Analysis of Traffic Stop and Search Data

Greensboro Police Department

With contributions by:

Dr. Eleazer Hunt

Dr. Karen Jackson

Dr. Jan Rychtar

Dr. Rahul Singh

Foreword

This report examines statistical data regarding racial disparities in traffic stops and searches within the City of Greensboro. It is the culmination of several years' worth of research by the Greensboro Police Department (GPD) and academic researchers.

GPD does not contest the fact that the data shows racial disparities with respect to traffic stops and searches. Data from Greensboro and across the nation shows that black motorists are more frequently pulled over and searched than white motorists. Recently, some researchers, reporters, and members of the public have asserted that these disparities are due to racial bias by the police. This explanation must be contextualized, however, because of the many alternative, nuanced, and complicated factors that contribute to these statistics.

This report discusses research that has examined racial disparities in traffic stops and searches, here and elsewhere, and the complexities of trying to determine the underlying causes of these disparities. By reviewing existing research, we know that these disparities – and the challenges associated with them – are neither new nor unique to Greensboro.

This report also examines the many factors that contribute to how, when, why, and where traffic stops and subsequent searches occur in Greensboro. By describing policing methods, we hope to provide a better understanding of who is likely to be affected by them and why. GPD is striving to continue the work that needs to be done to ensure that the public is treated fairly, and that the work of the Police Department is better understood, in order to build safer communities.

Differences and limitations in data collection are also factors discussed in this report. The report identifies and discusses data collection issues and their impact on the ability to analyze traffic stop and search data.

Finally, this report describes actions GPD is taking regarding traffic stops and searches. There is no single "fix" for the issues underlying racial disparities in traffic stops or searches. It is a complex phenomenon that deserves thoughtful solutions.

There is more work to be done in Greensboro, throughout the state, and across the country. We hope that this report provides data that will assist in furthering the important dialogue on this topic, result in change that benefits Greensboro and its citizens, and serve as a model for other communities to better understand and address similar issues.

Acknowledgements

This report draws upon the work of a number of individuals and institutions, identified in the References section at the end of the report. The agency appreciates the work of the outside researchers who prepared reports that are appended to this report:

- Dr. Karen Jackson, Adjunct Faculty in the Department of Leadership Studies, North Carolina Agricultural and Technical State University. Dr. Jackson met with the project team numerous times to discuss the data and analytical methods. Several of the meetings included additional faculty from the Department of Leadership Studies, including Professor Okpala, Professor Toms, and Professor Ross Baber. These individuals contributed input and ideas that guided the direction of the research.
- Dr. Jan Rychtar, Associate Professor in the Department of Mathematics and Statistics, University of North Carolina at Greensboro. Dr. Rychtar and an undergraduate research assistant, Jay Saini, met with the research team several times to discuss the research methodology.
- Dr. Rahul Singh, Associate Professor in the Bryan School of Business and Economics at UNCG and a graduate assistant, Amir Najafi, provided additional analysis into the topic of traffic stops and data.

The statistical analysis and impartial points of view contributed by Dr. Jackson, Dr. Rychtar, Dr. Singh, Jay Saini, and Amir Najafi greatly contributed to the research.

The agency also appreciates the work of Professor Frank R. Baumgartner, Professor of Political Science, and his colleagues at the University of North Carolina at Chapel Hill. Although this report highlights some issues with the data set used by Prof. Baumgartner, and disagrees with some of his conclusions, it is important to acknowledge that his work in this area has informed this report and has contributed to the discussion of racial disparities in traffic stops and searches in Greensboro and across the state. Dr. Deborah Lamm Weisel, of North Carolina Central University, has also analyzed relevant data and made a helpful contribution to the discussions in North Carolina. Her work is also discussed in this report.

Members of the Crime Analysis Unit within the Greensboro Police Department provided significant resources in completing this project. Numerous individuals within the Greensboro Police Department and several other police agencies across the state provided information, ideas, and context related to traffic stops. Within GPD, members of the Training Academy, Traffic Unit, and Patrol Training Officers provided information related to traffic stops. The North Carolina Department of Justice provided clarification regarding the traffic stop data it maintains.

Finally, Dr. Eleazer Hunt, Manager of Information Services for the Greensboro Police Department and Adjunct Faculty in the Department of Geography at UNCG identified the research protocol, directed project activities, and organized the outside researchers and the writing of the report.

Executive Summary

This report examines the statistical data regarding racial disparities in traffic stops and searches in the City of Greensboro. It is the culmination of several years' worth of research by the Greensboro Police Department (GPD). It also includes recent perspectives from academic researchers contracted by the department to analyze traffic stop and search data.

GPD does not contest the fact that the data shows racial disparities with respect to traffic stops and searches. Data from Greensboro and across the nation shows that black motorists are more frequently pulled over and searched than white motorists. Recently, some researchers, reporters, and members of the public have asserted that these disparities are due to racial bias by the police. This explanation must be contextualized, however, because of the many factors that contribute to these statistics.

Researchers who have studied this topic for decades have consistently found inconclusive evidence of institutional or individual racism as the reason for the racial disparity in traffic stops and searches. Many factors – besides the race or ethnicity of the driver – are involved in the decision to stop a vehicle, and these factors must be accounted for in any analysis of traffic stops. Ultimately, the data that is currently collected by local and state entities is not sufficient to prove that racial bias is a reason why GPD officers stop and search vehicles. This is true of the data that the State of North Carolina and the City of Greensboro collect.

To assist the Greensboro Police Department in analyzing this issue, researchers from the North Carolina Agricultural and Technical State University (NC A&T) and the University of North Carolina at Greensboro (UNCG) were contracted to analyze data supplied by the North Carolina Department of Justice and data maintained by the Greensboro Police Department. UNCG replicated analyses from previous studies and conducted statistical analyses using a methodology designed to test bias with traffic stops. NC A&T conducted exploratory and descriptive analyses of traffic stop records and traffic stops associated with census block groups. In addition, GPD's Crime Analysis Unit examined the Department's traffic stop data reporting procedures, identified issues in data collection, and conducted a detailed analysis of the Department's traffic stop and search data.

The research conducted by the researchers at NC A&T, UNCG, and the GPD Crime Analysis Unit finds no evidence supporting the claim that the disparities observed in the City of Greensboro are the result of racism. The findings of the research are:

- For traffic stops of black and white drivers, black drivers make up 55% of stops, and whites comprise 45% of stops.
- Following a traffic stop, black drivers were slightly more than twice as likely (102%) to be searched as white drivers.
- Following a search during a traffic stop, white drivers were 9% more likely to have contraband found than black drivers.
- There is a geographic correlation (or association) between the number of traffic stops and concentrations of quality of life crimes.

- Despite the observed disparities in traffic stops and searches, institutional or individual bias cannot be identified in the data.
- Limitations in the accuracy and uniformity of data collected impede the use of some analytical methodologies on the existing traffic stop and search data, which impacts the conclusions that can be made. These limitations occur at both the state and local levels.

Some of the data limitations arise at the local level. For example, the Traffic Data Module used by GPD officers to complete traffic stop reports does not allow officers to record all of the necessary details about why a stop occurred, what transpired during the stop, why a search occurred, and the outcome of the stop. There has also been inconsistent training in how to utilize the Traffic Data Module to complete a report. At the state level, this research has identified a number of data processing errors that occur when the North Carolina Department of Justice (NC-DOJ) collects data generated locally. As a result, there are a number of errors in the data provided by NC-DOJ to the public and researchers, which can affect the results of analyses of that data.

How and where policing efforts are conducted in Greensboro depends on a number of circumstances, including: where officers are needed to respond to citizens' calls for service; localized and broader crime trends; the use of proactive efforts to reduce crime and/or identify offenders in the community; and efforts to address citizens' concerns about quality of life issues. Due in large part to these factors and associated social issues, a direct correlation between bias and enforcement actions cannot be made.

An officer's decision to conduct a traffic stop is based on a number of factors, such as: responding to neighborhood complaints of speeding; criminal alerts; observed driving behaviors; and observed vehicle condition. Using various methodologies, the research discussed in this report did not identify a pattern of bias in traffic stops by GPD officers.

Members of the Greensboro Police Department recognize that the existence of racial disparities in traffic stops and searches is an important issue. There is no simple solution to ending the disparity, because there are no simple and discrete causes of the disparity. Understanding that, GPD has taken a holistic approach to addressing traffic stops and searches, in order to best serve the public. These actions include:

- Revising policies and carefully monitoring the effects of these policies through data collection and other methods. The policies that GPD will be implementing in the coming months include:
    - Requiring the completion of a traffic stop report for all traffic stops.
    - Documenting a person's consent to search through either body-worn cameras or a Consent to Search Form, including reporting the reasons for seeking consent to search.
    - Additionally, GPD will continue for the time being to operate under the Special Order issued by Chief Scott in November, 2015, temporarily suspending patrol officers from conducting traffic stops based solely on vehicle equipment infractions.
- Continuing to implement Neighborhood Oriented Policing (NOP), which combines a philosophy of problem-solving with geographic ownership of defined areas. NOP affects when and where

traffic stops are conducted by better focusing enforcement actions on areas where crimes are occurring and where key community stakeholders want a police presence.

- Enhancing training related to searches during a traffic stop, in order to address data limitations in the report process.
- Enhancing training on how to complete a traffic stop report, and the tools to recognize and mitigate implicit bias.
- Increasing transparency in our operations so residents can know when and where traffic safety or crime reduction campaigns will be occurring and the reason for the efforts.
- Making crime data more accessible to the public.
- Improving the data in order to better assess the disparity in traffic stops, discern bias, and provide greater transparency of police operations.
- Continuing the work associated with this research, including:
    - leading a regional effort to review state statutes and processes related to traffic stops and searches in order to recommend appropriate legislative changes
    - looking for funding for further research
    - creating portals for public access to data

There is no single "fix" for the issues underlying racial disparities in traffic stops or searches. Law enforcement, government leaders, community stakeholders, judicial representatives, and others have much work ahead of them in order to fully understand and address the issue. We hope that this report will further the dialogue on this topic, result in change that benefits Greensboro and its citizens, and serve as a model for other communities to better understand and address similar issues.

Table of Contents

Section I: Background on the Issue of Racial Disparities in Traffic Stops and Searches

The issue of racial profiling in traffic stops has been discussed for at least twenty five years (Fridell, 2001; 2004), and has often been tied to the "War on Drugs" (Tillyer, Engel, Wooldredge, 2008), which in turn has often been associated with minority and ethnic communities. This relationship has contributed to a belief from many within minority and ethnic communities that law enforcement is targeting those communities due to a perceived association with narcotics. These issues are sometimes described as "driving while black."

The national dialogue about traffic stops and racial profiling has resulted in several states passing laws requiring the collection of traffic stop data. In 1999, North Carolina was the first state to establish a law requiring the collection of information related to traffic stops – General Statute § 143B-903, *Collection of traffic law enforcement statistics* (Appendix A). Since 2002, most law enforcement agencies in North Carolina have submitted traffic stop data to the state. The collected data is available to the public via the NC–DOJ website, http://trafficstops.ncdoj.gov/Default.aspx.

Various groups have contributed to this dialogue. In 2009, the American Bar Association promoted the exploration of racial bias within the criminal justice system (law enforcement, courts, and prison/probation). The North Carolina Advocates for Justice (NCAJ) formed a Task Force on Racial and Ethnic Bias in 2010. It has produced several reports and position papers.

