

Exploring the Relationship Between Police Stops and Crime in San Diego: A Microgeographic Analysis of Demographic Factors and Policing Strategies

Abstract

This study investigates the relationship between police stops and crime in San Diego at a microgeographic level, taking into consideration regional variations and demographic factors. By analyzing crime patterns and outcomes within the city's diverse police beats, the research aims to provide valuable insights into the efficiency and consequences of police stops, ultimately informing evidence-based recommendations for refining and improving policing strategies. Building on existing literature and a recent news article highlighting disparities in police stops in San Diego, our study quantifies the relationship between the number of stops and the number of crimes, with a focus on variables such as race and gender. Our findings suggest that the number of crimes is a consistent predictor of the number of stops, and the proportion of non-white individuals in an area does not significantly affect the number of stops when controlling for the number of crimes. However, in areas with higher concentrations of black individuals, the observed number of police stops was higher than the predicted number based on the number of crimes. This localized analysis offers a unique perspective on the impact of police practices on different communities and supports the development of more equitable policing strategies. In summary, our study complements and extends the existing literature, providing valuable insights and evidence-based recommendations for San Diego and other similar urban areas.

Keywords: Police stops, crime rates, Microgeographic analysis, Racial disparities

Introduction

In recent years, the effectiveness and implications of police stops have been at the center of public debate and academic inquiry. This study aims to contribute to the ongoing discourse by examining the relationship between police stops and crime in San Diego at a microgeographic level. By focusing on regional variations, demographic factors, and community impact, we seek to provide valuable insights into the efficiency and consequences of police stops within the city's diverse police beats. Through a comprehensive analysis of crime patterns and outcomes, our research aims to inform evidence-based recommendations for refining and improving policing strategies in San Diego and other similar urban areas, ultimately fostering more equitable and effective law enforcement practices.

In examining the relationship between police stops and crime, it is important to consider the existing literature on this subject. Miller et al. (2000) found that while stops and searches play some role in fighting crime and lead to about one-tenth of arrests nationally, they have only a small impact on the detection and prevention of recorded or reported crimeⁱ. Additionally, searches tend to have a negative impact on public confidence in the police, often due to perceived impoliteness and inadequate explanations for stopping individuals. The authors recommend focusing on the efficient and targeted use of searches based on intelligence and high levels of suspicion while emphasizing more serious crimes and prolific offenders.

MacDonald et al. (2016)ⁱⁱ investigated the effects of the New York Police Department's (NYPD) Operation Impact, which deployed extra police officers to high-crime areas. The authors found that impact zones were associated with significant reductions in reported crimes and increases in reported arrests. However, they also noted that the majority of investigative stops did not play an important role in crime reduction, suggesting that more focused investigative stops could be more effective.

Weisburd et al. (2015)ⁱⁱⁱ explored the impact of stop, question, and frisks (SQFs) on crime in New York City at a microgeographic level. They found that SQFs produce a significant yet modest deterrent effect on crime but questioned whether other policing strategies might yield similar or stronger crime-control outcomes. They also noted that the level of SQFs needed to achieve meaningful crime reductions can be costly and potentially harmful to police legitimacy.

Petersen et al. (2023)^{iv} conducted a systematic review and meta-analysis on the effects of police-initiated pedestrian stops on crime and individual-level outcomes. Their findings indicated that pedestrian stop interventions were associated with a statistically significant reduction in crime for treatment areas relative to control areas. However, they also found that such interventions led to a broad range of negative individual-level effects, such as increased odds of mental and physical health issues, more negative attitudes toward the police, and higher levels of self-reported crime and delinquency. The authors concluded that, although pedestrian stop interventions have favorable effects on place-based crime and displacement outcomes, the negative individual-level effects make it difficult to recommend their use over alternative policing interventions.

