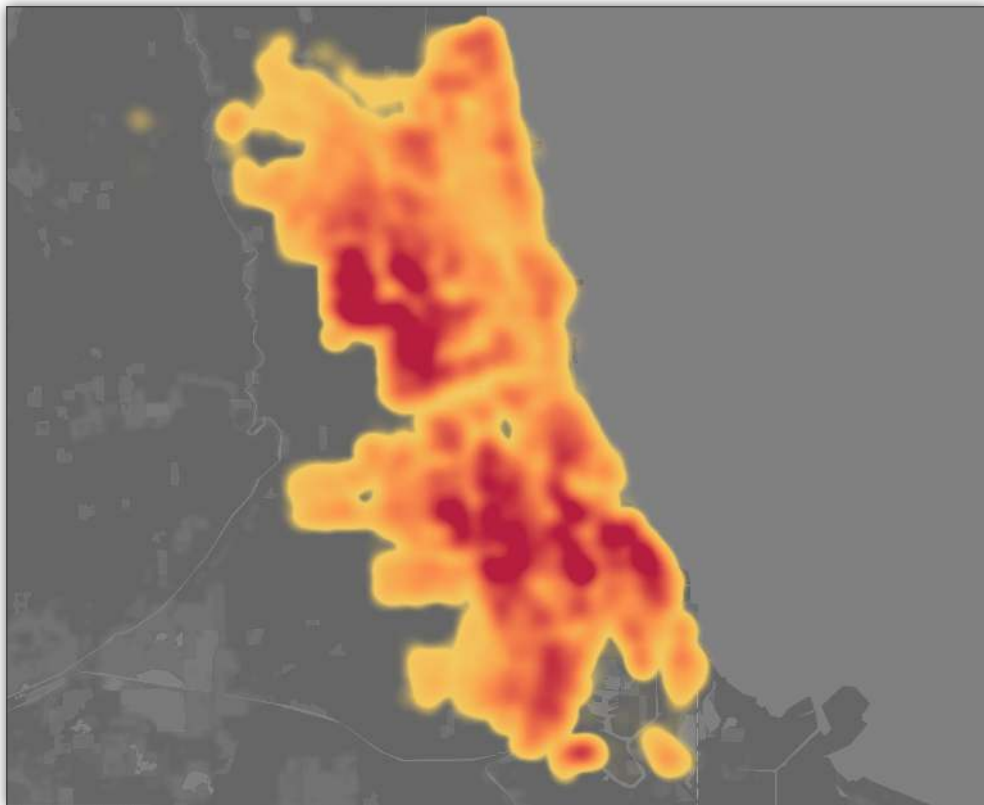

Figure 2: Heat map of domestic violence crimes
Domestic violence is heavily concentrated in segregated, impoverished Black neighbourhoods.

Redlining & Domestic Violence

The comparison between the current location of concentrated domestic violence crime and historically redlined areas of Chicago provided mixed results. On the South Side of the city, the hypothesis was partially supported, with higher rates of domestic violence appearing in some areas with historical D-grade ratings that prevented residents from getting mortgages. But the high concentration of domestic violence on the West Side was not predicted by D-graded areas on the redlining map.
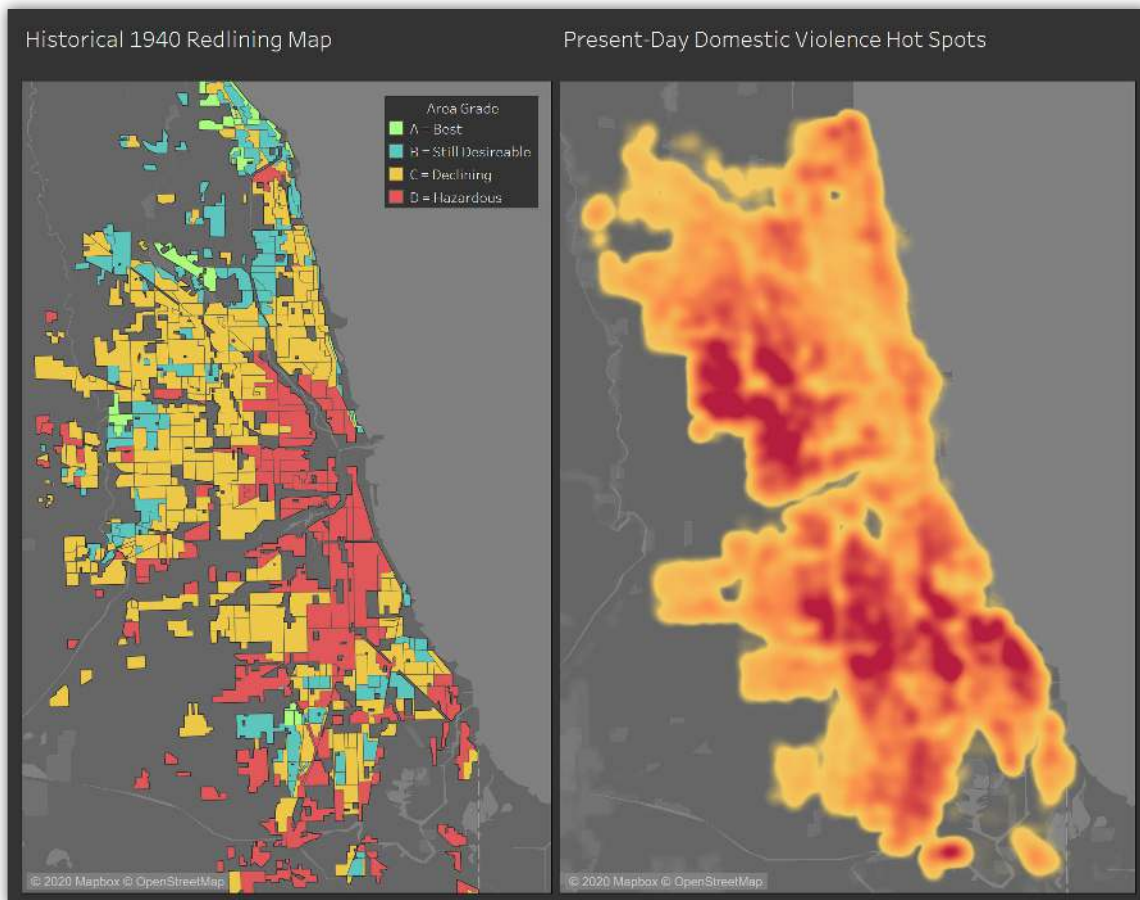

Figure 3: Historical redlining map compared to domestic violence heat map

Concentrated domestic violence on the South Side of Chicago correlates with historically redlined D-grade areas, but the high rate of domestic violence on the West Side does not.

The relationship between historical redlining and current neighbourhood segregation and disadvantage is complex and multifaceted. This complexity prevents this research from drawing any definitive conclusions about the relationship between redlining and modern levels of domestic violence. Prior research in this area has found strong links between historical redlining and modern levels of segregation and poverty as well as high levels of other types of crime (Aaronson et al. 34; Wilson 557; Jacoby et al. 92), but this preliminary and limited examination of the issue through the lens of domestic violence crime did not substantiate this relationship.

The formerly redlined downtown area became Chicago's major commercial district; one possible explanation for the emergence of the West Side as a domestic violence hot spot is that commercial development displaced the residents of these areas, pushing them farther west. Recent gentrification of many Chicago neighbourhoods adds an additional confounding variable. More comprehensive research on the relationship between historical redlining and rates of domestic violence should examine how the racial and economic makeup of redlined areas changed over time and control for other variables that were not addressed in this study.
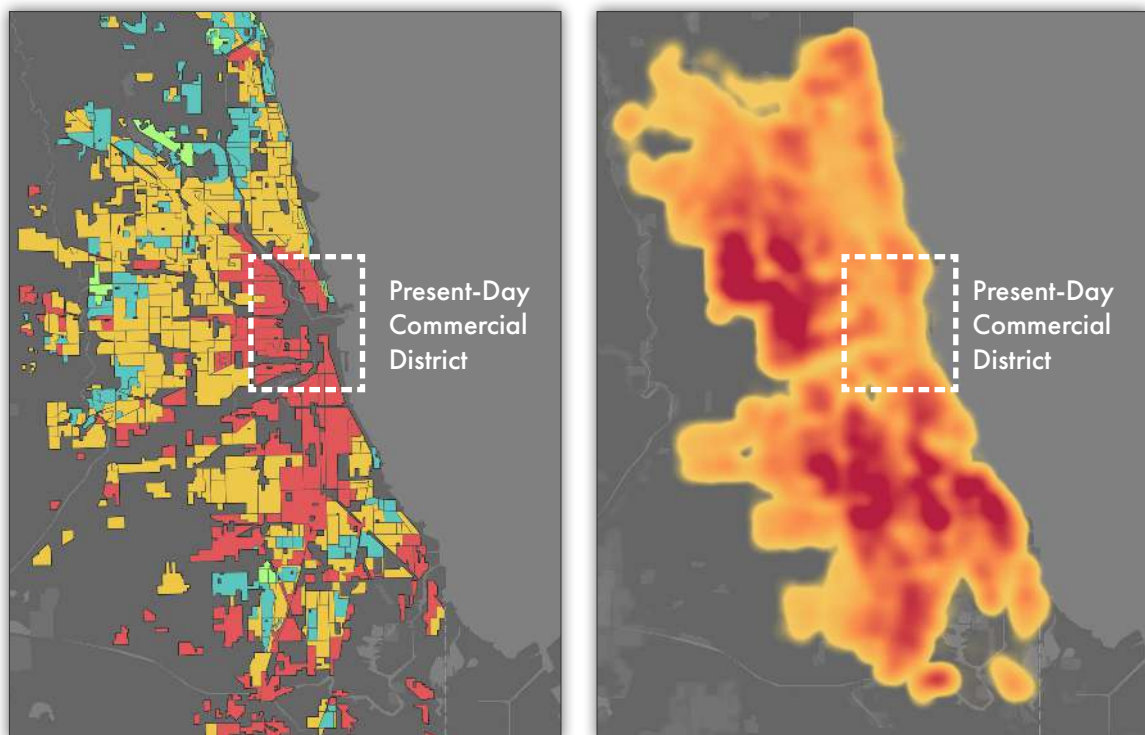

Figure 4: Maps annotated with present-day commercial district

One possible explanation for the West Side's current levels of domestic violence is that poor, Black residents were pushed farther west as the downtown area gentrified.