In February 2012, a report was submitted to the NCAJ Task Force on Racial and Ethnic Bias. The report, authored by Baumgartner and Epp (2012), focused on traffic stop data held by the North Carolina State Bureau of Investigation and provided various statistical analyses of the data. This data showed ratio differences of traffic stops, searches, and seized contraband by race, ethnicity, and gender. This was one of the first reports to conduct a statewide analysis of traffic stop data. Since the 2012 report, Baumgartner and various coauthors have published a series of reports on the topic of traffic stops in North Carolina. The reports and other resources related to traffic stops can be found at: http://www.unc.edu/~fbaum/traffic.htm.

In May 2014, the American Civil Liberties Union of North Carolina (ACLU-NC) released a report entitled *Road Work Ahead*. The report focused on data collection as a method to address possible bias in policing. The report provided an overview – historical, national, and state – of traffic stops and racial profiling. The report detailed the need for accurate data collection in order to develop sound conclusions and identify corrective actions. The report identified three areas that are needed to achieve the collection of better data: reporting the location of the stop; using a statewide unique identification number for each law enforcement officer; and training of law enforcement officers, via a standardized curriculum, on the importance of completing traffic stop reporting forms and collecting accurate data (American Civil Liberties Union of North Carolina, 2014).

The 2012 Baumgartner and Epp report did not go unnoticed by North Carolina law enforcement. Several agencies began evaluating and researching the data. In 2014, the North Carolina Association of Chiefs of Police and North Carolina Sheriff's Association contracted with Dr. Deborah Lamm Weisel, from North

Carolina Central University, to conduct a review and analysis of racial and ethnic disparities in North Carolina traffic stop data.

In 2011, GPD formed a committee to look into the issue of bias-based policing. In early 2013, GPD began an initial review of traffic stop data. This work focused on geographic patterns of traffic stops, police divisions within GPD, and completion rates (stops called in over the radio to traffic stop reports). The review was not finalized into a report at that time for several reasons. First, a shortage of analytical staff required secondary and tertiary projects to be suspended. Second, new crime analysis software was acquired and staff were dedicated to implementation and training. Third, a geographic digital warehouse was implemented, which consumed a significant amount of staff time. The warehouse provides geo-spatial analysis and increased accuracy and resolution of data. Fourth, analytical staff was involved in two large projects associated with Neighborhood Oriented Policing – patrol staffing analysis and geographic redistricting of patrol divisions.

In March 2015, Baumgartner and his colleagues released a report entitled: *Analysis of Black-White Differences in Traffic Stop and Searches in Greensboro, NC, 2002-2013*. In June 2015, Baumgartner and his colleagues released a report entitled: *Driving While Black: It's Getting Worse*. The first report examined data that GPD reported to the state. No conclusion or discussion of the data or interpretation was given; the report was simply a descriptive analysis of the data. The second report framed traffic stops within the existing national dialogue, provided historical context, discussed the US DOJ report on Ferguson, and presented updated analysis of North Carolina traffic stop data. The updated analysis of traffic stops took into account criticisms in the methodology used in prior reports (see Weisel, 2014).

Other Research

There is a substantial body of research related to traffic stops by law enforcement. Researchers have worked on this topic for more than twenty years and have produced a large set of results, analysis, and recommendations. Several best practices guides have been developed during this period. This report draws upon several of these guides to help understand the topic, guide the analysis, and form recommendations. The resources used include:

Fridell, Lorie, Robert Lunney, Drew Diamond, and Bruce Kubu (2001). *Racially Biased Policing: A Principled Response*. Washington, D.C.: Police Executive Research Forum

Fridell, Lorie (2004). *By the Numbers: a guide for analyzing race data from vehicle stops.* Washington, D.C.: Police Executive Research Forum.

Fridell, Lorie (2005*). Understanding Race Data from Vehicle Stops: A Stakeholder's Guide*. Washington, D.C.: Police Executive Research Forum.

McMahon, Joyce, Garner, Joel, Davis, Ronald and Kraus, Amanda (2002). *How to Correctly Collect and Analyze Racial Profiling Data: Your Reputation Depends On It!*. Washington, DC: U.S. Department of Justice, Office of Community Oriented Policing Services.

Ridgeway, Greg. & Rand Center on Quality Policing & Rand Corporation (2009). *Cincinnati Police Department traffic stops: applying RAND's framework to analyze racial disparities*. Santa Monica, CA: RAND, Center on Quality Policing, http://www.rand.org/pubs/monographs/2009/RAND_MG914.pdf

In addition to these primary resources, additional literature was reviewed to provide a thorough understanding of issues related to traffic stop analysis. A recent publication summarizing traffic stop analysis in North Carolina is:

Weisel, D.L. (2014). *Racial and Ethnic Disparity in Traffic Stops in North Carolina, 2000-2011: Examining the Evidence.*

Researchers, residents, stakeholders, and government officials who want to know more about the process of analyzing traffic stop and search data are encouraged to review these references.

Several key points are stated by Fridell (2005) and are, for the purposes of this research, worth emphasizing:

- Racially biased policing is defined as: "the inappropriate consideration by law enforcement of race or ethnicity in deciding with whom and how to intervene in an enforcement capacity."
- Social science research and the methodology used have been thought by some to provide a conclusive determination of the existence of biased policing. This is an inappropriate conclusion. Research has identified many problems and variables that need to be taken into account when examining this issue, and researchers have made recommendations on data requirements, statistical procedures, and analytical procedures. The ability to draw definitive conclusions from statistical data that biased policing exists is very limited.
- Simple statistical disparities do not provide an appropriate basis to conclude that bias in traffic stops exist. Community groups, stakeholders, and others are urged not to use simple ratio proportions of disparity as a form of proof of the existence of bias.
- It is important to understand the limitations to being able to conduct analysis and draw conclusions from data.
- Any efforts to address the issue of bias requires all stakeholders (residents, officials, community groups, law enforcement) to work together and cooperate for the best interest of everyone.
- The collection and analysis of information related to traffic stops forms the basis for dialogue and discussions between law enforcement and residents. Collecting this data…demonstrates a commitment to monitor and investigate the issue (2005).

The Issue Locally

National, state, and local research and reports show that black drivers are stopped more frequently than white drivers, even though blacks do not comprise the majority of the population in most states and cities. Between 2002 and 2013 in Greensboro, black drivers were stopped in 50% of traffic stops, while white drivers were stopped in 46% of traffic stops (Baumgartner, 2015). This disparity occurred despite blacks comprising 41% of the total population in Greensboro, and whites comprising 48% of the

population (US Census: http://quickfacts.census.gov/qfd/states/37/3728000.html). In other words, black drivers were stopped within the city more often than white drivers, even though Greensboro has a larger percentage of whites living in the city. Figure 1 illustrates the distribution of black and white populations in the city of Greensboro, based on the 2010 U.S. Census.

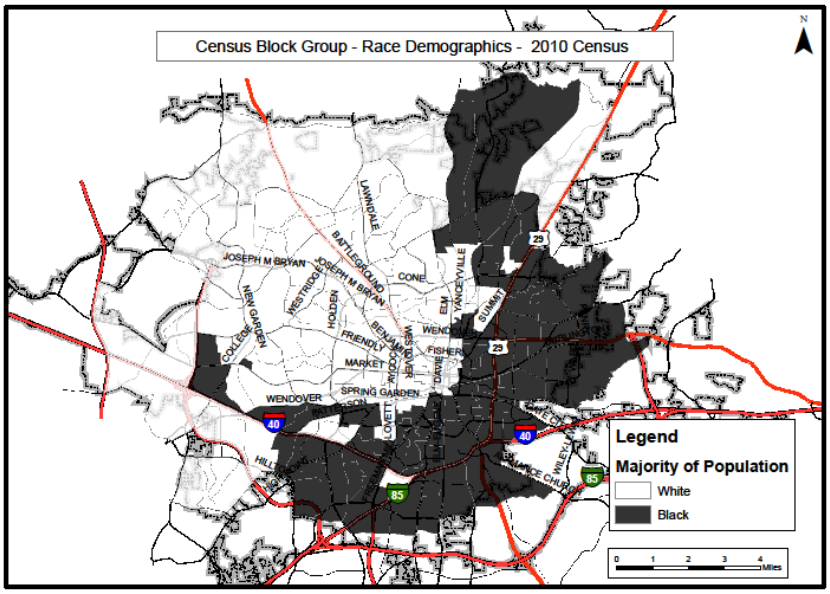

Figure 1: Census Block Group – Race Demographics – 2010 Census

A numerical disparity also exists with regards to searches. While less than 5% of traffic stops result in a search, blacks were searched within the city at slightly more than twice the rate (108%) of whites from 2002 to 2013. In all categories listed in the data set for a reason to stop a vehicle, save one (driving while impaired), blacks are searched within the city more than whites (Baumgartner, 2015).

GPD's leaders recognized the importance of better understanding this data. In mid-2013, members of the Crime Analysis Unit began gathering traffic stop data in order to analyze it. Their goal then, as remains today, was to determine underlying reasons for the disparity seen in the data. Due to the complexity of this effort, and the priority of transitioning GPD to Neighborhood Oriented Policing, which was itself a data-intensive task, this effort was not completed at that time.

The effort was renewed by Chief Scott upon his appointment in 2015. Baumgartner also published two more reports in 2015. At the same time, local print media interviewed police personnel and civic leaders on the topic and published several stories. Greensboro made national headlines when the New York Times published an article titled "The Disproportionate Risks of Driving While Black" on October 24, 2015. The article followed interviews with GPD staff and Chief Scott on August 12, 2015, and multiple requests for data and information. GPD willingly participated in the local and national media coverage in

order to provide reporters with an understanding of the complexities of police work and access to published cardinal works on the topic.

In an attempt to better understand the factors leading to traffic stops, Chief Scott issued a Special Order on November 10, 2015 temporarily suspending patrol officers from conducting traffic stops based solely on violations related to vehicle equipment infractions. In general, vehicle equipment infractions include those items normally checked during annual vehicle inspections. Instead, officers were to concentrate efforts on implementing Neighborhood Oriented Policing by increasing foot patrols in residential areas. Ninety days after the Special Order went into effect, the number of traffic stops and consent searches decreased; however, the disparity between black and white drivers remained for consent searches.

Despite the number of academic studies and media reports, the question still being asked locally and across the country is: why is there a disparity in traffic stops and searches? A sound answer has not yet been identified. A range of possible answers could include: officer bias, institutional bias, concentrations of crime and disorder, deployment patterns of police, the war on drugs, gang crackdowns, socio-economic status, or the overall structure of the criminal justice system. Each of these possible answers is nuanced, complex, and requires detailed analysis and research.

Locally and across the nation, many people are quick to conclude that the explanation for the disparity is institutional bias or individual officer bias. The work of Baumgartner and numerous media stories have posited this position as the answer for the disparity. The Greensboro Police Department recognizes that some people, acting in good faith, view the disparity in traffic stops alone as some evidence of bias. GPD also recognizes that people are impacted when stopped by police. However, it is also important to recognize the difference between *disparity* and *discrimination*. Observed disparities may be the result of a wide range of factors, which does not necessarily include discrimination. All of these factors can interact with each other, making it difficult to pinpoint specific causes for the observed disparities.

Section II: The Challenges in Quantifying the Reasons for Traffic Stops and Searches

The traffic stop is probably the most common type of encounter people have with police. Nationwide, approximately 10% of all drivers are stopped by law enforcement at least once a year (Weisel 2014). Traffic stops are also one of the most frequent activities police officers perform. This interaction, more than many other police-citizen interactions, has come under increased scrutiny in recent years.

Although the vehicle stop is a fairly common occurrence, it is not routine. The officer must make several assessments and decisions before pulling over a vehicle and while engaging with the driver and any other occupants.