A recent news article by Moran, Winkley, and Schroeder (2022)^v provides additional context for our study, highlighting disparities in police stops within San Diego. Their analysis revealed that police in San Diego conduct more traffic and pedestrian stops per reported crime in areas where non-Whites make up the majority of the population. While police officials attribute the disparity in enforcement to factors other than racial bias, the analysis suggests that some communities experience a level of enforcement that cannot simply be explained by crime rates. However, the article does not quantify or measure the relationship between stops and crimes, nor does it directly answer the question, "Are stops happening where crime is happening?" Instead, the authors primarily rely on descriptive statistics.

Building upon the previous literature and the findings of Moran et al. (2022), our study aims to fill this gap by quantifying the relationship between the number of stops and the number of crimes within San Diego's police beats. This localized focus allows us to compare different areas with varying levels of crime and stops, providing insights that can be used to improve policing strategies. Furthermore, our research will assess the efficiency of police stops in San Diego and explore how well they align with crime levels across different police beats. Focusing on demographic factors, our study will investigate the role of variables such as race and gender in the relationship between police stops and crime in San Diego. By examining how these factors may influence the patterns and outcomes of stops, we aim to contribute to a deeper understanding of the impact of police practices on different communities and support the development of more equitable policing strategies. In summary, our study on the relationship between police stops and crime in San Diego will complement and extend the existing literature, offering valuable insights that contribute to a deeper understanding of this relationship and providing evidence-based recommendations for refining and improving policing strategies in San Diego and other similar cities.

Data Set Used

The data used in this project spans multiple years (2019-2021) and is derived from various sources. The primary datasets used in the analysis are the stop data files, which include information on stops conducted by SDPD for the years 2019, 2020, and 2021. These files provide comprehensive data on each stop, such as the location, demographics of the person stopped, the reason for the stop, and other relevant details. The stop data is collected under the Racial and Identity Profiling Act of 2015 (RIPA), which requires nearly all California law enforcement agencies to submit demographic data on all detentions and searches. This data is publicly available and can be downloaded from the City of San Diego's data portal: <https://data.sandiego.gov/datasets/police-ripa-stops/>. By combining these files, a complete picture of police stops over the three years can be obtained.

To gain insights into the spatial distribution of police stops, shapefiles for SDPD beats are used. These files contain the geographic boundaries of police beats, which are essential for visualizing and understanding the spatial patterns of stops and crimes in San Diego. Additionally, population data for each beat is incorporated into the analysis. This data is sourced from the U.S. Census Bureau's American Community Survey (ACS) for 2019, which provides demographic information, including the racial composition of residents within each beat. By including this data, potential racial biases in police stops can be identified and examined.

Finally, a dataset containing all crimes reported to the SDPD between 2019 and 2021 is utilized. This data was obtained under the California Public Records Act (PRA) by the San Diego Union-Tribune and is essential for understanding the relationship between police stops and crime incidents in San Diego. By merging this dataset with the stop data and beat demographics, a comprehensive analysis of the spatial and demographic aspects of police stops can be conducted.

Exploring the Data

Before diving into the regression models, we performed an exploratory data analysis to better understand the distribution of police stops, crime rates, and demographic factors across San Diego's police beats (figure 1). We generated summary statistics for key variables, such as the number of stops, number of crimes, and other demographic metrics, such as the percent of population that is non-white. Additionally, we created maps and graphs to visualize the spatial distribution of stops, crimes, and demographics, allowing us to identify patterns and trends within the data. This initial exploration of the data revealed that certain police beats experienced higher numbers of stops and crimes, while others had a more diverse racial composition. By identifying these patterns, we were able to develop a more nuanced understanding of the data, informing our subsequent regression analyses.

Our exploratory data analysis revealed notable geographic variation in crime rates, police stops, and the percentage of non-white individuals across the different police beats in San Diego. This section highlights some of the key findings and patterns observed in our data.