Race & Domestic Violence

The percentage of Black residents in a census tract was highly correlated with the number of crimes per 100 residents in the same geographic area. Visualisations show a clear pattern of domestic violence crime locations overlapping segregated Black areas on the South and West Sides of the city.
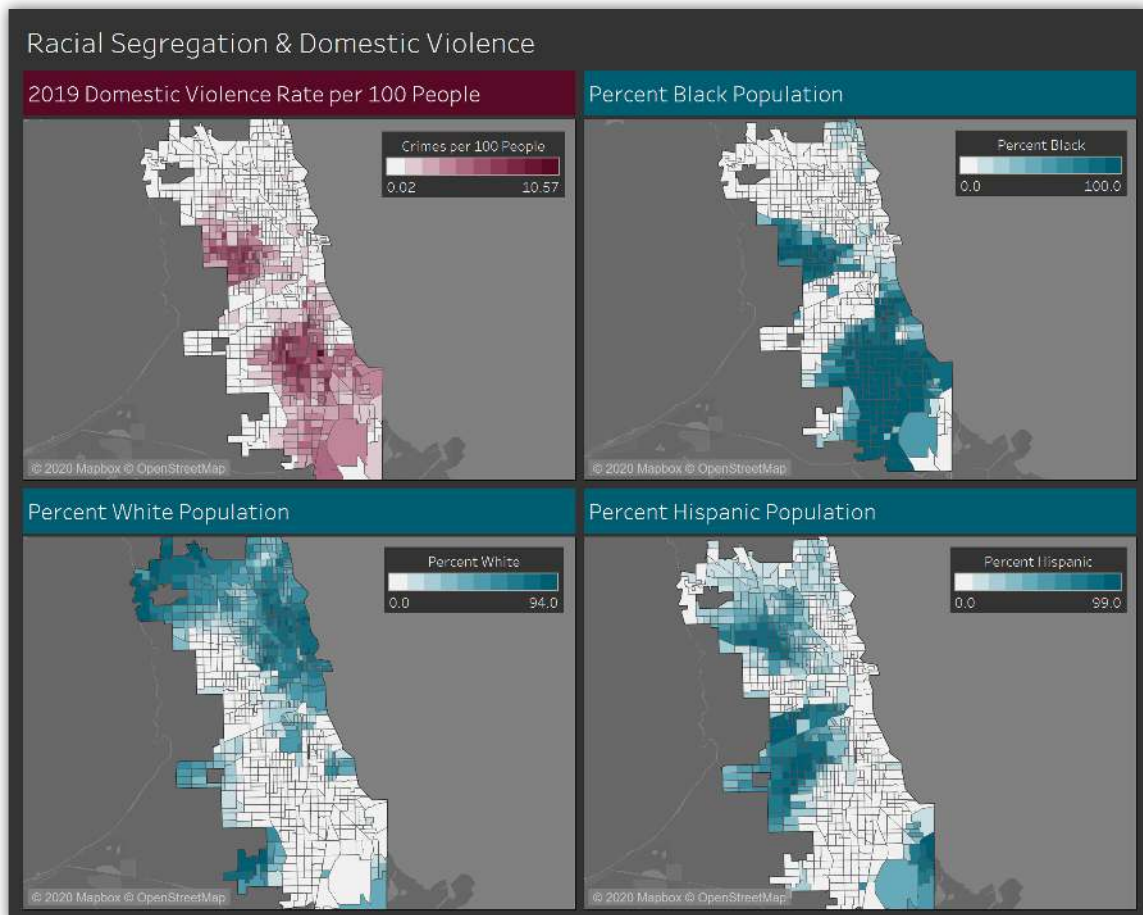

Figure 5: Racial segregation and domestic violence maps

High rates of domestic violence are concentrated in heavily segregated Black areas of Chicago. Hispanic and white areas showed significantly lower rates of domestic violence and lower levels of segregation.

Plotting the rates of domestic crime by percentage of race in a given census tract makes this wide variability in crime rates among heavily Black areas clearer, as well as highlighting the extreme level of Black segregation.
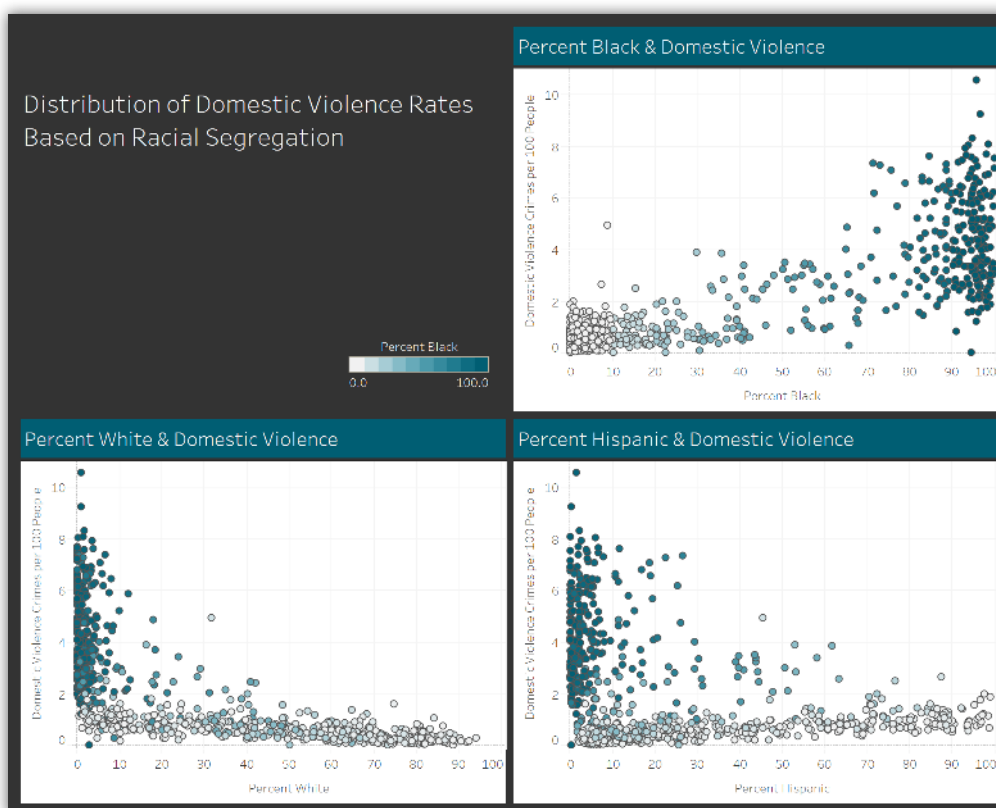

Figure 6: Racial segregation scatterplot charts

Domestic violence crime rate compared to the percentage of Black residents in the census tract.

The strong correlation between the Black population and the rate of domestic violence is a finding that must be interpreted with care. Multiple studies have found that after controlling for individual poverty and neighbourhood disadvantage, the wide discrepancy between domestic violence rates among Blacks and whites decreases or disappears (Rennison and Planty 440; Benson and Fox 5; Sokoloff and Dupont 48; Benson et al. 338). The data analysed did not permit controlling for these factors, and Chicago's extreme level of segregation and inequality makes it difficult to separate race from poverty. Reliance on official police-recorded data presents additional issues. Black women are more likely to report domestic violence incidents than white women, which could over-represent domestic violence rates in predominantly Black census tracts (Greenfeld et al. 19; Felson et al. 633).

Additionally, the context of the fraught relationship between Black communities, the police, and the criminal justice system as a whole must be considered when analysing crime data in Black neighbourhoods. In disadvantaged and segregated Black neighbourhoods, police behave differently than they do in white neighbourhoods—officers view residents with more suspicion, arrest at higher rates, use force at higher rates, and exhibit other behaviours indicative of aggressive policing that make interaction with the criminal justice system more likely in disadvantaged neighbourhoods (Smith 313; Terrill and Reisig 291).