First, the officer must have a legitimate law enforcement reason for the stop. A stop may be initiated if an officer has probable cause or reasonable suspicion that a violation of motor vehicle law has occurred, or that criminal activity may be occurring. Probable cause and reasonable suspicion are two of the most important concepts in deciding if it is appropriate for police to stop a person for questioning, search for evidence, or make an arrest. Probable cause exists when facts or evidence are present that would lead a reasonable person to believe that a suspect has committed a crime. Reasonable suspicion is justification for an officer to stop and briefly detain a person if, based upon the officer's training and experience, there is reason to believe that the individual is engaging in criminal activity.

Second, after the traffic stop is initiated and the officer engages with the driver and other occupants, the officer has additional decisions to make based upon the information presented to him. This can include, but is not limited to:

- compliance with license, registration, and insurance requirements
- status of driver or passengers, e.g. warrants for arrest or missing persons reports
- evidence of criminal activity in plain view

Depending on these circumstances and many other variables, the officer may have reason to search the vehicle and/or its occupants. Searches of drivers, passengers, or vehicles occur in 5.2% of all traffic stops. (Appendix F contains a more detailed breakdown of traffic stop statistics.)

Finally, the officer must determine what course of action to take as a result of the vehicle stop. The three most common outcomes from a traffic stop are a verbal warning, a written warning, or a citation.

With all of these variables and possible outcomes, the biggest challenge in evaluating the data is determining whether there exists a cause-and-effect relationship between the race of a driver and the behavior of police when making the stop (Fridell, 2005). One approach to determining this relationship is the use of a "benchmark." As Fridell states:

> In analyzing the data, researchers have attempted to develop comparison groups to produce a "benchmark" against which to measure their stop data. If an agency determines that, say, 25 percent of its vehicle stops are of racial/ethnic minorities, to what should this be compared? In other words, what percentage would indicate racially biased policing?

> This is the question at the core of benchmarking. To determine an answer, researchers have compared the demographic profiles of people stopped by police to the demographic profiles of the residential population of the jurisdiction, to the demographic profiles of residents with a driver's license, and to the demographic profiles of people observed driving on jurisdiction roads—to name a few comparison groups. (2005)

The objective of benchmarking is to understand if there is a causal relationship between a characteristic of the driver (e.g., race, ethnicity, gender) and the decision by police to initiate a traffic stop. The most reliable benchmarks look to develop a profile of who should be stopped within a jurisdiction in the absence of any biased decision-making. Benchmarks vary in quality due to the quality of data and how well it represents the population being stopped. It is not as simple as determining the demographic makeup of the driving age population of a city, however. There are complicating factors, such as the fact that nonresidents may be stopped in the city, although they would not be included in the city's population. Thus, how well the data represents the population is related to knowing the driving and stop rates for nonresidents (commuters) who use jurisdiction roads, driving behaviors by various groups (e.g., racial, ethnic, gender, or age groups), and vehicle stops associated with increased police activity/operations.

To identify the existence of causal relationships, not only does the direct relationship of driver to stop need to be evaluated, but also the many other variables that can influence the decision to make a stop. An analysis of traffic stops can be undertaken using two approaches: a two-variable (bivariate) model and a multivariate model.

Bivariate Model

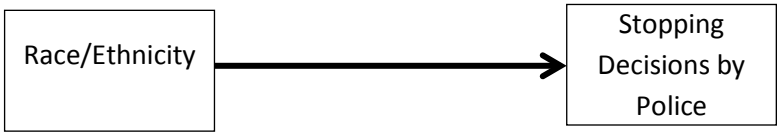

Figure 2: Bivariate Model (after Fridell 2004) Race or Ethnicity is the sole reason for conducting the traffic stop

A two-variable (bivariate) model is not sufficient to explain disparity in traffic stop data. Figure 2 illustrates this simple model: the race or ethnicity of a driver is the sole reason a vehicle is stopped by a police officer. This model assumes that there are no other variables that create the conditions for a traffic stop. It further assumes that within a given jurisdiction, drivers of different age, race, and sex are evenly distributed and stops should be proportional to the demographic makeup of the jurisdiction. This is referred to as the normative model (Engel, 2008). The bivariate model uses census data as a form of benchmark and compares profiles of drivers stopped to demographic profile of the jurisdiction. Using this kind of demographic proportional comparison, "…researchers can draw no definitive conclusions regarding racially biased policing" (Fridell, 2005).

Using the two-variable (bivariate) model to conclude that race is the primary factor for traffic stops is tenuous at best. The weakness in this approach can be shown by considering the gender of drivers and reaching a similar conclusion. Fridell states:

> The reports of most jurisdictions regarding their police-citizen contact data state that men are stopped by police more than women. For instance, a jurisdiction may find that 65 percent of its vehicle stops by police are of male drivers and 35 percent are of female drivers. Does this indicate gender bias on the part of the police? It is unclear from these data, but most of us are disinclined to jump to that conclusion because factors other than police bias could account for the disproportionate stopping of male drivers. (2005)

In Greensboro, 60% of all traffic stops involve male drivers, although males comprise just 47% of the city's population. It is apparent that other explanations for why males are stopped more than females must be taken into account to explain the disparity in stops by gender. For example, males may drive more miles and spend more time on the road than females, thus increasing their chances of being stopped. Males may violate traffic laws at a higher rate than females. Males may drive in areas where greater concentrations of police are operating, and stopping rates are higher in these areas. Each of these alternative variables needs to be considered in any explanation of why males are stopped at higher rates. In the same way, many alternative variables beyond the race of the driver need to be considered in any explanation of why blacks are stopped at higher rates than whites in Greensboro.

Research has demonstrated other variables that can affect the rate of drivers stopped, such as driver age, proportion of the population that drives by demographic profile, driving behavior (e.g., aggressive driving or speeding), and maintenance of a vehicle to operate per state requirements. For example, younger drivers have been shown to speed more (Schmitt, 2002). Drivers near the poverty line may be more likely to have a vehicle that does not meet state requirements or less likely to have a valid driver's license or current registration. In Greensboro in 2013, 33% of blacks and 11% of whites were below the poverty line, which potentially increases the likelihood that a higher proportion of blacks have vehicles in violation of equipment or registration requirements (http://www.greensboro-nc.gov/modules/showdocument.aspx?documentid=26511). In 2014, the State of North Carolina combined the payment of the vehicle registration fee and local property taxes; both amounts are now due at the same time. It is possible that individuals near the poverty line are unable to afford registering their vehicles as an unintended result of this change, although more study of this question is needed.

Multivariate Model

Figure 3 (opposite page) shows a different model, which incorporates several other variables that contribute to traffic stop decisions by police. This is known as the multivariate model. It is an alternative to the bivariate model, and GPD believes that the multivariate model more accurately reflects the many inputs into traffic stop decisions. These factors include: traffic enforcement, increased patrol presence in a geographic area, area of crime complaints, an alert to be on the lookout for a car or person, observable offenses, and investigative reasons. All of these counter the

normative approach, because each alternative increases police resources in specific areas of the city for short or long durations. For example:

- Speeding complaints by community members generate increased presence by traffic enforcement, patrol officers, and community resource officers in a given area.
- Alerts to be on the lookout for vehicles in specific areas of the city are a daily occurrence. These can be vehicles involved in a crime or that have been reported stolen. When a vehicle description is broadcast, officers will key on any vehicle matching the description until the alert is cancelled.
- Zones with increased calls for service through 911, crimes, or active crime patterns will receive additional policing resources. Additional patrol units, community resource officers, traffic officers, and vice/narcotics detectives may be deployed in these areas. The increased police presence in these areas will increase contacts with motorists.
- Crime Stoppers tips as to locations, persons, or vehicles are followed up by detectives and patrol officers.
- Investigations led by federal, state, and local law enforcement may provide advance knowledge of individuals in a vehicle or criminal activity associated with a vehicle.

The best practice guides indicate that all the alternatives must be reviewed and assessed, in the context of the multivariate model, before the bivariate model can be considered as an explanation for the statistical disparity in traffic stops. Even then, the bivariate model is, more often than not, insufficient as an explanation for disparities.

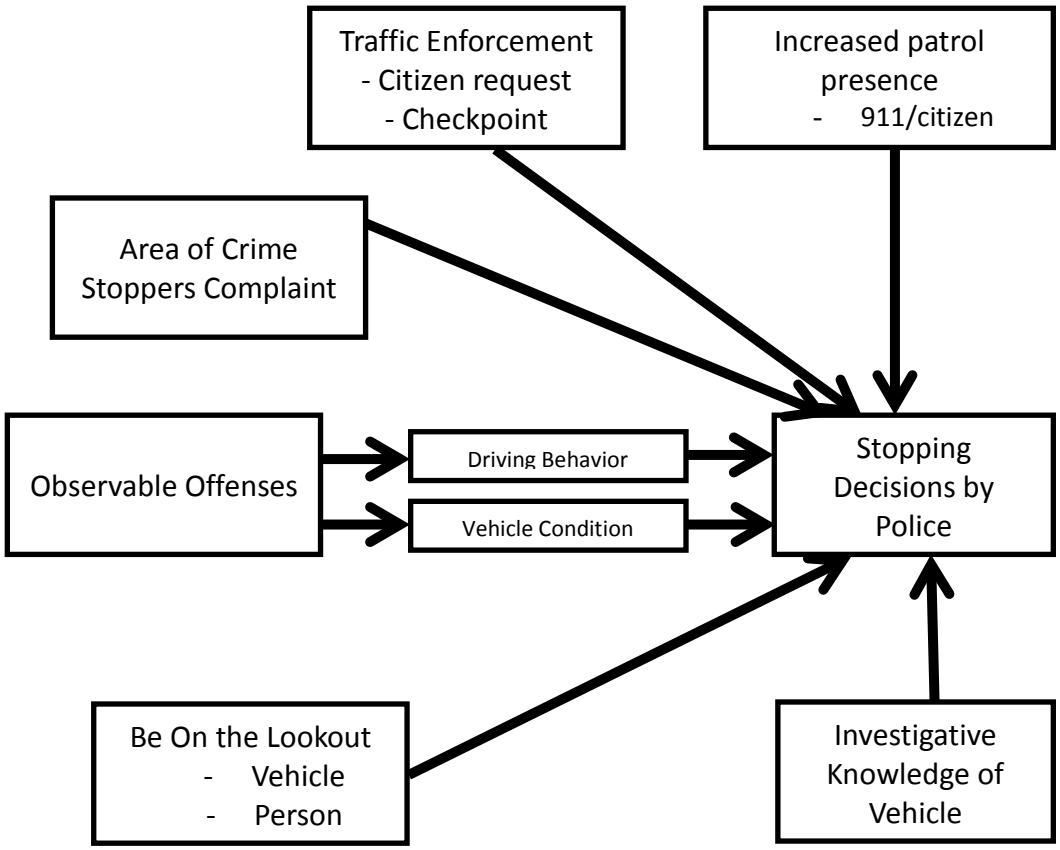

Figure 3: Multivariate Model (after Fridell 2004). Other variables that need to be considered as a reason for conducting a traffic stop

Searches

There are two types of searches following a traffic stop: low discretion and high discretion. Low discretion searches are those when the officer has no choice under applicable policies/directives/laws but to conduct a search. Such searches include: searching the driver or passenger incident to arrest, a search of a vehicle after its seizure, or a pat down search to determine if weapons are accessible by a driver or passenger. Because low discretion searches are not based on an officer's evaluation of the facts or circumstances of a traffic stop, it is generally believed that they are not influenced by bias.