Crime Rates by Beat: The analysis of crime data across the police beats in

San Diego revealed that crime rates vary significantly between different beats. Some areas, particularly those located in the downtown, Pacific Beach, and central parts of the city, exhibited higher crime rates compared to other regions, such as suburban or residential neighborhoods. This spatial distribution of crime rates indicates that certain areas may require more focused and targeted policing efforts to address specific crime patterns and challenges.

Police Stops by Beat: Similarly, the distribution of police stops across the beats showed considerable variation. In general, areas with higher crime rates exhibited a higher number of police stops, suggesting that police enforcement activities tend to be concentrated in areas with elevated levels of criminal activity.

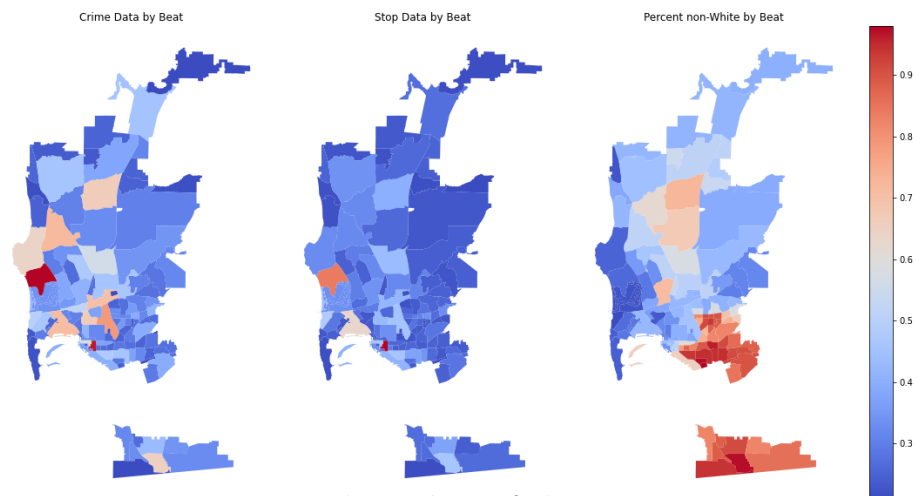


Figure 1: Geographic Distribution of Select Metrics

However, some beats with relatively lower crime rates also exhibited a higher number of stops, indicating that other factors, such as policing strategies or community dynamics, may influence the distribution of stops in San Diego.

Percent of Non-White Individuals by Beat: The analysis of demographic data from the American Community Survey (ACS) revealed that the racial and ethnic composition of San Diego's police beats is highly diverse and varies significantly across different areas. In some beats, the proportion of non-white individuals was considerably higher than in others, with specific regions characterized by a higher concentration of certain racial or ethnic groups. This geographic variation in demographic composition highlights the importance of considering the diverse needs and experiences of different communities when developing and implementing policing strategies.