Poverty & Domestic Violence

Poverty also showed a clear correlation with elevated domestic violence rates across multiple different measures. Determining poverty is a complex matter involving many different factors; this study focuses on the percentage of unemployment, the percentage of residents living below the poverty line, the percentage of residents using food stamps, and the median household income in each census tract. Broadly, all measures of poverty positively correlated with higher rates of domestic violence; median household income was inversely related to the rate of domestic violence. It is not a coincidence that the Blackest neighbourhoods in Chicago are also the poorest; this pattern is both a symptom of racism and segregation and a factor perpetuating racial inequality. Although the margin of error for these economic measures is high overall, it is significantly higher in poor and nonwhite areas of the city, providing an example of how data about marginalised groups is neglected and deprioritised by official agencies (D'Ignazio and Klein 39).
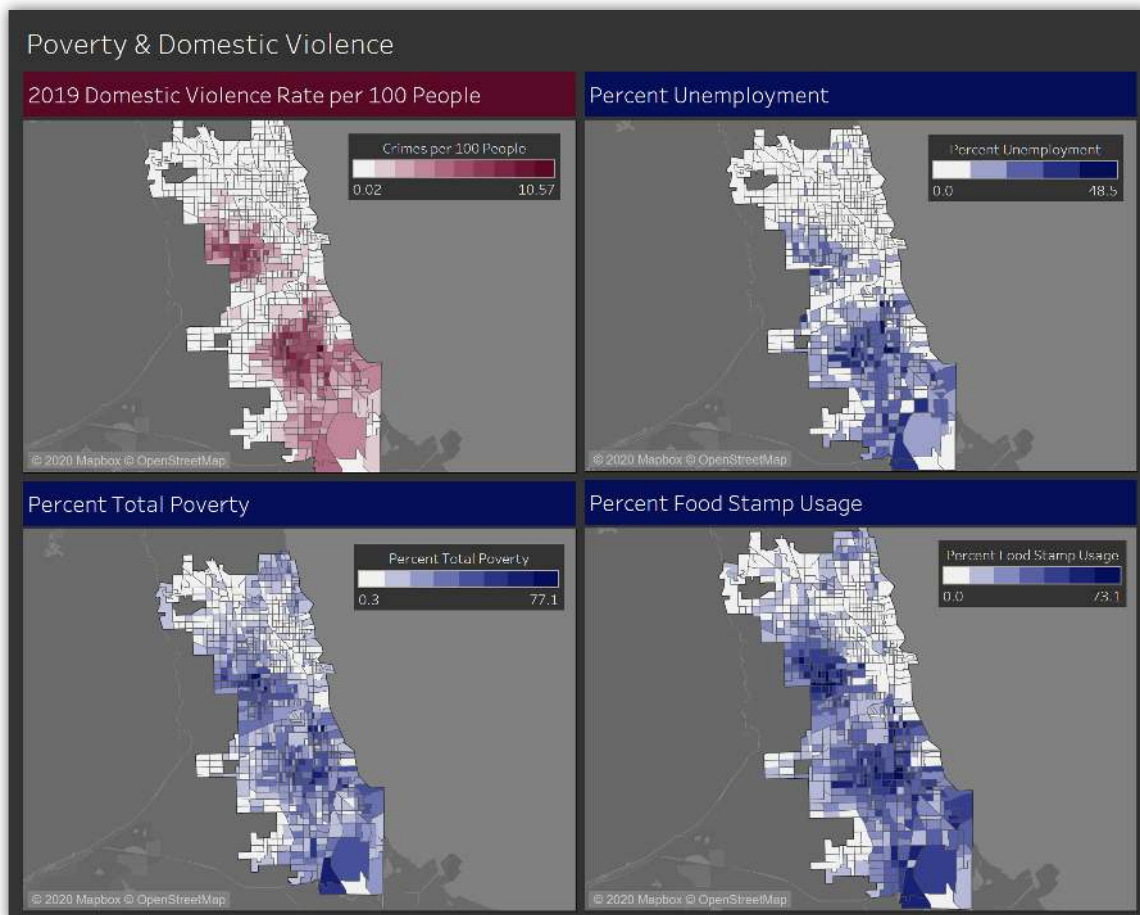

Figure 7: Poverty measures and domestic violence

Domestic violence crime hot spots correlate with higher poverty levels.

Unemployment

The strongest relationship between all poverty measures analysed and domestic violence rates was unemployment. Unemployment rates closely tracked with the geographic distribution of concentrated domestic violence crime. This finding supports prior research linking individual unemployment and economic insecurity to higher rates of domestic violence (Macmillan and Gartner 947; Benson and Fox 5; Benson et al. 338). Highly segregated Black areas of the city showed the highest rates of unemployment. Other research has indicated segregation and housing discrimination contribute to the large disparity between Black and white male unemployment levels (Farley 129; Galster and Keeney 87). Although this analysis did not address gender-specific unemployment rates, the concentration of high unemployment in heavily segregated Black areas of Chicago provides support for this research.
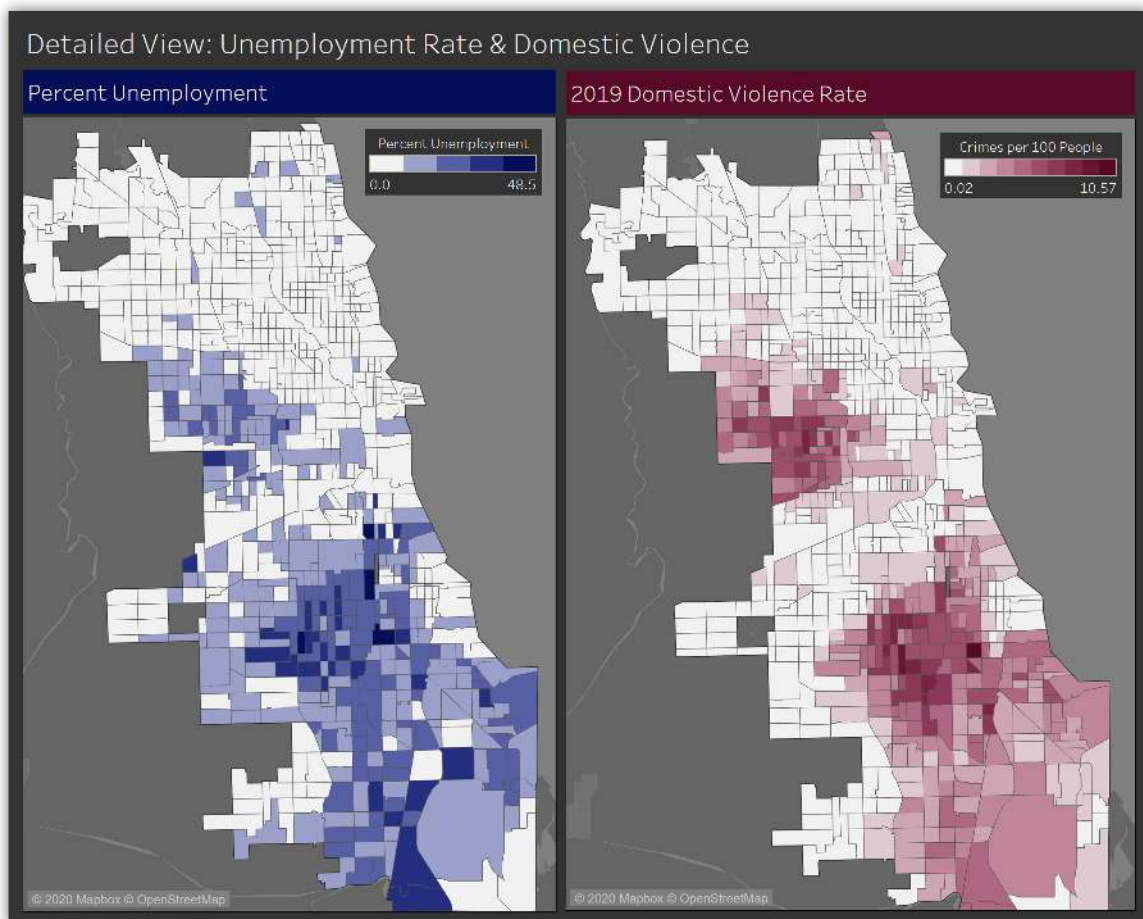

Figure 8: Unemployment rate compared to domestic violence

Unemployment showed the strongest correlation to rates of domestic violence of all poverty measures analysed, with unemployment rates closely matching the geographic distribution of domestic violence.