High discretion searches are those when the officer has latitude and is not required to conduct a search but, due to a variety of other factors, the officer determines a search is warranted. Just as there are various reasons for a traffic stop, there are also various factors that officers may consider when determining whether to conduct a search following a traffic stop. These include:

- Criminal history of the driver or other occupant
- Nervousness beyond what is expected for an interaction with police
- Sweating
- Evasiveness in answering questions, or providing false or conflicting information
- Inability to provide answers to simple questions
- No identification
- Driving someone else's car and cannot locate registration or paperwork for vehicle
- Impairment
- Excessively talkative or extremely quiet to the point of not answering questions
- Vehicle matches the description of a suspect vehicle
- Observation of items in the vehicle that are consistent with contraband or tools of crime
- Vehicle stop is part of a response to drug complaints or Crime Stoppers tips in a specific area

This is not an exhaustive list. An officer's experience, training, and skills all contribute to his or her ability to assess the truthfulness and behaviors of drivers and passengers.

Researchers have identified high discretion searches as the area where bias could influence the decision to search (Engel 2008). By considering the search percentages and hit rates for all searches (the percent of searches in which contraband is located), across all officers and situations, it is not possible to separate out instances when officers may simply be following their training instead of engaging in biased decision-making. Several of the cues that police officers in the United States commonly evaluate to determine whether or not to conduct a search may be indirectly related to the race or cultural background of a vehicle occupant. Engel and Johnson summarize research on behavior, and find that black individuals are more likely to use verbal and nonverbal cues that police officers identify as suspicious. Generally, police officers in the United States are trained that people who fidget, avoid eye contact, or stutter may be hiding something. These behaviors are more common in black individuals than in whites (2006). As a result, typical police officer training may be inadvertently causing officers to incorrectly identify behaviors as suspicious more frequently in black drivers than in white drivers.

We know that searches after a traffic stop are of concern to residents and of interest to researchers (Fridell, 2005). However, the question of whether race or ethnicity impacts search decisions is difficult to answer. Much of the data collected by law enforcement is not sufficient to reach an answer using accepted statistical analyses. Two approaches have been used to assess bias related to searches: percent searched measure and search hit rates. Both have significant limitations that must be understood in order to draw appropriate conclusions from their application to a data set.

Percent Searched Measures

This approach seeks to identify potential bias by calculating the percentage of stopped drivers that are searched, broken into categories such as race, ethnicity, sex, or age. The relative proportions of such searches are "…often used erroneously to draw conclusions regarding racial bias" (Fridell, 2005). Fridell further states:

> In many jurisdictions higher proportions of stopped minorities are searched than stopped Caucasians. Analysts, stakeholders, reporters, and even expert witnesses have mistakenly concluded that this disparity between the frequency of searches of minorities and searches of Caucasians necessarily indicates bias on the part of police. Such conclusions are not supported by "percent searched" information.
>
> "Percent searched" information may show disparity, but it cannot identify the *cause* of disparity between searches of racial/ethnic groups or, relatedly, whether or not the disparity is justified. Not every person who is detained is at equal risk of being searched by police; there are very legitimate reasons why some persons are at greater risk of being searched than other persons. Indeed, the public should not expect equal search proportions across stopped groups. Virtually all agencies report that stopped men are searched in greater proportions than stopped women. Does this finding indicate police bias against men? Not necessarily. It could be that more men are at greater legitimate risk of being searched by police than women because men, more than women, manifest behaviors that provide legal grounds for a search. (2005)

Search Hit Rate

The Search Hit Rate method seeks to identify bias by determining the percentage of searches when an officer finds contraband (drugs, illegal weapons, alcohol, money, stolen property, or burglary tools). As Fridell states:

> Lower hit rates for minorities than for Caucasians *for certain categories of searches* are cause for concern. These results are a warning signal or "red flag" requiring the serious attention of law enforcement agencies. They are, however, not *proof* of racially biased policing [emphasis original]. (2005)

Different hit rates demonstrate disparity in the productivity of searches. The issue is whether all drivers are being held to the same standard by police officers when determining if a search is warranted.

Limitations in Search Percents and Hit Rates

One of the ways researchers have attempted to identify bias is by examining the outcomes of traffic searches (Tomaskovic-Devey, Mason, & Zingraff, 2004). The theory is that if traffic searches are consistently unsuccessful with one group and not another, then officers may be unfairly targeting the first group for searches. Furthermore, regardless of the question of potential bias, search and hit rate disparities raise the question of whether law enforcement resources could be more efficiently used in other activities that were more consistently productive. GPD has looked at versions of these outcome tests with its data, both for whether or not a search was successful, and also for the enforcement actions that resulted from traffic stops and searches.

However, outcome tests have their own drawbacks. Engel outlines a number of problems with outcome tests, which essentially rely "on a number of underlying assumptions regarding police and citizen behaviors that do not coincide with what is known about decision-making during police-citizen encounters" (2008). These assumptions include differences in police discretion, racial and cultural differences in behavior, and differences in police and citizen behavior. According to Engel, these factors make it impossible for outcome tests to identify racial bias (Engel, 2008).

The large amount of data collected by the Greensboro Police Department can address some of the criticisms outlined by Engel. Although we still cannot use the data to show any potential police officer bias, we can continue to look at more pieces of this puzzle. While it is true that we are unable to identify potential racial bias in individual police officers, we can try to determine if the procedures and training that officers undergo are unintentionally leading to the disparities seen in the data. Whether or not the disparities that we observe in search rates are due to individual behavior or institutional behavior requires further research.

Benchmarking for Stops and Searches

Internal benchmarking is the primary method to determine if evidence of bias is present. Internal benchmarking is the analysis of traffic stops of an individual officer, with the officer being compared to officers in a similar situation (shift, geographic assignment, or traffic or investigative assignment). Internal benchmarking can be used to compare groups of officers to other groups of officers in a similar situation, if there is sufficient data available to conduct a reliable analysis (Fridell, 2005).

The Greensboro Police Department is unable to conduct an internal benchmark analysis at this time with any validity or reliability due to the following reasons:

- Movement of officers is frequent and does not allow squad by shift to be compared.
- As a result of the transition to Neighborhood Oriented Policing, GPD has recently and significantly updated geographic boundaries and officer assignments to new zones. As a result, there is less consistent and comparable data to use in an internal benchmark analysis. This transition is a priority for the Department, and GPD is using data it has collected to refine this ongoing project.
- Not enough officers have been employed for a sufficient number of years to provide reliable, individual data. Forty four (43.77%) percent of patrol officers have been employed for less than

six years. Eighteen (18.18%) percent of patrol officers have been employed for less than three years.

- Traffic stop reports are not consistently being completed to ensure accuracy of the numbers to compare within and across squads and shifts.
- Officer IDs are not all accurately input in connection with traffic stop reports, resulting in errors in IDs that may coincidently be another officer's ID or not be a valid ID at all.

With improvements to the data collection processes and the gathering of more data over time, GPD should be in a better position in the future to conduct an internal benchmark analysis.

There are other benchmarking methods discussed by researchers. These methods rely on data from the Department of Motor Vehicles, red light cameras, traffic stops using radar, crime data, vehicle crash data, transportation data, and survey data (Fridell, 2005). These methods of analysis are not all possible or reliable, however, as the data needed is not available, and some are prohibitively time-consuming and/or expensive. For these reasons, GPD has not used these other methods in this report.

SECTION III: Gaps in Data Collection

In addition to the many variables that affect vehicle stops and their outcomes are gaps and inconsistencies in data collection both locally and at the state level. The three primary issues discussed herein are limitations in the traffic stop reporting software used by GPD and many other agencies in the state, consequences of the training received by officers, and errors introduced when NC-DOJ collects and processes data generated at the local level.

Once a traffic stop is concluded, the officer is usually required to complete administrative paperwork. Form SBI-122 *Traffic Stop Report* (Appendix B) is required by state statute. Officers can complete the form on their mobile computer terminals from their vehicles, and submit it electronically to the records management database. The software for this database was developed by a vendor to meet the reporting requirements of the state. It is during this step that errors in documenting the traffic stop can occur. These errors are generated in part due to limitations of the software application, which are discussed below. In general, the software does not sufficiently allow officers to record all permutations of a complex traffic stop. For example, from the resulting data, it is not always clear if multiple searches have been conducted during a stop or how contraband is associated with the stop/search (e.g., was it found on the driver, on a passenger, or elsewhere in the vehicle).

Variations in training GPD officers on how to use the software also contribute to inconsistencies in the data. The training process consists of training on the software during the Police Academy, followed by practical use during field training. Training officers vary in how they instruct the completion of the report. This variation affects the accuracy and completeness of the data reported.

To identify and correct some errors, employees from GPD's Records Division review the reports after they have been entered into the records management database. The review is intended to ensure that all the fields required by the state have been completed. The errors that often occur are missing age for the driver or passenger and if an individual was charged with an offense. The errors are identified via a review process within the records management system, and on average ten errors are identified and corrected each month. Once a month, the traffic stop data is electronically sent to NC-DOJ.

Traffic Stop Module

The Traffic Stop module of GPD's record management systems warrants further discussion because the information it captures sometimes paints an incomplete picture of traffic stops. Not all kinds of traffic stops are included, and the software cannot capture the complexity of events that occur within a traffic stop. An officer makes many decisions and performs many actions over the course of a traffic stop, and it is currently impossible to parse out each step that is taken with the present software. This affects the present ability to draw conclusions from the traffic stop data recorded by the software. Despite these limitations, we can still examine the data to identify themes and patterns, while acknowledging the existence of the flaws and evaluating methods to improve data gathering and reporting.

The Traffic Stop Module is comprised of four pages or screens, which most officers use to fill out the form. The four pages are: Stop, Search, Contraband/Property, and Misc.

Stop Page

The Stop Page is the first page an officer sees upon opening the Traffic Stop Module. Data captured here includes:

- Officer ID
- Date and time of stop
- Purpose of stop
- Enforcement action taken
- Physical resistance or injuries encountered

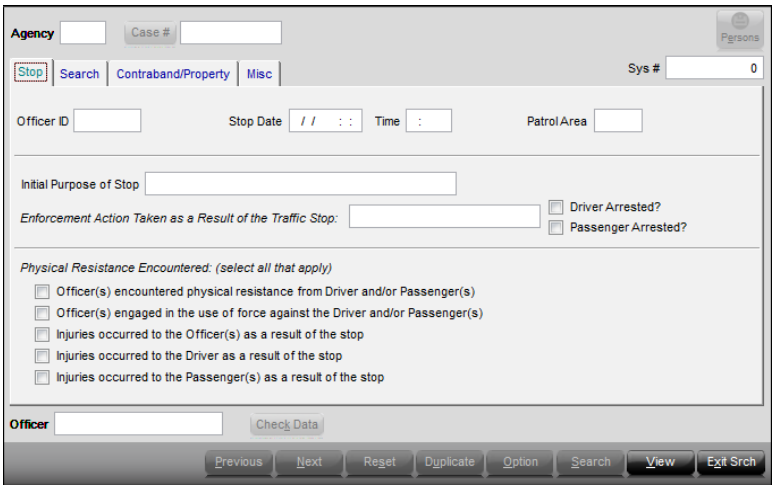

Figure 4. Traffic Stop Module Stop Page

Officers are directed to input one purpose for the stop and one enforcement action as a result of the stop. If a vehicle commits multiple violations before being stopped (e.g. having a broken brake light and running a red light), only one of these will be captured in a drop down menu. If multiple individuals are in the car and there are different enforcement actions taken against the individuals, not all of these may be captured by the form. For example, for a car with a driver and two passengers, it is possible that the driver could receive a citation, the first passenger could be issued a verbal warning, and the second passenger could be arrested. Not all of these enforcement actions would be reflected in the data captured by the software.