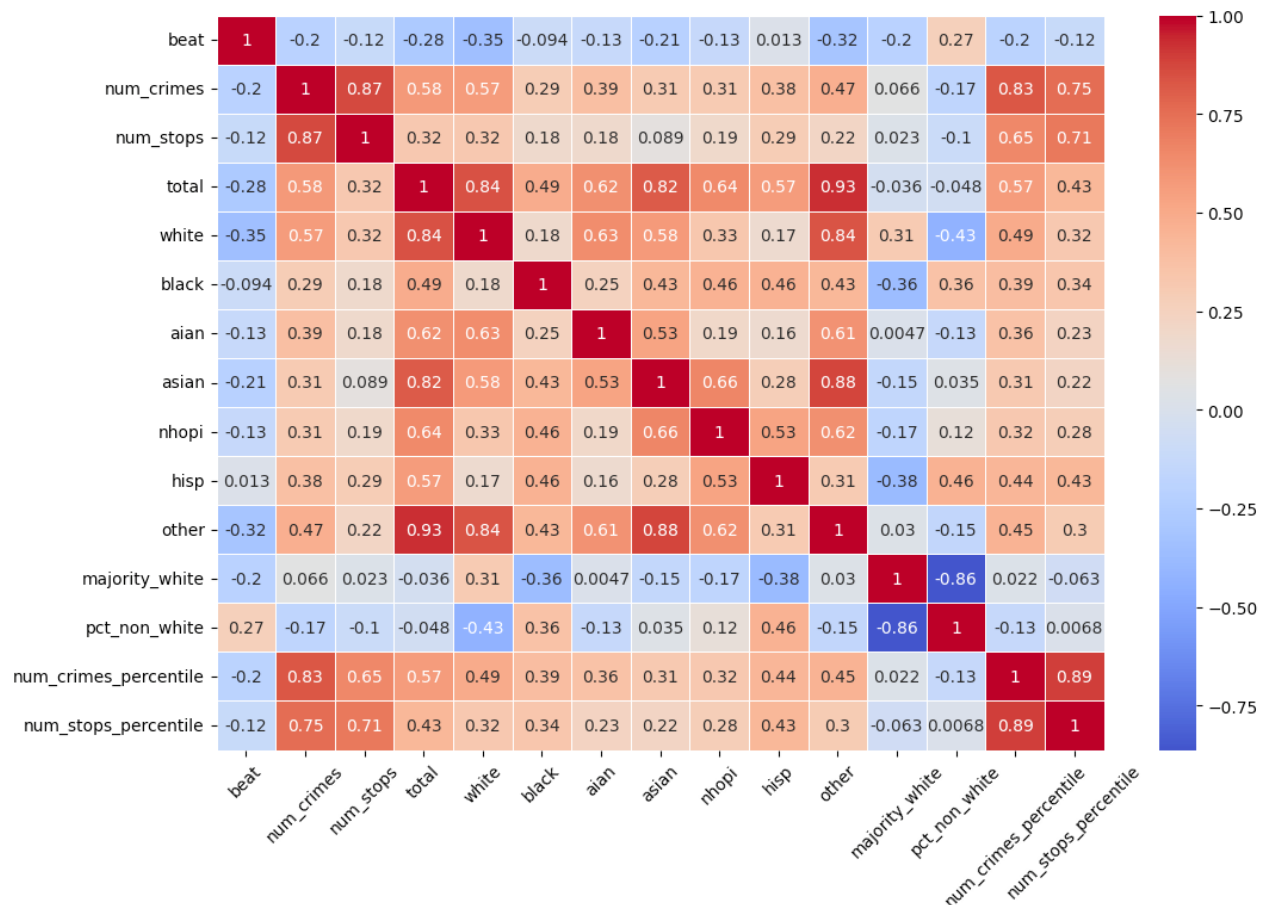


Figure 2: Correlation Matrix for Select Variables

Our analysis also involved generating a correlation matrix to examine the relationships between various factors, such as the number of crimes, number of stops, and demographic variables like the percentage of the population belonging to different racial groups. The correlation matrix revealed that the number of crimes and the number of stops had a positive correlation, indicating that areas with higher crime rates generally experienced a higher number of police stops. Furthermore, we observed varying degrees of correlations between the percentage of the population belonging to specific racial groups and the number of stops or crimes. Some racial groups showed a positive correlation with the number of stops, while others exhibited minimal to no significant correlation. Additionally, we explored the correlations between percentiles and other factors in our matrix, which provided further insights into the distribution and relationships among these variables. The correlation matrix (figure 2) proved to be a valuable tool in

understanding the complex interrelationships between crime, policing, and demographic factors, and it guided our subsequent regression analyses and investigations into the impact of these factors on police stops in San Diego.