Total Poverty Rate

The areas with the highest percentage of residents living below the poverty line roughly aligned with the domestic violence hot spots. However, high levels of poverty are more widely distributed across the city than the pattern of domestic violence crime, with many Hispanic areas of the city experiencing elevated levels of poverty but not correspondingly high domestic violence rates, diverging from the relationship seen in Black areas. This result supports the National Intimate Partner and Sexual Violence Survey finding that Hispanic women experience domestic violence at a lower rate than Black women (37.1 percent for Hispanics compared to 43.7 percent for Blacks) (Breiding et al. 27).
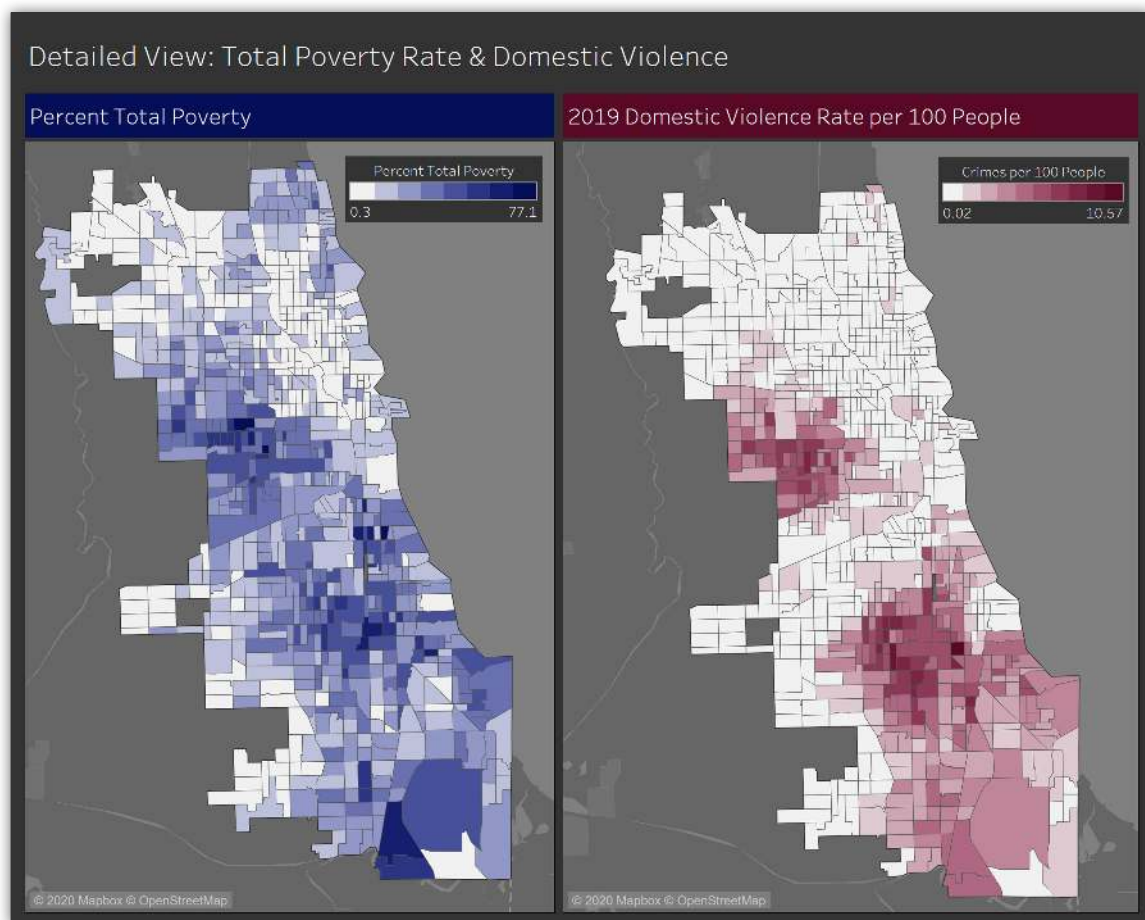
Figure 9: Total poverty rate and domestic violence

The areas with the highest percentage of residents living below the poverty line roughly aligned with the domestic violence hot spots. However, high levels of poverty are more widely distributed across the city than domestic violence.

Considering other measures of poverty and racial composition when comparing the total poverty rate to domestic violence highlights some of the differences between majority-Black and majority-Hispanic census tracts with similar levels of poverty. Most majority-Black census tracts have higher rates of unemployment than majority-Hispanic census tracts with similar poverty rates.

Food Stamp Usage

The percentage of households using food stamps had a closer link to domestic violence than the percentage of residents living below the poverty line. However, the same pattern seen in analysis of the population living below the poverty line—that majority-Hispanic neighbourhoods have moderately high levels of poverty but not significantly higher domestic violence rates—occurs here to a lesser degree. Levels of food stamp usage were significantly higher in majority-Black districts, and Ulmer et al. found that racial gaps in poverty rates between Blacks and Hispanics were positively associated with disparities in homicide and violence rates between the two racial groups (799). This analysis reveals a similar pattern with domestic violence.
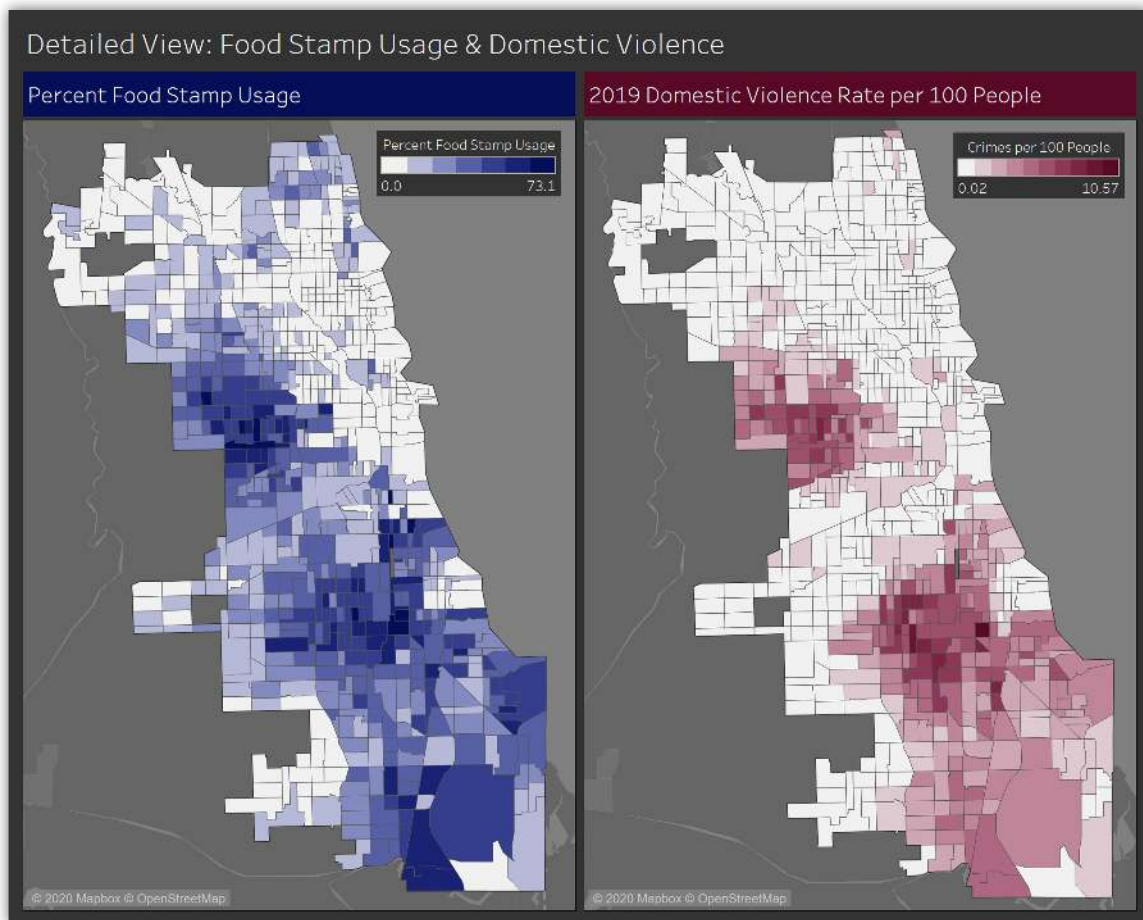

Figure 10: Food stamp usage and domestic violence

The percentage of households using food stamps had a closer link to domestic violence than the percentage of the population living below the poverty line, with a more clear correlation to high domestic violence rates on the South and West Sides.

Median Household Income

A negative correlation emerged between the median household income and the rate of domestic violence, with the wealthiest areas of Chicago showing domestic violence rates 10 times lower than the most impoverished areas. The inverse relationship between income and domestic violence highlights the significance of poverty as a risk factor for domestic violence, and the geographic clustering of high poverty levels in segregated Black areas of Chicago visually depicts the statistical reality that Blacks experience higher rates of poverty than whites (Benson and Fox 4; Semega et al. 13; Rennison and Planty 440).
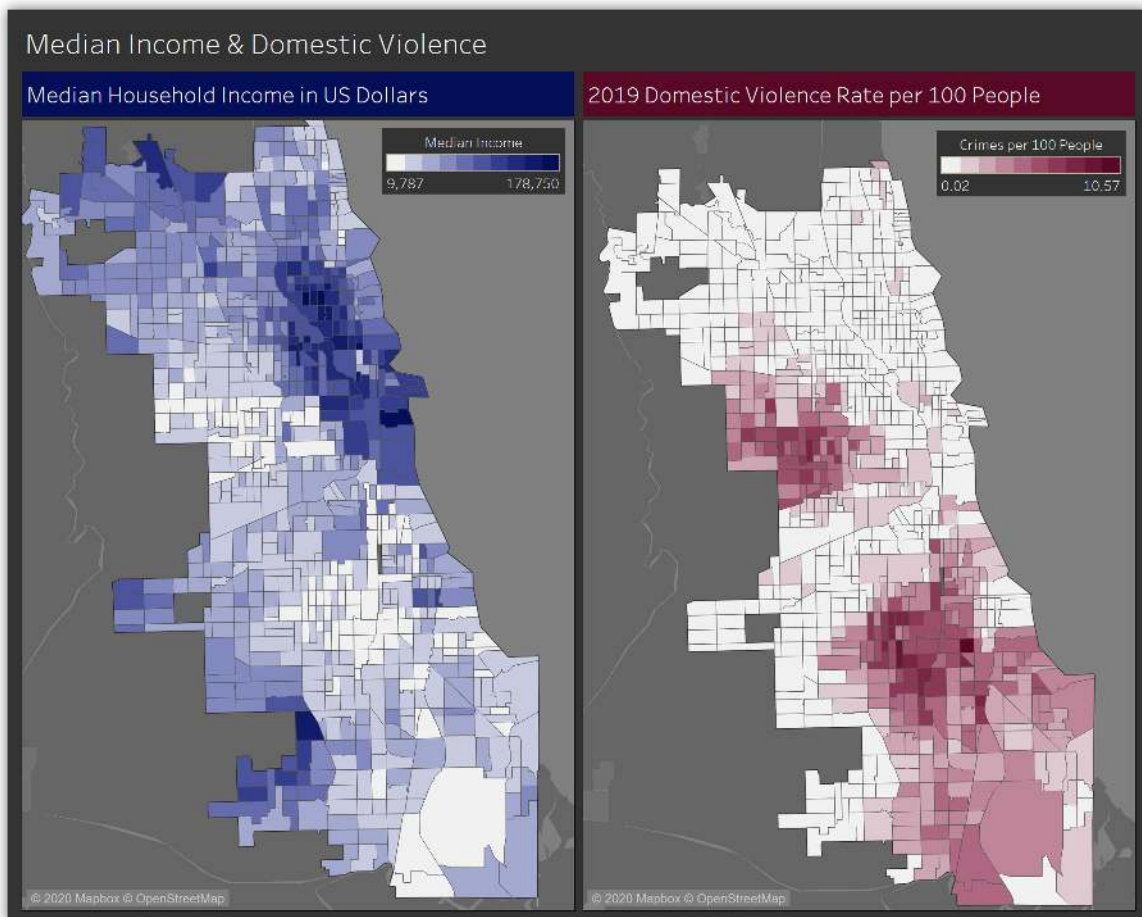