Search Page

The Search Page includes a number of checkboxes, including:

- Whether a search was conducted
- What type of search was conducted
- What was the basis for the search
- Who and what was searched
- In addition to these checkboxes, there are two non-functional fields related to consent searches, which can be used to identify the person giving consent and the reason the officer sought consent to search. These fields are currently not being used by GPD, and officers cannot enter information into these areas.

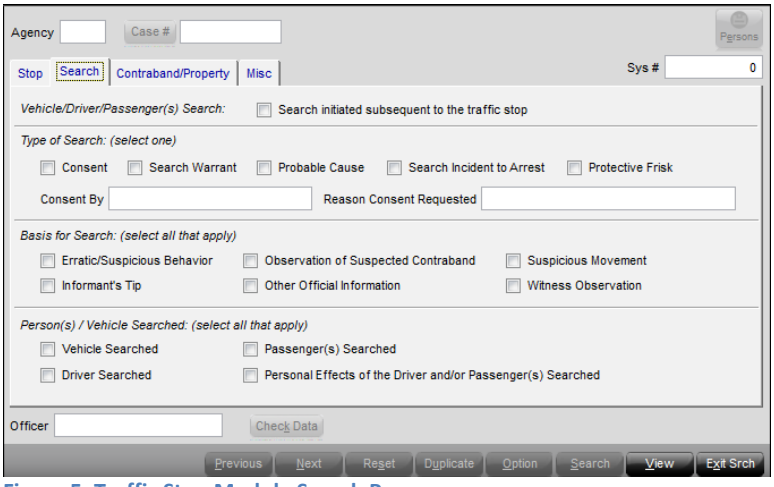

Figure 5. Traffic Stop Module Search Page

In theory, one should be able to count the number of searches that occur by simply counting all the stops where the checkbox for "Search initiated subsequent to traffic stop" is marked. In practice, this checkbox is not always marked, even when a search is conducted. This inconsistency makes it difficult to accurately capture the real number of searches that have been conducted at traffic stops.

There are five options for the type of search that is conducted. While the form tells officers to select only one option, the software actually allows for multiple boxes to be checked, and officers routinely check multiple options. We cannot say for certain how frequently officers adhere to the stated instructions and only select one option, even when multiple searches were conducted. For example, an officer could have probable cause but nonetheless request and receive consent to search. Following the instructions in the software, the officer may mark only "Consent" or "Probable Cause," while other officers may mark both boxes.

The Search Page acknowledges that multiple searches can occur at a single traffic stop; however, it has no way of differentiating the search types and bases for each search that is conducted. An officer may conduct a consent search of the driver and a protective frisk of a passenger. The bases for each of these searches may also differ. If multiple searches occurred, we cannot identify the type of search or basis for search for each search that occurred. This problem is compounded by the fact that officers may be filling this form out differently (based on whether or not they adhere to the stated instructions to only check a single box for the type of search).

Contraband/Property Page

The Contraband/Property Page shows the types of contraband that may be found during a search. Here, officers can identify whether drugs, alcohol, money, weapons, or other contraband was found, as well as the amounts for each type of contraband. There are problems with inconsistent use here as well. Some officers will only check a contraband type without identifying an amount, and vice versa. In a stop with multiple searches, the software is also unable to report which kind of contraband was found by each search (e.g., drugs found on the driver during a consent search and a weapon found on a passenger during a protective frisk).

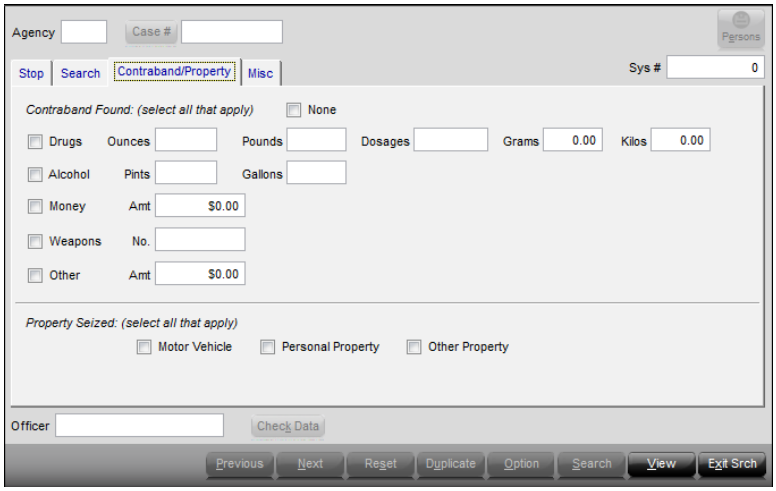

Figure 6. Traffic Stop Module Contraband/Property Page

Additionally, on some rare occasions, contraband items are selected, indicating that a search took place, but no information is included on the Search Page that would identify the type and basis for the search.

Misc Page

The Misc Page includes information on the officer assignment, as well as persons included in the traffic stop (i.e. the driver and passengers, if applicable). Officers are not required to include information on passengers unless they are searched during the traffic stop. For this reason, it is impossible to know how many people occupy a car during each traffic stop.

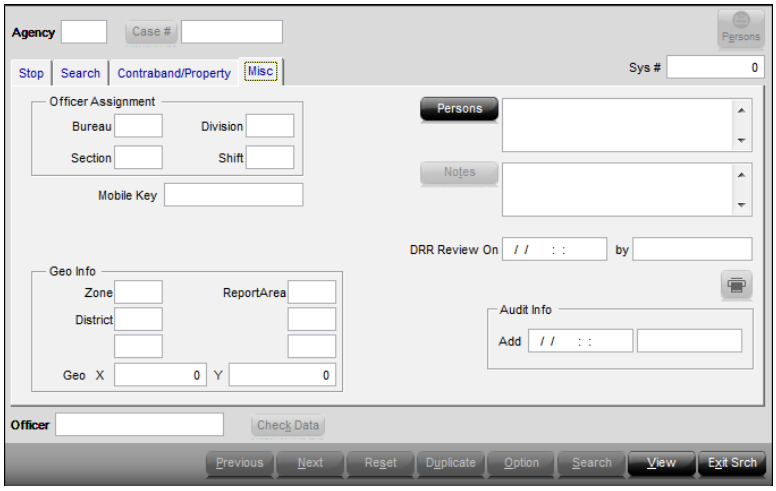

Figure 7. Traffic Stop Module Misc Page

Traffic Stop Report Completion Rate

The completion rate of Traffic Stop Reports for the Greensboro Police Department is not 100%. The analysis conducted in 2013 showed an overall completion rate of 78% for the agency. Variations in the completion percentages occur between different parts of the Department, such as Patrol, Traffic, Detectives, and Vice/Narcotics. Calculating the completion rate is not as simple as comparing the number of traffic stops to the number of traffic stop reports. Investigatory stops and traffic checkpoints have not historically required the completion of a traffic stop report. As a result, these kinds of traffic stops would need to be identified and excluded. Because of these limitations and the need for sound methods to calculate a completion rate, near-term calculations have not been conducted. This is a data need that is currently being researched.

Errors at the State Level

During the Department's review of state and local data and other researcher's work, it was discovered that a series of errors affecting the accuracy of the data are introduced as the North Carolina Department of Justice collects and processes the data generated by GPD and then posts it on its website. The data published by NC-DOJ is relied upon by the public and researchers (e.g., Baumgartner), and therefore it can affect public perceptions of GPD and other agencies. These errors include:

- **Limiting the reason for a search to only one category.**
  The state only requires one reason for a search, and the form states that only a single reason should be selected. Nonetheless, the software actually allows officers to select multiple reasons for a search. There are five types of searches:
  - consent
  - search warrant
  - probable cause
  - search incident to arrest
  - protective frisk

In 22% of searches conducted by GPD officers between January 1, 2009 and June 30, 2015, more than one reason for a search was selected. These multiple reasons were entered into the appropriate data base fields in the electronic form commonly used by most agencies in North Carolina. The state receives the data in a structured format and the information is imported into the state's database, with values assigned to specific fields. The state assigns one category for type of search by selecting the first field, reading left to right, that contains a value.

- **Populating the fields in a left to right order skews the type reported by order.**
  With the current software application used in patrol vehicles, there is variation within and across agencies in how the search type category is completed. For example, some officers were trained to ask for consent to search even if the officer also had probable cause to search. This approach became a common practice after local District Attorneys promoted the benefit of having both grounds as a reason to search. Here, the officer may check the probable cause search type and the consent search type as well, since the officer had both consent and probable cause to search. If the officer marked both "Consent" and "Probable Cause" for a particular search, GPD's internal data will show both search types were selected, but the state's processing will result in the state-level data only showing "Consent," because that field comes before the "Probable Cause" field. As a result, the only reason reported by the state is consent, even though probable cause also existed. A user of the state data could then incorrectly assume that the officer lacked probable cause to conduct the search at issue. This issue calls into question the accuracy of the consent searches reported by NC-DOJ relative to other search types. The result is the over-reporting of consent as the basis for a search.

- **Incorrectly reporting the weight or volume of contraband seized during a traffic stop.**
  If the amount of drugs is reported to be less than .5 ounces, pounds, grams or kilos, the state rounds the amount down to zero when it processes the data. The number of searches would be reported correctly, but there would be no way, using the state data, to tally the amount of contraband or know which category of weight or volume is associated with the contraband. GPD's records management system maintains these amounts, which allows more detailed analysis to be conducted with this data. Similar analysis is not available using data published by the state.

- **Conflating the bases for searches.**
  There are six categories for basis of search: erratic/suspicious behavior, observation of suspected contraband, suspicious movement, informant's tip, other official information, and witness observation. The state's data processing introduces errors in three of the six categories. The count values that are reported under Suspicious Movement are assigned to and published by the state in the category Informant's Tip. Informant's Tip counts are ascribed to Other Official Information. Other Official Information counts are ascribed to Suspicious Movement. See Table 1 as an example of discrepancies between GPD's basis for search counts compared to the state data.

Basis for Search	GPD	NC DOJ
Erratic/Suspicious Behavior	3548	3475
Observation of Suspected Contraband	2861	2780
Other Official Information	2249	88
Suspicious Movement	1943	2201
Informant's Tip	92	1893
Witness Observation	116	113

Table 1. GPD and NC DOJ Traffic Stop Data Discrepancies, 1/1/2011 - 6/30/2015

- **Incorrect assumption about the reporting rate.**
  Users of the State's data may assume that figures reflect 100% of all vehicles stopped by an agency. GPD's analysis of its own data indicates that not all traffic stops have a corresponding traffic stop report. There are several reasons for this; and, these reasons can realistically be extended to other police departments as well. First, officers in specialized units may not have a mobile computer terminal in their vehicles and be unable to complete a traffic stop report. Second, according to a GPD directive, any traffic stop that is deemed investigatory has not required completion of a traffic stop report. Vice/Narcotics and detective units consider traffic stops they make to be investigative in nature, thus not requiring a traffic stop report. Patrol units may be asked to assist Vice/Narcotics or detectives in making these stops and, as a result, a traffic stop report may not be completed. Third, the officer may simply forget to complete the report or be unable to complete a timely report due to the occurrence of an intervening event. The absence of these reports affects the accuracy and completeness of the underlying data regarding traffic stop rates, search rates, and hit rates.

Users of the state traffic stop website should be aware of these data processing issues, and any conclusions drawn from these data should be appropriately qualified. As discussed later in this report, GPD is making its traffic stop data used for this report available, which will allow researchers and others to conduct further analyses without the effects of the data processing issues.

Section IV: Analysis of GPD's Data

For this report, we analyzed a large amount of data from a variety of sources. This section outlines the methods used to process and compile the data in order to best answer our research questions. For the purposes of this analysis, we are only analyzing stops for black and white drivers, and excluding stops for Native American, Asian, or Other drivers (as identified by the state traffic stop report form).