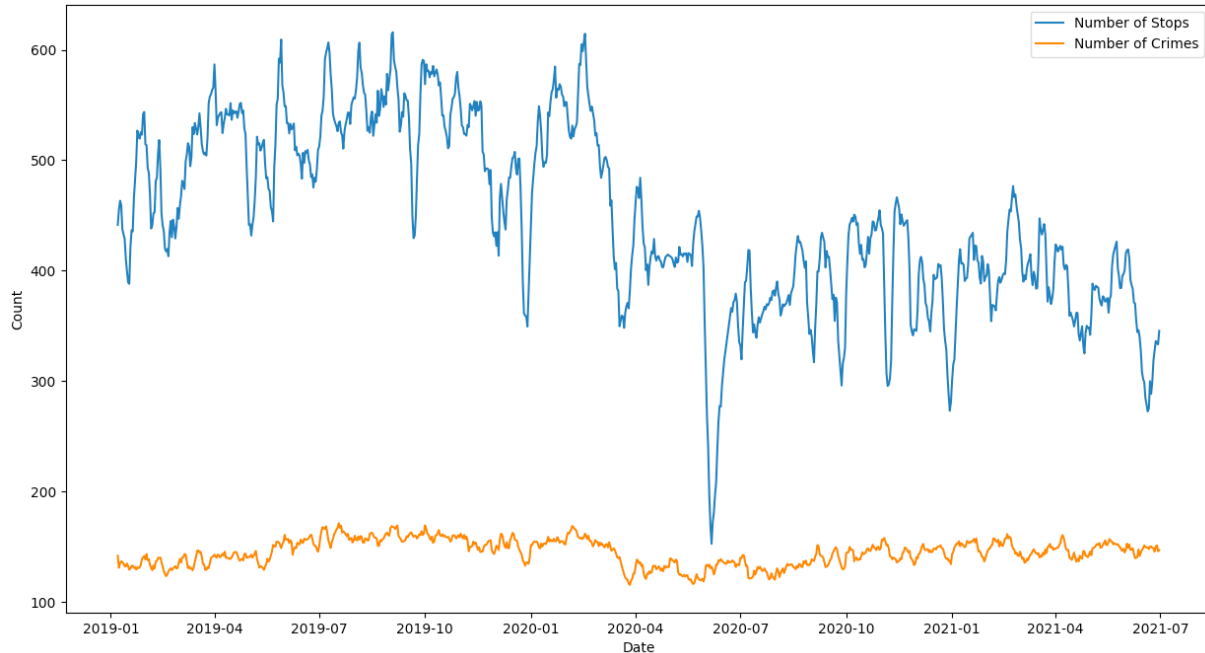


Figure 3: 7-Day Moving Average of Number of Stops & Crimes

We also generated a visualization illustrating the overall daily trends of the number of stops and the number of crimes in San Diego over the selected time period, with a 7-day moving average (figure 3). The purpose of creating this visualization was to identify any temporal patterns or trends in police stops and crime rates, as well as to explore the potential relationship between these two variables on a day-to-day basis. This approach allowed us to gain a deeper understanding of the dynamics between policing activities and crime occurrences in the city.

We observe that the number of stops and crimes both exhibited fluctuations over time, with certain periods experiencing higher levels of police activity or crime rates than others. While there were instances where the daily trends in stops and crimes appeared to align, indicating a potential link between increased police stops and higher crime rates, there were also periods where this relationship was not as apparent. This finding suggests that the relationship between stops and crimes might be more complex than a simple one-to-one correspondence, as other factors, such as specific policing strategies or external events, could also play a role in shaping these trends. Generally, the number of crimes appear to be relatively stable over the time period, while the number of stops appear to have measurably decreased in following the start of the COVID-19 pandemic.

Methodology and Findings

We began our analysis by running two regression models. The first model examined the relationship between the number of stops and the number of crimes (stops ~ crimes), while the second model included an additional variable, percent_non_white, to account for the proportion of non-white individuals in the area as a proxy for race. The results showed that the coefficient for crimes remained relatively stable across both models, and the percent_non_white coefficient was not significant (figure 4). These findings suggest