Figure 11: Median household income and domestic violence

Median household income shows an inverse relationship to the domestic violence rate in each census tract.

Gaps & Missing Data

Although I found strong support for the links between race, poverty, and domestic violence, the analysis uncovered an additional unexpected finding—consistently high margins of error in the American Community Survey census data about poverty in minority census tracts. Prior research has found ACS data in predominantly nonwhite areas is less accurate than in white areas, particularly when comparing small areas with low populations, as was the case for data used in this study (Napierala and Denton 287). Small sample size was a clear and significant contributor to high margins of error in this dataset. However, the relatively consistent patterns that emerged from the analysis across many different measures of poverty add reliability to the general narrative despite flaws and "fuzziness" in the data.

The large discrepancy in the margin of error between white areas and nonwhite areas supports D'Ignazio and Klein's assertion that data reflects existing power structures and that missing and flawed data about marginalised groups serves to maintain those gendered and racialised structures (38–39). Inaccurate or absent data absolves bodies in power from addressing problems rooted in racism and misogyny in an increasingly data-driven society where "proof" is required for taking action (D'Ignazio and Klein 57). This pattern consistently appeared across all measures of poverty, but the high margin of error for the percentage of children living below the poverty line in nonwhite census tracts provides the most striking example.
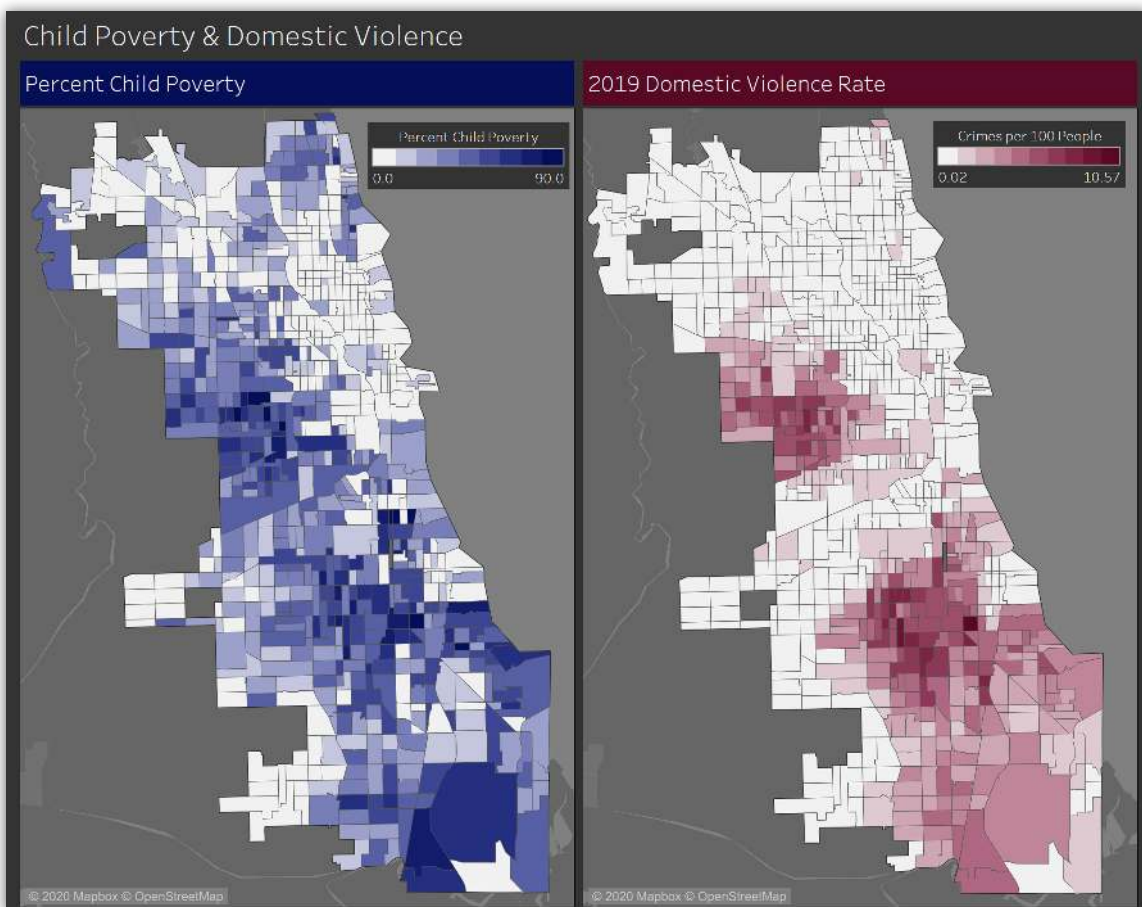

Figure 12: Child poverty and domestic violence

Child poverty appears to be more widely distributed across the city than other poverty measures.

An initial comparison of the child poverty map with the domestic violence crime map shows extremely high levels of child poverty across much of the city. Although the most concentrated child poverty levels are clustered on the South and West Sides, consistent with the other poverty measures analysed, much of the rest of the city has child poverty rates far greater than the national average rate of 19.5 percent ("Selected Economic Characteristics"). The hot spots of domestic violence crime initially appear to show a weaker relationship to child poverty. But visualising the margin of error and missing data reveals the incomplete and flawed nature of this data.
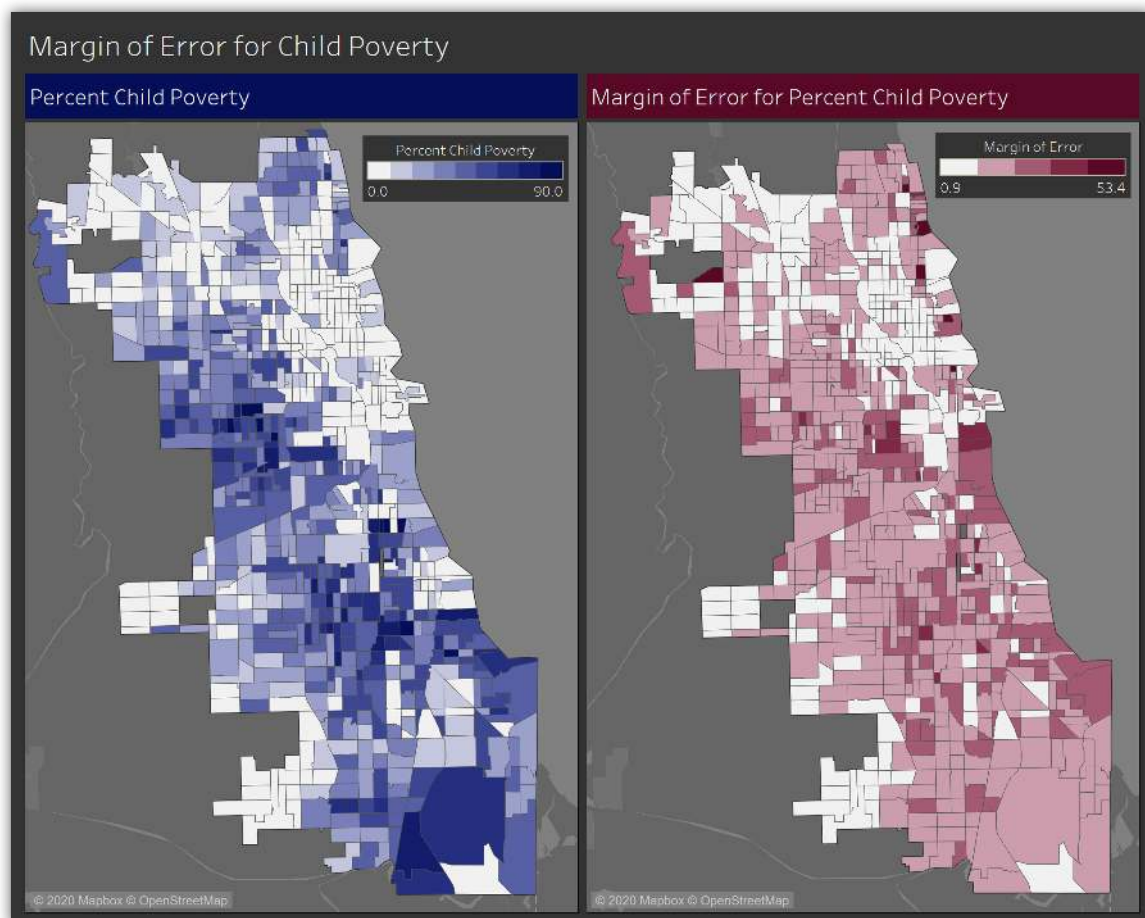

Figure 13: Child poverty margin of error

Visualising the margin of error for child poverty shows the same pattern as the data itself. Higher rates of child poverty on the South and West Sides of Chicago correlate with higher margins of error. The data collected about the highest-poverty areas has the least reliability.