GIS Methodology

Traffic stops, crime, and other variables were analyzed to generate hotspot density maps and to examine correlations between variables. The date range for all of the queries used to export the data was between 1/1/2009 – 6/30/2015. Incidents, vehicle stops, and Crime Stoppers information was queried out of the GPD Records Management System (RMS). Call data was queried out of the GPD Computer Aided Dispatch (CAD) database.

Incident Variables – RMS

	Category	Detail
1.	Part 1 Crimes	Homicide, Rape, Robbery, Aggravated Assault, Burglary, Larceny, Motor Vehicle Theft
2.	Part 2 Crimes	Assault, Fraud, Forgery, Intimidation, Sex Crime, Family Offense, Other Offenses
3.	Part 1 Crimes – Violent crime categories	Homicide, Rape, Robbery, Aggravated Assault
4.	Part 1 Crimes – Property crime categories	Burglary, Larceny, Motor Vehicle Theft
5.	Part 1 Crimes – Property crime categories (excluding the Larceny-Shoplifting subcategory)	Burglary, Larceny (excluding Larceny-Shoplifting subcategory), Motor Vehicle Theft
6.	Quality of Life Crimes	Disorderly Conduct, Drugs, Fraud, Prostitution, Vandalism, Weapons

Traffic Stop Variables – RMS

1. All stops
2. Searches
3. Contraband Found
4. Black Drivers
5. White Drivers
6. Black Drivers Searched
7. White Drivers Searched

8. Black Drivers with Contraband Found
9. White Drivers with Contraband Found

Traffic Stop Variables by Type – RMS

1. Driving While Impaired
2. Investigation
3. Other Motor Vehicle Violation
4. Safe Movement Violation
5. Seat Belt Violation
6. Speed Limit Violation
7. Stop Light/Sign Violation
8. Vehicle Equipment Violation
9. Vehicle Regulatory Violation

Additional Variables

1. CAD – Calls For Service
    1. Total Count: 1,638,799
    2. Police Headquarters/Substations: 42,134
    3. Geocoded CAD Calls for Service: 1,596,665
2. CAD – Self Initiated
    1. Total Count: 636,790
    2. Police Headquarters/Substations: 39,470
    3. Geocoded CAD Self-Initiated Activity or Stops: 597,320
3. CAD – Citizen Calls (E911, Phone, W911, Text)
    1. Total Count: 998,764
    2. Police Headquarters/Substations: 2,644
    3. Geocoded CAD Citizen Calls: 996,120
4. CAD – BOLOs (Be On Look Out)
    1. Total Count: 55,983
    2. Missing Coordinates; 18,787
    3. Geocoded BOLOS: 37,196
5. Crime Stoppers
    1. Total Count: 6,009
    2. Missing Coordinates: 1,663
    3. Geocoded Crime Stoppers: 4,346

Technical Description

In short, GPD used the available data to create maps showing the concentrations of various kinds of traffic stops and searches throughout the city. A more technical description of this process follows.

All RMS and CAD variables were geocoded and loaded into ArcMap as point shapefiles. The *Kernel Density* tool in ArcGIS was then used to create density layers for each point. Environment settings were applied to standardize output results. The extent of analysis was set to the extent of the city limits (Top: 898162.951064, Bottom: 810852.440391, Right: 1816393.351119, Left: 1698510.675809) in the NAD

1983 State Plane North Carolina Fips 3200 Feet projection. The cell size for each density layer was set to 250 feet and the search radius was 2,400 feet. All density maps were symbolized with five equal interval classifications and displayed on a gray scale with ordinal values. Bilinear Interpolation and a transparency level of twenty percent were applied to each density layer to optimize the display of the data.

In order to examine correlations between density layers, the *Raster to Point* tool was used to convert the density layers for each variable from raster layers to points. The *Intersect* tool was then used to join all of the density point layers into one shapefile with all of the original cell density values. As a result, the vector layer represents the city as a grid of 250 by 250 points with each cell containing density values for all of the traffic stop and incident variables. The table was then exported as a .dbf and loaded into Microsoft Excel for further analysis. The Pearson's R correlation was executed for each variable combination and added to a correlation matrix. Possible results of correlative analysis included values ranging from -1 to 1.

Traffic Stop Module Data

In order to best analyze the traffic stop data, while accounting for the issues with the Traffic Stop Module described above, we made a number of decisions to refine the data. Based on the information we sought to analyze, we needed to identify a number of variables. First and foremost was to accurately count the number of traffic stops when a search was conducted. Additionally, we sought to examine several types of searches that were not immediately captured by the Traffic Stop Module. These included consent searches, searches due to suspicious actions, and low discretion searches.

Identifying Traffic Searches

To identify whether or not a search occurred, we used several variables from the Traffic Stop Module. A traffic stop was counted as having a search if one of the following criteria was met:

- Any checkbox was marked on the Search Page
- Any checkbox was marked on the Contraband/Property Page, or
- Any amount was filled out on the Contraband/Property Page

This method captures instances when the officer does not check the "Search initiated subsequent to the traffic stop" box, but does include additional information indicating a search was conducted.

Second, only drivers were counted for stops and searches. Information on passengers was excluded, because we cannot say for certain how many passengers were included in the entire traffic dataset. As discussed earlier, officers are not required to enter information regarding passengers into the Traffic Stop Module unless a passenger is searched. There are still potential issues with the data set, however, because we cannot say for certain in every instance whether a search that was conducted refers to a passenger or the driver.

Third, a search was deemed successful if any contraband box was checked, or if any amount of contraband was included.

Identifying Consent Searches

The Traffic Stop Module instructs officers to select only one search type, although some officers will nonetheless select multiple applicable search types (see the earlier discussion of the Search Page). Because of this, we cannot simply count the number of consent searches that occur. Officers may have probable cause to search a vehicle, but also ask for consent. Whether consent was subsequently given may or may not be reflected on the Traffic Stop Module.

We chose to analyze only those searches for which the only reason for a search was the consent of either the driver or the passenger to search. In other words, we sought to count the searches in which an officer asked for consent to search as an exercise of the officer's discretion, based on training and experience, and did not search as a requirement of legal or departmental regulations. In order to count these consent searches, we identified any search that met the following three criteria:

- The Consent box was checked under Type of Search
- The Probable Cause box was NOT checked under Type of Search, and
- The Observation of Suspected Contraband box was NOT checked under Basis for Search

The rationale for removing all searches where there was no observation of suspected contraband was based on officers asking for consent when they already have probable cause. If officers observed contraband, they usually had probable cause to search. If they choose to ask for and receive consent, they may not check the Probable Cause box in the Traffic Stop Module.

There are limitations to this approach that arise from the limitations in the Traffic Stop Module. There may be scenarios when an officer has probable cause but receives consent to search first and does not identify the probable cause in the Traffic Stop Module. Additionally, there may be an instance when multiple searches are conducted, and a passenger submits to a consent search, but not the driver.

Identifying Searches as a Result of Suspicious Actions

The Traffic Stop Module includes two categories for suspicious actions as a basis for a search: erratic/suspicious behavior and suspicious movement. To examine whether or not there are differences in searches based on these suspicious actions, we isolated these two search bases. Due to the previously discussed limitations in the Traffic Stop Module, we cannot identify every search that was initially conducted due to suspicious actions. However, we can look at searches that have no other reasons listed for the basis of the search.

We counted searches based on suspicious activity when the following criteria were met:

- The Erratic/Suspicious Behavior box was checked for Basis for Search, or
- The Suspicious Movement box was checked for Basis of Search

Identifying Low Discretion Searches

In order to control for situations when formal procedure plays a greater role in guiding an officer's actions, we have attempted to identify searches that are best described as "low discretion." These are

searches when the police officer's decisions were guided by law or policy, such as the search of a driver or vehicle incident to arrest or a search based on probable cause.

We identified low discretion searches as any search when the following criteria were met:

- The Search Warrant box was checked under Type of Search, or
- The Probable Cause box was checked under Type of Search, or
- The Search Incident to Arrest box was checked under Type of Search.

Section V: Results

Analysis conducted by the Greensboro Police Department is based on the variables illustrated in Figure 3 (the multivariate model). These variables relate to patterning of context for crime, calls for service (e.g., 911 calls), be on the lookout, Crime Stoppers tips, vehicle crashes, traffic enforcement, and investigative (where the officers have information regarding wanted individuals or illegal contraband in the vehicle) traffic stops. In addition, maps showing the distribution of traffic stops, aggregated and specific categories, are included. For clarity, each map shows the major roads within the City of Greensboro and one specific variable. Due to the scale of the maps and cartographic limitations, overlaying two or more variables generates a map that is visually difficult to interpret. As a result, the reader is best served by comparing maps to one another. Each map includes a short narrative with additional details. Larger versions of the maps are in Appendix C. In addition, a series of correlations were run for the maps, using a geo-spatial correlation analysis, resulting in a correlation matrix.

The goal of this analysis is to determine whether the distribution of traffic stops and searches in Greensboro matches what would be predicted by the normative model. The normative model suggests, a priori, how things ought to be; that in the case of traffic stops, stops should reflect the percentage of the population by race, ethnicity, or sex and have randomness to it. Examining Greensboro's data in this way, we can seek to understand whether traffic stops, crime, calls for service, and other variables are randomly or uniformly distributed across the jurisdiction, or if instead there is patterning or clustering that would not be predicted by the normative model.

The source data used for this analysis are from traffic stops between 1/1/2009 and 6/30/2015. This timeframe was selected because it matched the range used in the RAND study, discussed in a later section, and it encompasses the period when the disparity in stops between black and white drivers increased (see Appendix F).

Due to the high counts for theft from shoplifting, a subcategory of larceny, the density maps for Part 1 Property crime categories have excluded shoplifting. If shoplifting crimes were included, the maps would simply highlight major shopping areas of Greensboro, because these areas have the highest numbers of shoplifting crimes. We omitted shoplifting crimes because they have negligible impact on evaluating or explaining the traffic stop and search data.

Maps

Figure 8 shows the density of all 911 Calls for Service initiated within Greensboro. 911 calls are most concentrated in commercial areas, high density housing, and along thoroughfares. Low and medium concentrations of 911 calls are mainly in residential areas.

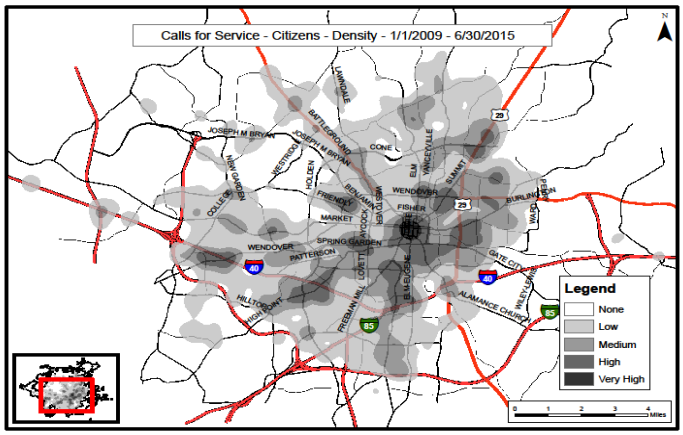

Figure 8. Calls for Service – Citizens – Density – 1/1/2009-6/30/2015

Figure 9 shows all reported property crime, excluding shoplifting. This provides the resolution to view the concentrations of burglaries, auto theft, and larcenies. While there is some association with commercial areas, much of the low to medium concentrations are in residential areas.