that the number of crimes is a consistent predictor of the number of stops, and the proportion of non-white individuals in an area does not significantly affect the number of stops when controlling for the number of crimes. It is important to consider that these results might not capture the full extent of potential relationships between racial and ethnic composition and policing patterns, as the percent_non_white variable may not adequately represent the diversity and complexity of racial and ethnic distribution in the area. With this in mind, we proceeded to further study the effects of segregation on the number of stops using the location quotient (LQ) of each racial group as a measure of their concentrations across the different beats. The location quotient (LQ) is a widely used geographic index that measures and maps relative distributions or concentrations of a specific characteristic in a subarea compared to the entire area. The concept was first introduced by Walter Isard (1960)^{vi} in his book "Methods of Regional Analysis: An Introduction to Regional Science." It has been extensively applied in various fields, including regional economic studies and residential segregation analysis (Benassi et al., 2022)^{vii}. In general, a higher value of LQ for a given racial group, means a higher concentration of that group (figure 5).

Using the calculated LQs, we ran a third regression model but found no statistical significance (figure 4). This, however, doesn't necessarily mean that discrimination isn't present. It could mean that there are instances of discrimination in the tails of the distribution of concentrations of these ethnic groups that aren't captured by our regression models. To examine this, we investigated the relationship between the LQ of various racial and ethnic groups and the average percent difference in the actual number of police stops compared to the predicted number of stops based on the number of crimes (using the first regression). We

	Dependent variable: num_stops		
	Linear (1)	Linear with Race (2)	Location Quotient (3)
Constant	-115.605 (81.977)	-247.448 (173.203)	7.720 (41.163)
LQ_aian			-3.494 (42.764)
LQ_asian			-112.367 (99.749)
LQ_black			40.680 (55.110)
LQ_hisp			40.611 (56.002)
LQ_nhopi			66.982* (37.901)
LQ_other			-303.776 (193.107)
LQ_white			51.088 (98.892)
Crimes	3.168*** (0.157)	3.198*** (0.161)	3.215*** (0.158)
Pct. Non-White		202.294 (234.040)	
Observations	135	135	135
R ²	0.753	0.755	0.778
Adjusted R ²	0.751	0.751	0.766
Residual Std. Error	677.417 (df=133)	678.062 (df=132)	657.358 (df=127)
F Statistic	406.174*** (df=1; 133)	203.074*** (df=2; 132)	63.654*** (df=7; 127)
Note:	* p<0.1; ** p<0.05; *** p<0.01		

Figure 4: Regression Results

specifically focused on the beats within the 75th percentile of each LQ variable, which represents areas with a higher concentration of the respective racial or ethnic group.

Our findings revealed that all racial and ethnic groups, except for black, had negatively weighted averages for the percent difference in police stops. This means that in areas with higher concentrations of white, AIAN, Asian, NHOPI, Hispanic, and other groups, the observed number of police stops was lower than the predicted number based on the number of crimes. However, in areas with a higher concentration of black individuals, the observed number of police stops was higher than the predicted number (figure 6).

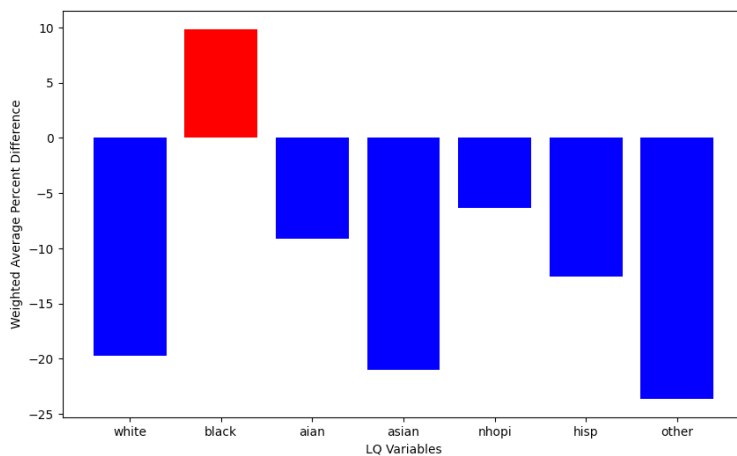


Figure 6: Weighted Average Actual vs. Expected Stops Percent Difference for Beats within the 75th Percentile of LQ Variables