Missing data is a clear issue. Multiple census tracts show a zero percent poverty rate. In affluent areas of the city, this data may be fairly accurate. But on the South and West Sides of the city in census tracts with high segregation, high poverty, and high levels of domestic violence, zero percent childhood poverty rates are beyond implausible.

Analysis reveals that though the margin of error is high for this variable across the entire city, nonwhite census tracts have consistently higher margins of error than white census tracts. Differing population sizes and the percentage of children living in each census tract account for a great deal of this difference, as white census tracts tend to have higher populations. However, this pattern still emerges when majority-white tracts are compared to majority-Black tracts with similar populations.

The amount of missing data about poverty and its extremely high margins of error in Black census tracts provides an indication of who matters and whose data gets counted. The most tragic narrative shown by this data negligence is that even when wildly large margins of error are accounted for, child poverty levels on the South and West Sides of Chicago remain staggeringly high. Census tract data is extensively used in both policymaking and research, and accurate collection is vital to effective implementation. As long as the data is unreliable, the status quo persists.

Summary

The hypothesized relationship between historically redlined areas of Chicago and the current distribution of domestic violence was only partially supported; high levels of domestic violence on the West Side of the city were not correlated with historical redlining. The limited nature of this investigation prevents drawing any definitive conclusions about these findings. Analysis of the relationship between domestic violence rates and segregation, race, and poverty showed correlations across all measures. The relationship between race, poverty, and domestic violence is a complex one, particularly in highly segregated neighbourhoods. Disproportionately high margins of error in the Blackest and most impoverished areas of Chicago indicate who is valued and what data is deemed worth recording.

Recommendations

A common adage in Chicago is that "every map is the same map." The geographic distribution of domestic violence in Chicago largely aligns with maps plotting data about everything from parking tickets to homicides because the underlying narrative is the same—segregation, poverty, and racism have a punishing impact on every aspect of Black Chicagoans' lives (Sanchez and Ramos; "Tracking Chicago Homicide Victims"). This is a known issue, and failing to address it is an active choice that perpetuates past injustice. The overarching theme that has emerged from this research is the need to involve Black communities and Black women specifically in efforts to address high rates of domestic violence. D'Ignazio and Klein have defined seven principles of data feminism—examine power, challenge power, elevate emotion and embodiment, rethink binaries and hierarchies, embrace pluralism, consider context, and make labour visible—that should be taken into consideration (17–18).

The primary recommendation is to devote significant resources to rigorous, detailed, and timely data collection about domestic violence and poverty. These visualisations show the location of domestic violence crimes and their relationship to poverty measures, but the official data sources used cannot tell the complete story. Involving local community groups on the South and West Sides of Chicago and organizations such as Data 4 Black Lives as part of a data-collection process that incorporates the experiences and perspectives of Black women would counterbalance "official" data that results from unequal power relations ("About Us"; D'Ignazio and Klein 17).

Addressing the Chicago adage that "every map is the same map"—and changing the narrative that map depicts—requires significant effort as well. Critical cartography states that maps are not neutral scientific documents; they reflect power, politics, and representation (Crampton and Krygier 12). Counter-mapping, which emerged as a tool for marginalized groups to "re-claim territories" from official sources, is a promising avenue for collecting missing data (Peluso 383).

The Detroit Geographic Expedition and Institute's 1971 map *Where Commuters Run Over Black Children on the Pointes-Downtown Track* (see fig. 15) marked areas where white commuters were killing Black children—data that was well-known in Black communities but not collected by official sources (D'Ignazio and Klein 49).
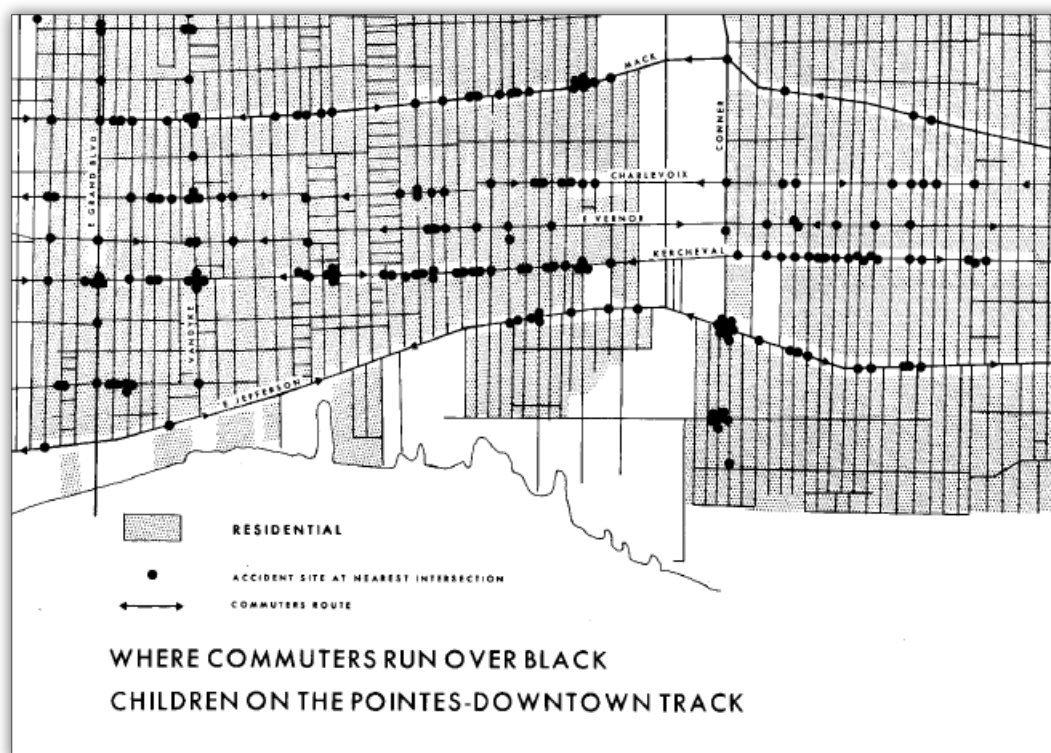

Figure 14: *Where Commuters Run Over Black Children on the Pointes-Downtown Track*

1971 Detroit Geographic Expedition and Institute map created from community knowledge to document missing data about Black children being killed by white motorists.

Credit: Gwendolyn Warren, Detroit Geographical Expedition and Institute, Field Notes No. 3: The Geography of Children, Part II

Detailed mapping in the context of domestic violence is a fraught and challenging measure due to the dangers of identifying particular locations that could endanger victims. But counter-mapping community-defined measures of poverty—such as the percentage of residents who lack a bank account or cannot afford a parking ticket—that incorporate lived experiences in map creation is an area worth exploring.

A final recommendation is to test the effectiveness of this data visualisation in informing and persuading audiences about this issue, as well as broader testing of data visualisations about race, inequality, poverty, and sexism. Discovering what techniques and types of visualisations effectively advance anti-racism advocacy, influence policy, and track progress would aid in future developments. Research testing data visualisation effectiveness focuses on hand-coded pieces from well-resourced news organisations; little research exists about the effectiveness of data visualisations created with off-the-shelf software. Additional work must be done to examine the effectiveness of visualisations created with Tableau and other similar programmes.

Conclusion

This project and data visualisation are a starting point, a proof of concept using publicly available data to visually represent the racial inequity of domestic violence rates in Chicago. Results showed significant support for positive relationships between race, segregation, poverty, and domestic violence. Less support was found for a positive relationship between historically redlined areas of the city and current levels of domestic violence, partially as a result of limitations in the dataset analysed. Missing data and high margins of error in nonwhite areas of Chicago emerged in the analysis. The patterns revealed in these visualisations told a consistent narrative about race, segregation, poverty, and domestic violence, but the validity of the findings was compromised by the data used to create them.

In addition to the other limitations, this project's examination of domestic violence as a female problem is inherently flawed, but this oversimplification was an inevitable result of limited research about men experiencing domestic violence, the lower rate at which men report domestic violence incidents, and the inability to isolate gender in the crime data analysed.