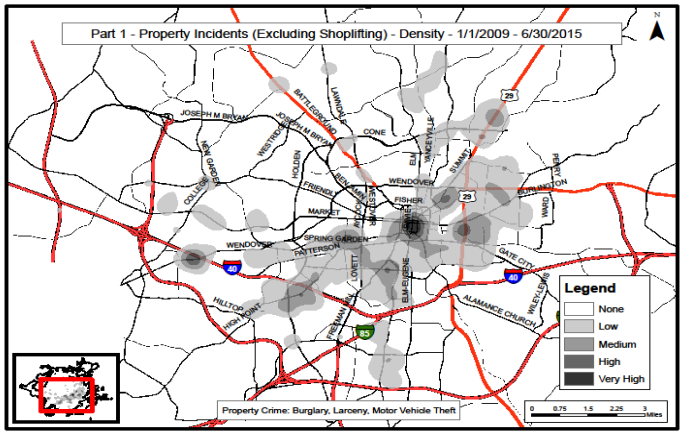

Figure 9. Property Incidents (Excluding Shoplifting) – Density – 1/1/2009 – 6/30/2015

Figure 10 shows the density of Part 1 violent crime. Violent crime has limited association with land use (primarily robbery), but low to medium densities are defused across the east and south of the city.

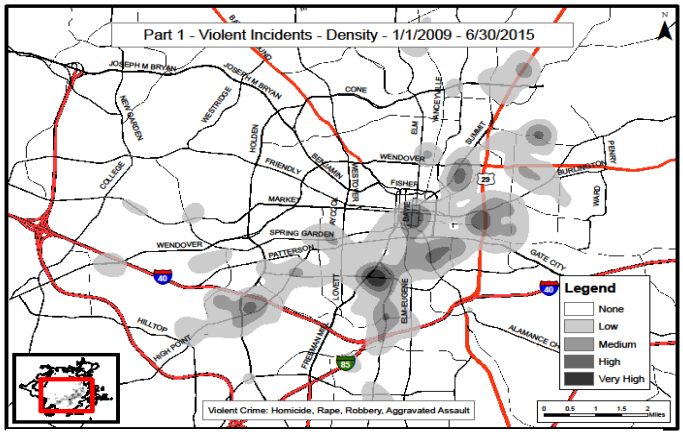

Figure 10. Part 1 – Violent Incidents – Density – 1/1/2009 – 6/30/2015

Figure 11 shows Part 2 crimes. Part 2 crimes are all the other categories of crimes not reported to the state or federal government. There are dozens of categories of crime that include violations of state statutes and city ordinances. Part 2 crimes include drug and weapons offenses, simple assault, domestic disputes, and vandalism, to list a few. The higher concentrations reflect commercial areas, major thoroughfares, and areas of residential and multifamily use.

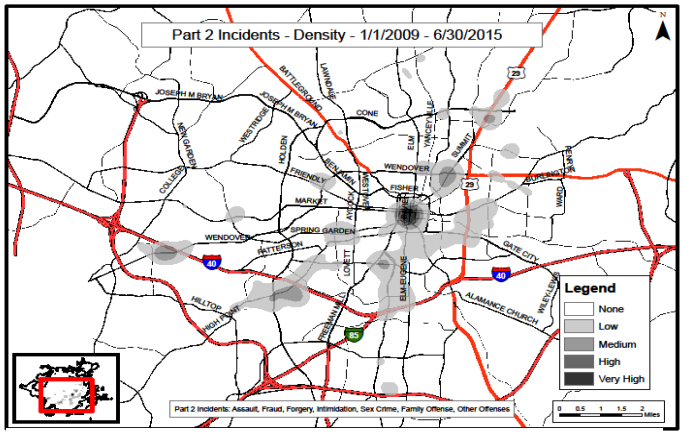

Figure 11. Part 2 Incidents – Density – 1/1/2009 – 6/30/2015

Figure 12 shows quality of life crimes, such as disorderly conduct, drugs, fraud, prostitution, vandalism, and weapons. These are crimes that affect residents' sense of safety and security. These crime categories are often reported to law enforcement in the form of a 911 call, complaint, or Crime Stoppers tip.

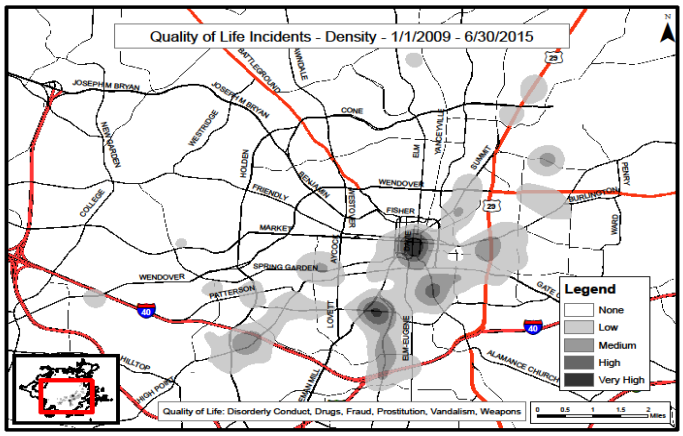

Figure 12. Quality of Life Incidents – Density – 1/1/2009 – 6/30/2015

Figure 13 shows the density of traffic stops. The higher concentrations of stops are associated with the central business district and major thoroughfares.

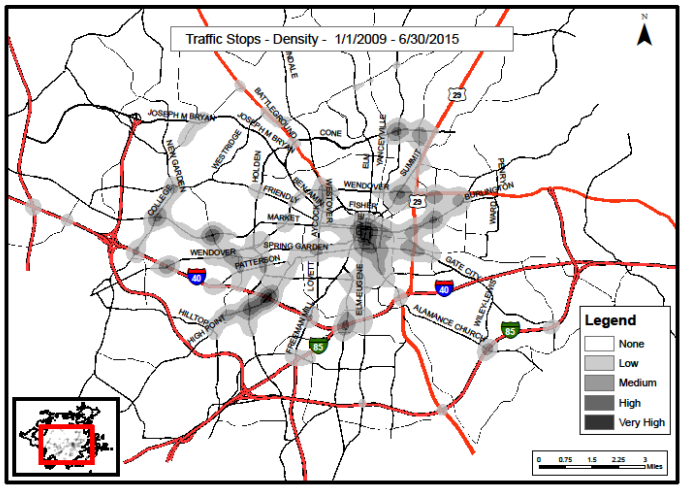

Figure 13. Traffic Stops – Density – 1/1/2009 – 6/30/2015

Figure 14 shows searches following traffic stops. The density of searches is associated with the central business district, thoroughfares, major intersections, and residential areas.

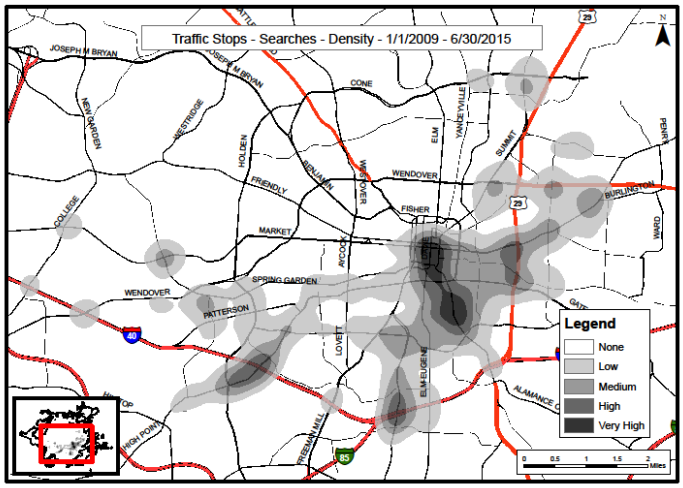

Figure 14. Traffic Stops – Searches – Density – 1/1/2009 – 6/30/2015

Figure 15 shows the density of contraband found during traffic stops for all races. The density of stops is associated with the central business district, thoroughfares, and some diffusion into residential and multifamily land use.

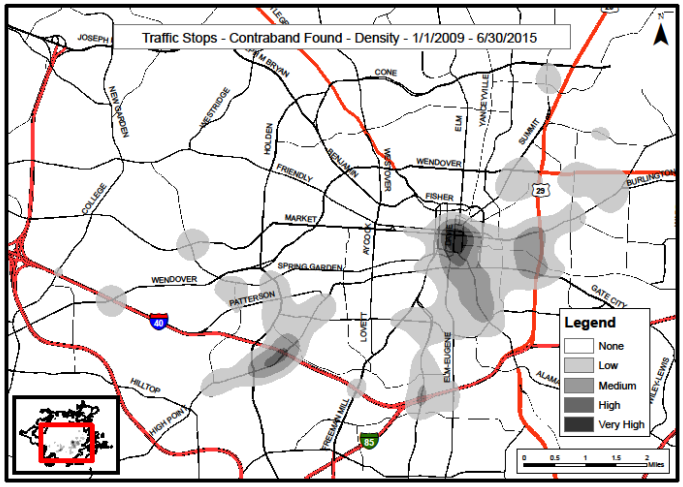

Figure 15. Traffic Stops – Contraband Found – Density – 1/1/2009 – 6/30/2015

Figure 16 shows the density of traffic stops of black drivers. The density of stops is associated with the central business district, thoroughfares, and some diffusion into residential and multifamily land use.

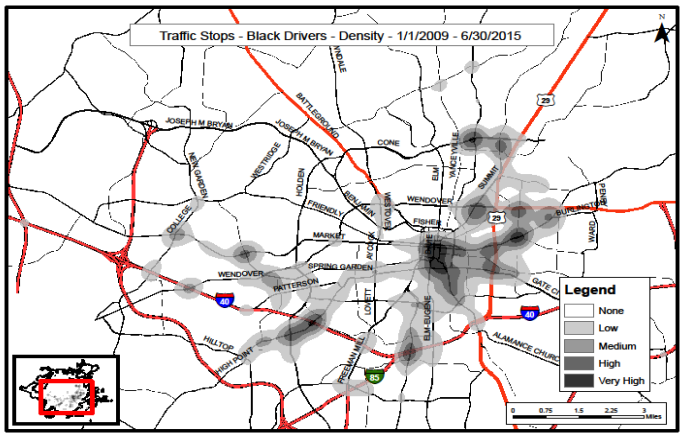

Figure 16. Traffic Stops –Black Drivers – Density – 1/1/2009 – 6/30/2015

Figure 17 shows the density of traffic stops of white drivers. The density of stops is associated with the central business district, thoroughfares, and some diffusion into residential and multifamily land use.

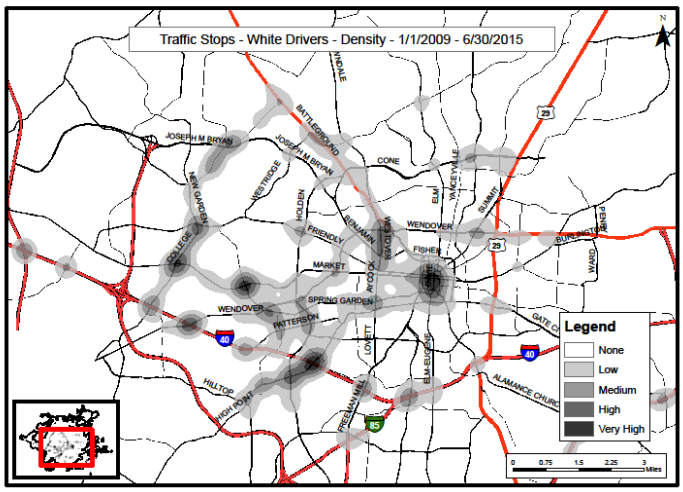

Figure 17. Traffic Stops –White Drivers – Density – 1/1/2009 – 6/30/2015

Figure 18 shows the density of searches conducted during traffic stops of black drivers. The density of searches is associated with thoroughfares, and some diffusion into residential and multifamily land use.