Implications for Policy and Practice

Our findings have several implications for policy and practice related to policing and crime prevention in San Diego and other urban areas. First, the results suggest that focusing on the efficient and targeted use of police stops, based on intelligence and high levels of suspicion, could lead to more effective crime reduction strategies. This supports the recommendations made by previous literature, such as Miller et al. (2000), and suggests that resources may be better allocated towards intelligence-led policing approaches.

Second, the observed relationship between racial and ethnic composition and police stops emphasizes the need for continued efforts to address potential racial disparities in policing practices. This could include the implementation of bias-awareness training programs for police officers, the establishment of community advisory boards to foster dialogue and collaboration between law enforcement and residents, and the adoption of new technologies or protocols to ensure greater transparency and accountability in police stop decisions.

Finally, our findings underscore the importance of considering the broader social and economic context when designing and implementing policing strategies. By taking into account factors such as socioeconomic status, education, and employment, police departments can better tailor their approaches to the specific needs and characteristics of the communities they serve, ultimately leading to more effective and equitable policing outcomes.

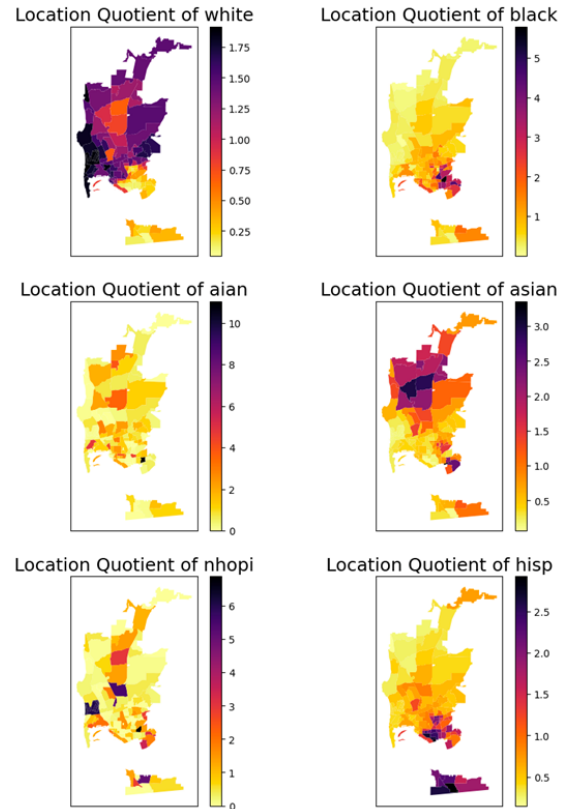


Figure 5: Location Quotient of Racial Groups

Limitations and Alternative Approaches

While our study provides valuable insights into the relationship between police stops and crime in San Diego, there are several limitations that should be acknowledged. One limitation is the use of aggregate data at the police beat level, which may not fully capture the complex dynamics of policing and crime at a more granular level, such as individual streets or neighborhoods. Future studies could explore the relationship between police stops and crime at a finer spatial resolution to better understand the nuances of this relationship.

Another limitation is the reliance on reported crime data, which may not accurately represent the true prevalence of crime in a given area. Underreporting of crime is a common issue, particularly for certain types of offenses and in specific communities. Future research could employ alternative measures of crime, such as self-reported victimization surveys or police intelligence data, to provide a more accurate representation of crime in San Diego.

Moreover, our study primarily focused on race as a demographic factor, but other factors such as socioeconomic status, education, and employment could also be relevant in understanding the relationship between police stops and crime. Future research could expand the scope of demographic factors considered and investigate their potential influence on policing practices and crime patterns in San Diego.