Data visualisation can be a powerful tool for exploring narratives that highlight inequity and persuading audiences to support policy efforts to address these problems. The narrative in this visualisation is clear, but it is not complete or reliable. Official sources of data fail to depict the full scope of this issue, and this project makes clear how much work remains to tell a comprehensive narrative about the relationship between domestic violence, race, and poverty in Chicago.

Appendix

Data Used for Analysis

This folder contains all crime data, census data, and shapefiles used in the data visualisations.

Citations

2019 Diversity and Inclusion Report. The New York Times, 2019. *www.nytco.com*, https://www.nytco.com/company/diversity-and-inclusion/2019-diversity-and-inclusion-report/.

Aaronson, Daniel, et al. *The Effects of the 1930s HOLC "Redlining" Maps.* Federal Reserve Bank of Chicago, Feb. 2019, https://www.chicagofed.org/publications/working-papers/2017/wp2017-12.

"About Us." *Data 4 Black Lives*, http://d4bl.org/about.html. Accessed 31 July 2020.

"Abuse Defined." *The National Domestic Violence Hotline. www.thehotline.org*, https://www.thehotline.org/is-this-abuse/abuse-defined/. Accessed 18 June 2020.

"ACS Demographic and Housing Estimates." *United States Census Bureau*, 2018, https://data.census.gov/cedsci/table?q=dp05&tid=ACSDP5Y2018.DP05&vintage=2018.

Anderson, E. W., et al. "A User Study of Visualization Effectiveness Using EEG and Cognitive Load." *Computer Graphics Forum*, vol. 30, no. 3, 2011, pp. 791–800. *Wiley Online Library*, https://doi.org/10.1111/j.1467-8659.2011.01928.x.

Benson, Michael L., et al. "The Correlation between Race and Domestic Violence Is Confounded with Community Context." *Social Problems*, vol. 51, no. 3, Oxford Academic, Aug. 2004, pp. 326–42. *academic.oup.com*, https://doi.org/10.1525/sp.2004.51.3.326.

Benson, Michael L., and Greer L. Fox. *Economic Distress, Community Context and Intimate Violence: An Application and Extension of Social Disorganization Theory, Final Report.* Mar. 2002, pp. 1–166. *DOI.org (Crossref)*, https://doi.org/10.1037/e513092006-001.

Benson, Michael L., and Greer L. Fox. *When Violence Hits Home: How Economics and Neighborhood Play a Role.* U.S. Department of Justice Office of Justice Programs, 2004, pp. 1–6. *DOI.org (Crossref)*, https://doi.org/10.1037/e308402005-001.

Black, M. C., et al. *The National Intimate Partner and Sexual Violence Survey (NISVS): 2010 Summary Report.* Summary Report, National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, 2011, pp. 1–113, https://www.cdc.gov/violenceprevention/pdf/NISVS_Report2010-a.pdf.

Borkin, Michelle A., et al. "What Makes a Visualization Memorable?" *IEEE Transactions on Visualization and Computer Graphics*, vol. 19, no. 12, Dec. 2013, pp. 2306–15. *IEEE Xplore*, https://doi.org/10.1109/TVCG.2013.234.

Bosman, Julie. "Domestic Violence Calls Mount as Restrictions Linger: 'No One Can Leave.'" *The New York Times*, 15 May 2020. *NYTimes.com*, https://www.nytimes.

com/2020/05/15/us/domestic-violence-coronavirus.html.

boyd, danah, and Kate Crawford. "Critical Questions for Big Data." *Information,*
Communication & Society, vol. 15, no. 5, Routledge, June 2012, pp. 662–79. *Taylor and*
Francis+NEJM, https://doi.org/10.1080/1369118X.2012.678878.

Breiding, M. J., et al. *Intimate Partner Violence In the United States – 2010*. National Center
for Injury Prevention and Control, Centers for Disease Control and Prevention, 2014, pp.
1–96. https://www.cdc.gov/violenceprevention/pdf/cdc_nisvs_ipv_report_2013_
v17_single_a.pdf.

Browne, Angela, and Shari S. Bassuk. "Intimate Violence in the Lives of Homeless and Poor
Housed Women: Prevalence and Patterns in an Ethnically Diverse Sample." *American*
Journal of Orthopsychiatry, vol. 67, no. 2, 1997, pp. 261–78. *DOI.org (Crossref)*,
https://doi.org/10.1037/h0080230.

Bullock, Cathy Ferrand. "Framing Domestic Violence Fatalities: Coverage by Utah
Newspapers." *Women's Studies in Communication*, vol. 30, no. 1, Routledge, Apr.
2007, pp. 34–63. *Taylor and Francis+NEJM*, https://doi.org/10.1080/07491409.200
7.10162504.

Chicago Police Department. "Crimes - 2001 to Present." *Chicago Data Portal*, https://data.
cityofchicago.org/Public-Safety/Crimes-2001-to-Present/ijzp-q8t2.

City of Chicago. "Boundaries - Census Tracts - 2010." *Chicago Data Portal*, https://data.
cityofchicago.org/Facilities-Geographic-Boundaries/Boundaries-Census-Tracts-
2010/5jrd-6zik.

Crampton, Jeremy W., and John Krygier. "An Introduction to Critical Cartography." *ACME: An*
International Journal for Critical Geographies, vol. 4, no. 1, 1, 2005, pp. 11–33. *acme-*
journal.org, https://acme-journal.org/index.php/acme/article/view/723.

Crenshaw, Kimberlé. "Mapping the Margins: Intersectionality, Identity Politics, and Violence
against Women of Color." *Stanford Law Review*, vol. 43, no. 6, July 1991, p. 1241. *DOI.*
org (Crossref), https://doi.org/10.2307/1229039.

D'Ignazio, Catherine, and Lauren F. Klein. *Data Feminism*. MIT Press, 2020.

Drew, Emily M. "'Coming to Terms with Our Own Racism': Journalists Grapple with the
Racialization of Their News." *Critical Studies in Media Communication*, vol. 28, no. 4,
Routledge, Oct. 2011, pp. 353–73. *Taylor and Francis+NEJM*, https://doi.org/10.1080
/15295036.2010.514936.

Dube, Shanta R., et al. "Exposure to Abuse, Neglect, and Household Dysfunction Among Adults
Who Witnessed Intimate Partner Violence as Children: Implications for Health and
Social Services." *Violence and Victims*, vol. 17, no. 1, Springer, Feb. 2002, pp. 3–17.
connect.springerpub.com, https://doi.org/10.1891/vivi.17.1.3.33635.

Dunlap, Joanna C., and Patrick R. Lowenthal. "Getting Graphic about Infographics: Design Lessons Learned from Popular Infographics." *Journal of Visual Literacy*, vol. 35, no. 1, Jan. 2016, pp. 42–59. *DOI.org (Crossref)*, https://doi.org/10.1080/105114 4X.2016.1205832.

Easteal, Patricia, et al. "Enduring Themes and Silences in Media Portrayals of Violence against Women." *Women's Studies International Forum*, vol. 48, Jan. 2015, pp. 103–13. *ScienceDirect*, https://doi.org/10.1016/j.wsif.2014.10.015.

Emerson, John, et al. "The Challenging Power of Data Visualization for Human Rights Advocacy." *New Technologies for Human Rights Law and Practice*, edited by Jay D. Aronson and Molly K. Land, Cambridge University Press, 2018, pp. 162–87. *Cambridge University Press*, https://doi.org/10.1017/9781316838952.008.

Felle, Tom. "Digital Watchdogs? Data Reporting and the News Media's Traditional 'Fourth Estate' Function." *Journalism*, vol. 17, no. 1, Sage UK: London, England, 2016, pp. 85–96, https://doi.org/10.1177/1464884915593246.

Felson, Richard B., et al. "Reasons for Reporting and Not Reporting Domestic Violence to the Police." *Criminology*, vol. 40, no. 3, 2002, pp. 617–48. *Wiley Online Library*, https://doi.org/10.1111/j.1745-9125.2002.tb00968.x.

Gillum, Tameka L. "The Intersection of Intimate Partner Violence and Poverty in Black Communities." *Aggression and Violent Behavior*, vol. 46, May 2019, pp. 37–44. *DOI.org (Crossref)*, https://doi.org/10.1016/j.avb.2019.01.008.

Greenfeld, Lawrence A., et al. *Violence by Intimates: Analysis of Data on Crimes by Current or Former Spouses, Boyfriends, and Girlfriends.* Bureau of Justice Statistics Factbook, U.S. Department of Justice Office of Justice Programs, Mar. 1998, pp. 1–49. https://www.ncjrs.gov/App/Publications/abstract.aspx?ID=167237.

Guzman, Gloria. "U.S. Median Household Income Up in 2018 From 2017." *The United States Census Bureau*, 26 Sept. 2019. *www.census.gov*, https://www.census.gov/library/stories/2019/09/us-median-household-income-up-in-2018-from-2017.html.

Harmon, Amy, and Audra D. S. Burch. "White Americans Say They Are Waking Up to Racism. What Will It Add Up To?" *The New York Times*, 22 June 2020. *NYTimes.com*, https://www.nytimes.com/2020/06/22/us/racism-white-americans.html.

Iliadis, Andrew, and Federica Russo. "Critical Data Studies: An Introduction." *Big Data & Society*, vol. 3, no. 2, SAGE Publications, Dec. 2016, pp. 1–7. *SAGE Journals*, https://doi.org/10.1177/2053951716674238.