Additionally, it is worth noting that our study is based on cross-sectional data, which limits our ability to infer causal relationships between police stops and crime. Longitudinal analyses or experimental designs, such as natural experiments or randomized controlled trials, could provide stronger evidence of causality and help disentangle the complex relationships between police stops, crime, and other contextual factors.

An additional limitation is that our study relies on publicly available data sources, which may have inherent biases or inaccuracies. For example, the stop data collected under the Racial and Identity Profiling Act of 2015 (RIPA) may not capture all instances of police stops, particularly if there is underreporting or misreporting by law enforcement agencies. Similarly, the demographic data from the U.S. Census Bureau's American Community Survey (ACS) may not provide a fully accurate representation of the population within each police beat, particularly for smaller population subgroups. The use of alternative data sources or the collection of primary data could help address these limitations and improve the reliability of the study's findings.

Also, while our study controls for a range of demographic factors, there may be other unobserved or unmeasured factors that influence the relationship between police stops and crime. Examples could include police patrol patterns, community engagement efforts, or variations in the built environment. Future research could seek to incorporate additional variables or employ advanced statistical techniques, such as propensity score matching or multilevel modeling, to better account for these potential confounders and provide a more robust analysis of the relationship between police stops and crime.

Finally, our study focused on San Diego as a case study, but the findings may not be generalizable to other cities or regions. Comparative research that examines the relationship between police stops and crime in different urban contexts could provide further insights and help inform more effective and equitable policing strategies across diverse settings.

Conclusion and Future Work

Overall, our study presents a microgeographic analysis of the relationship between police stops and crime in San Diego, taking into consideration demographic factors and regional variations. By examining this relationship at the level of individual police beats, we have provided valuable insights into the efficiency

and consequences of police stops in different communities within the city. Our findings suggest that the number of crimes is a consistent predictor of the number of stops, and the proportion of non-white individuals in an area does not significantly affect the number of stops when controlling for the number of crimes. However, when examining the relationship between location quotients for various racial and ethnic groups and the percent difference in actual versus predicted police stops, we found that areas with higher concentrations of black individuals had a higher observed number of police stops than predicted based on the number of crimes.

This study contributes to the existing literature on police stops and crime rates by offering a localized perspective on the impact of police practices on different communities. Our findings not only provide insights into the efficiency of police stops in San Diego but also support the development of more equitable policing strategies. By understanding how demographic factors and regional variations influence the relationship between police stops and crime, policymakers and law enforcement agencies can make more informed decisions about policing strategies that promote fairness and justice.

While this study has provided valuable insights into the relationship between police stops and crime in San Diego, there are several areas of potential future research that can further contribute to our understanding of this topic. Some possible directions for future work include:

1. Expanding the scope of the study to incorporate more granular data on police stops, such as the reason for each stop, the outcome of the stop, and the type of crime associated with the stop. This additional information can help to better understand the specific factors that contribute to the relationship between police stops and crime, as well as to assess the overall effectiveness of different policing strategies.
2. Investigating the impact of various policing policies and practices on the relationship between police stops and crime. This could include exploring the effects of community-oriented policing, problem-oriented policing, and other alternative policing strategies on crime rates and the number of police stops.
3. Analyzing the relationship between police stops and crime in other cities, both within the United States and internationally. By comparing the findings of this study with those from other locations, researchers can gain a broader understanding of the factors that influence the relationship between police stops and crime, as well as identify potential best practices for effective and equitable policing.
4. Examining the long-term impacts of police stops on crime rates and community relations. This could involve conducting longitudinal studies to assess how changes in policing strategies and the frequency of police stops influence crime trends and public perceptions of law enforcement over time.
5. Investigating the potential psychological, social, and economic impacts of police stops on individuals and communities. This could include studying the effects of police stops on mental health, trust in law enforcement, and economic opportunities for individuals who have been stopped by the police.

By exploring these areas of future research, scholars and practitioners can continue to build on the findings of this study and further contribute to the development of equitable and effective policing strategies that promote public safety and justice for all.

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