Jacoby, Sara F., et al. "The Enduring Impact of Historical and Structural Racism on Urban Violence in Philadelphia." *Social Science & Medicine*, vol. 199, Feb. 2018, pp. 87–95. *ScienceDirect*, https://doi.org/10.1016/j.socscimed.2017.05.038.

Janssen, Marijn, et al. "Benefits, Adoption Barriers and Myths of Open Data and Open Government." *Information Systems Management*, vol. 29, no. 4, Taylor & Francis, Sept. 2012, pp. 258–68. *Taylor and Francis+NEJM*, https://doi.org/10.1080/10580530.2 012.716740.

Kennedy, Helen, et al. "Engaging with (Big) Data Visualizations: Factors That Affect Engagement and Resulting New Definitions of Effectiveness." *First Monday*, vol. 21, no. 11, University of Illinois at Chicago Library, Nov. 2016. *eprints.whiterose.ac.uk*, https://doi.org/10.5210/fm.v21i11.6389.

Kuhn, Moritz, et al. *Income and Wealth Inequality in America, 1949-2016.* Institute Working Paper, Federal Reserve Bank of Minneapolis Opportunity and Inclusive Growth Institute, 14 June 2018, pp. 1–55. https://minneapolisfed.org/institute/institute-working-papers/income-and-wealth-inequality-in-america-1949-2016.

Labrinidis, Alexandros, and H. V. Jagadish. "Challenges and Opportunities with Big Data." *Proceedings of the VLDB Endowment*, vol. 5, no. 12, Aug. 2012, pp. 2032–2033. https://doi.org/10.14778/2367502.2367572.

Lee, Tina. "Child Welfare Practice in Domestic Violence Cases in New York City: Problems for Poor Women of Color." *Women, Gender, and Families of Color*, vol. 3, no. 1, University of Illinois Press, 2015, pp. 58–87. JSTOR, https://www.jstor.org/stable/10.5406/womgenfamcol.3.1.0058.

Lesage, Frédérik, and Robert A. Hackett. "Between Objectivity and Openness—The Mediality of Data for Journalism." *Media and Communication*, vol. 2, no. 2, July 2014, pp. 42–54. *www.cogitatiopress.com*, https://doi.org/10.17645/mac.v2i2.128.

Macmillan, Ross, and Rosemary Gartner. "When She Brings Home the Bacon: Labor-Force Participation and the Risk of Spousal Violence against Women." *Journal of Marriage and Family*, vol. 61, no. 4, 1999, pp. 947–58. JSTOR, https://doi.org/10.2307/354015.

Max, Wendy, et al. "The Economic Toll of Intimate Partner Violence Against Women in the United States." *Violence and Victims*, vol. 19, no. 3, Springer, June 2004, pp. 259–72. *connect.springerpub.com*, https://doi.org/10.1891/vivi.19.3.259.65767.

McKenna, S., et al. "Visual Narrative Flow: Exploring Factors Shaping Data Visualization Story Reading Experiences." *Computer Graphics Forum*, vol. 36, no. 3, June 2017, pp. 377–87. *DOI.org (Crossref)*, https://doi.org/10.1111/cgf.13195.

Napierala, Jeffrey, and Nancy Denton. "Measuring Residential Segregation With the ACS: How the Margin of Error Affects the Dissimilarity Index." *Demography*, vol. 54, no. 1, Feb. 2017, pp. 285–309. *DOI.org (Crossref)*, https://doi.org/10.1007/s13524-016-0545-z.

Nelson, Robert K., et al. "Mapping Inequality: Redlining in New Deal America," *American Panorama*, edited by Robert K. Nelson and Edward L. Ayers, https://dsl.richmond.edu/panorama/redlining/#loc=10/41.944/-88.096&city=chicago-il.

Oh, Jeeyun, et al. "Harnessing the Persuasive Potential of Data: The Combinatory Effects of Data Visualization and Interactive Narratives on Obesity Perceptions and Policy Attitudes." *Telematics and Informatics*, vol. 35, no. 6, Sept. 2018, pp. 1755–69. *ScienceDirect*, https://doi.org/10.1016/j.tele.2018.05.004.

Pandey, Anshul Vikram, et al. "The Persuasive Power of Data Visualization." *IEEE Transactions on Visualization and Computer Graphics*, vol. 20, no. 12, Dec. 2014, pp. 2211–20. *DOI. org (Crossref)*, https://doi.org/10.1109/TVCG.2014.2346419.

Peluso, Nancy Lee. "Whose Woods Are These? Counter-Mapping Forest Territories in Kalimantan, Indonesia." *Antipode*, vol. 27, no. 4, 1995, pp. 383–406. *Wiley Online Library*, https://doi.org/10.1111/j.1467-8330.1995.tb00286.x.

Pew Research Center. *In Changing News Landscape, Even Television Is Vulnerable*. Pew Research Center, 27 Sept. 2012, pp. 1–87. https://www.pewresearch.org/wp-content/uploads/sites/4/legacy-pdf/2012-News-Consumption-Report.pdf.

Remington, Alex. "'Social Science Done on Deadline': Research Chat with ASU's Steve Doig on Data Journalism." *Journalist's Resource*, 21 Aug. 2012, https://journalistsresource. org/tip-sheets/research/research-chat-steve-doig-data-journalism-social-science-deadline/.

Rennison, Callie, and Mike Planty. "Nonlethal Intimate Partner Violence: Examining Race, Gender, and Income Patterns." *Violence and Victims*, vol. 18, no. 4, Springer, Aug. 2003, pp. 433–43. *connect.springerpub.com*, https://doi.org/10.1891/vivi.2003.18.4.433.

Richie, Beth E. *Arrested Justice: Black Women, Violence, and America's Prison Nation*. NYU Press, 2012.

Sanchez, Melissa, and Elliott Ramos. "Chicago Hiked the Cost of Vehicle City Sticker Violations to Boost Revenue. But It's Driven More Low-Income, Black Motorists Into Debt." *ProPublica*, 26 July 2018, https://www.propublica.org/article/chicago-vehicle-sticker-law-ticket-price-hike-black-drivers-debt.

Segel, Edward, and Jeffrey Heer. "Narrative Visualization: Telling Stories with Data." *IEEE Transactions on Visualization and Computer Graphics*, vol. 16, no. 6, Nov. 2010, pp. 1139–48. *DOI.org (Crossref)*, https://doi.org/10.1109/TVCG.2010.179.

"Selected Economic Characteristics." *United States Census Bureau*, 2018, https://data.census. gov/cedsci/table?q=dp03&tid=ACSDP5Y2018.DP03.

Semega, Jessica, et al. *Income and Poverty in the United States: 2018*. U.S. Census Bureau, 2020, pp. 1–88, https://www.census.gov/library/publications/2019/demo/p60-266.html.

Shapiro, Thomas M. "Race, Homeownership and Wealth Poverty, Justice, and Community Lawyering: Interdisciplinary and Clinical Perspectives." *Washington University Journal of Law & Policy*, vol. 20, 2006, pp. 53–74. *HeinOnline*, https://heinonline.org/HOL/P?h=hein.journals/wajlp20&i=59.

Smith, Douglas A. "The Neighborhood Context of Police Behavior." *Crime and Justice*, vol. 8, The University of Chicago Press, Jan. 1986, pp. 313–41. *www-journals-uchicago-edu. libgate.library.nuigalway.ie (Atypon)*, https://doi.org/10.1086/449126.

Sokoloff, Natalie J., and Ida Dupont. "Domestic Violence at the Intersections of Race, Class, and Gender: Challenges and Contributions to Understanding Violence Against Marginalized Women in Diverse Communities." *Violence Against Women*, vol. 11, no. 1, SAGE Publications Inc, Jan. 2005, pp. 38–64. *SAGE Journals*, https://doi.org/10.1177/1077801204271476.

Terrill, William, and Michael D. Reisig. "Neighborhood Context and Police Use of Force." *Journal of Research in Crime and Delinquency*, vol. 40, no. 3, SAGE Publications Inc, Aug. 2003, pp. 291–321. *SAGE Journals*, https://doi.org/10.1177/0022427803253800.

"Tracking Chicago Homicide Victims." *Chicago Tribune*, 29 July 2020, https://www.chicagotribune.com/news/breaking/ct-chicago-homicides-data-tracker-htmlstory.html.

Ulmer, Jeffery T., et al. "Racial and Ethnic Disparities in Structural Disadvantage and Crime: White, Black, and Hispanic Comparisons." *Social Science Quarterly*, vol. 93, no. 3, 2012, pp. 799–819. *Wiley Online Library*, https://doi.org/10.1111/j.1540-6237.2012.00868.x.

"What Middle-Class Families Want Politicians to Know." *The New York Times*, 5 July 2019. NYTimes.com, https://www.nytimes.com/2019/07/05/opinion/middle-class-families.html.

Wilson, William Julius. "The Political and Economic Forces Shaping Concentrated Poverty." *Political Science Quarterly*, vol. 123, no. 4, 2008, pp. 555–71. *JSTOR*, https://www.jstor.org/stable/25655565.

Zamith, Rodrigo. "Transparency, Interactivity, Diversity, and Information Provenance in Everyday Data Journalism." *Digital Journalism*, vol. 7, no. 4, Jan. 2019, pp. 470–89, https://doi.org/10.1080/21670811.2018.1554409.