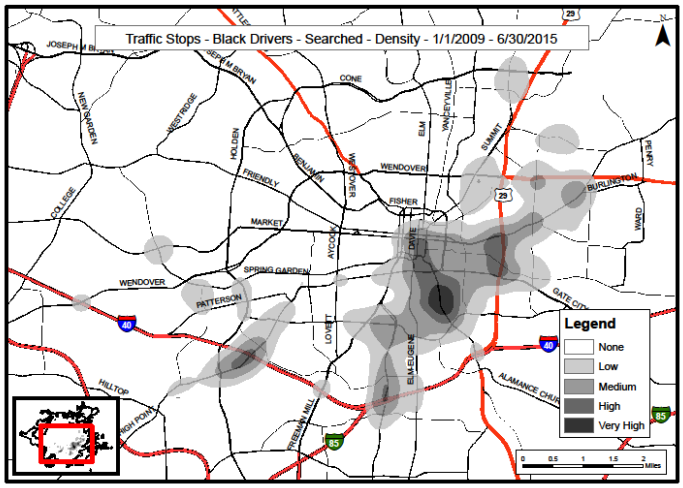

Figure 18. Traffic Stops – Searches – Black Drivers – Density – 1/1/2009 – 6/30/2015

Figure 19 shows the density of searches conducted during traffic stops of white drivers. The density of searches is associated with the central business district, thoroughfares, and some diffusion into residential and multifamily land use.

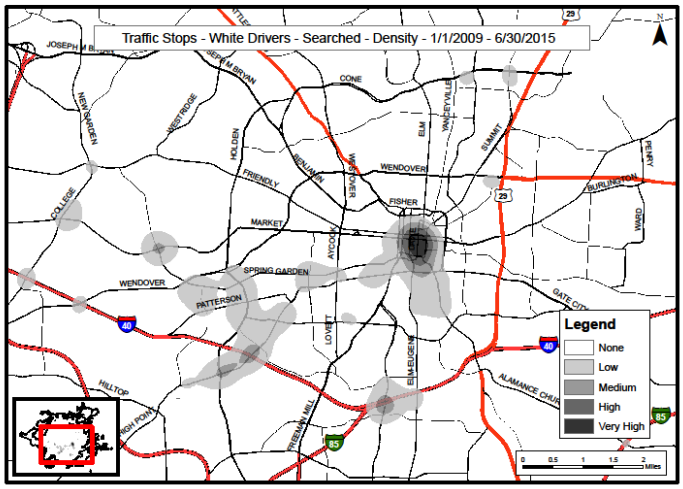

Figure 19. Traffic Stops – Searches – White Drivers – Density – 1/1/2009 – 6/30/2015

Figure 20 shows the density of contraband found during traffic stops of black drivers. The density of stops is associated with the central business district, thoroughfares, and some diffusion into residential and multifamily land use.

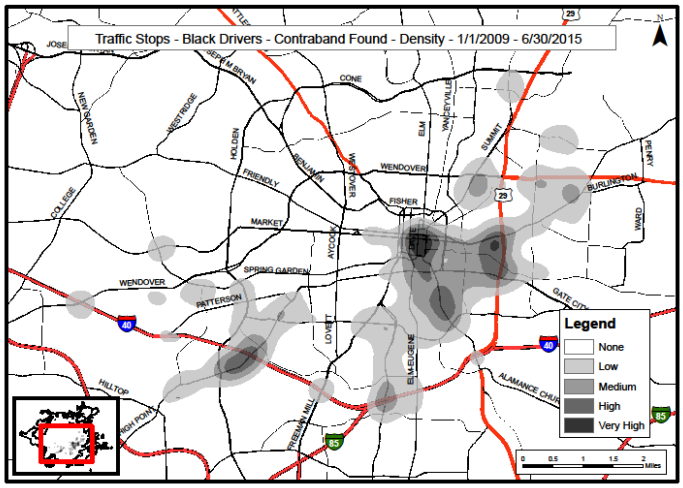

Figure 20. Traffic Stops – Contraband Found – Black Drivers – Density – 1/1/2009 – 6/30/2015

Figure 21 shows the density of contraband found during traffic stops of white drivers. The density of stops is associated with the central business district, thoroughfares, and some diffusion into residential and multifamily land use.

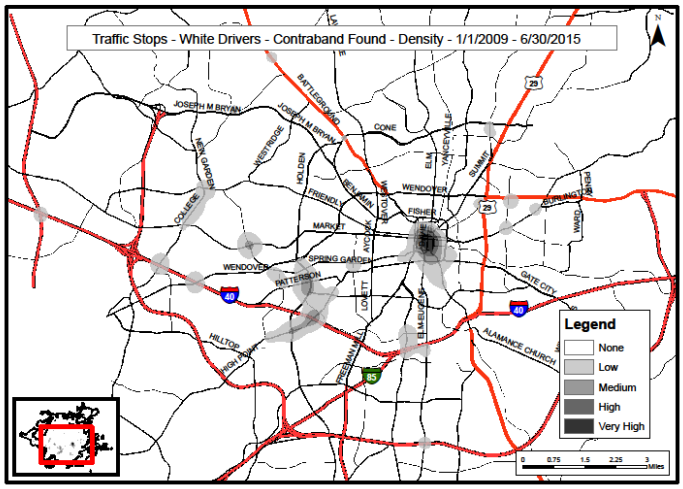

Figure 21. Traffic Stops –Contraband Found – White Drivers – Density – 1/1/2009 – 6/30/2015

Figure 22 shows the density of traffic stops due to driving while intoxicated. The density of driving while intoxicated stops is associated with the central business district, thoroughfares, and major intersections.

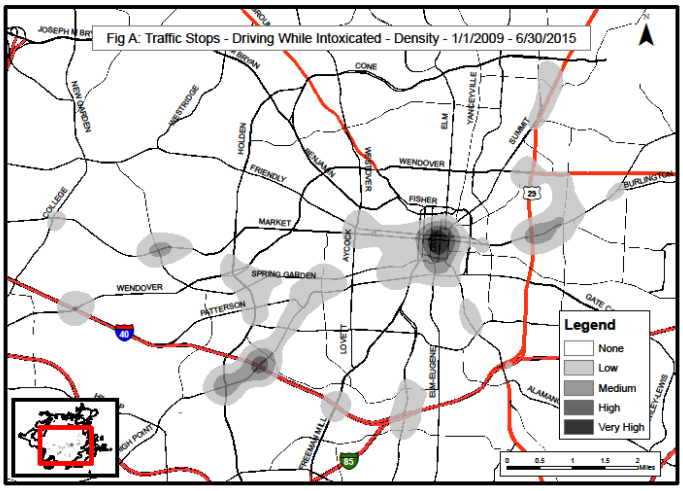

Figure 22. Traffic Stops –Driving While Intoxicated Stops – Density – 1/1/2009 – 6/30/2015

Figure 23 shows the density of all reported investigative traffic stops. An investigative stop is based on information that has been developed by or provided to law enforcement indicating that the vehicle or a person is associated with some infraction of the law. Investigative stops are concentrated near thoroughfares, and low to medium densities in residential areas. Note that because investigative stops are not required to have a traffic stop report completed, the data set and resulting map do not reflect all investigative stops in the city.

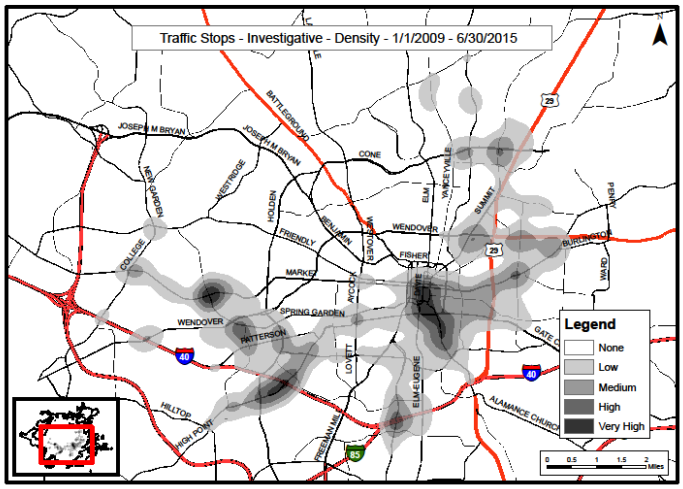

Figure 23. Traffic Stops – Investigative Stops – Density – 1/1/2009 – 6/30/2015

Figure 24 is a density of Other Motor Vehicle Violations. This is a category of stop that the state has included in its reporting requirements. The density of stops is associated with the central business district, thoroughfares, and some diffusion into residential and multifamily land use.

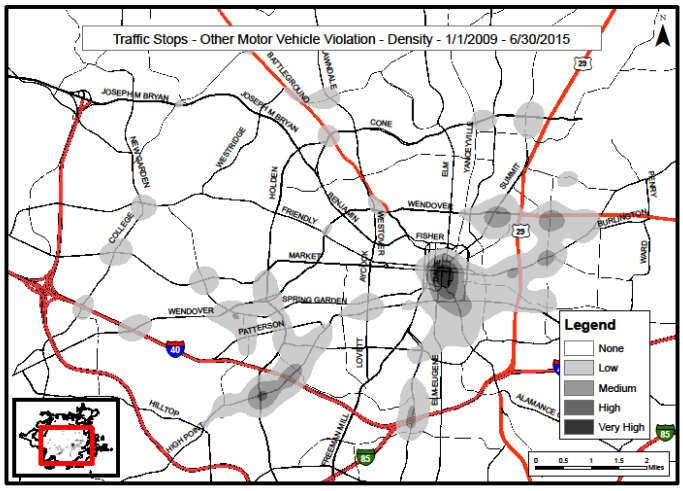

Figure 24. Traffic Stops – Other Motor Vehicle Violation Stops – Density – 1/1/2009 – 6/30/2015

Figure 25 shows the density of traffic stops due to safe movement violations, which include (but are not limited to) unsafe lane changes or unsafe turning. The density of safe movement stops is associated with the central business district, thoroughfares, and major intersections.

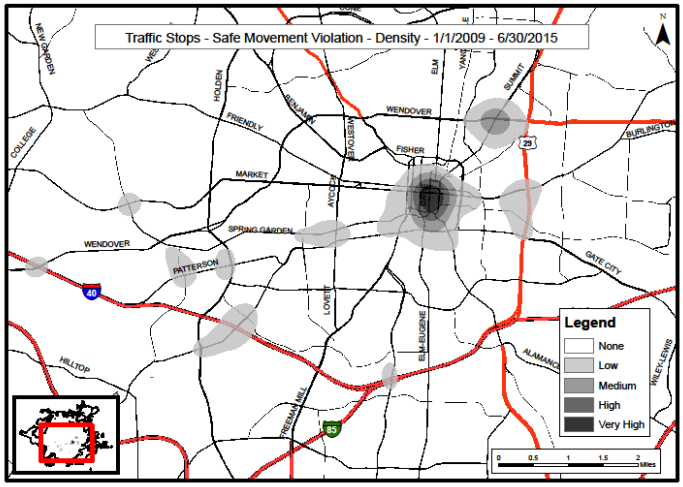

Figure 25. Traffic Stops –Safe Movement Violation Stops – Density – 1/1/2009 – 6/30/2015

Figure 26 shows the density associated with speed limit violations for all traffic stops. The density of speed limit violations is associated with thoroughfares and major intersections.

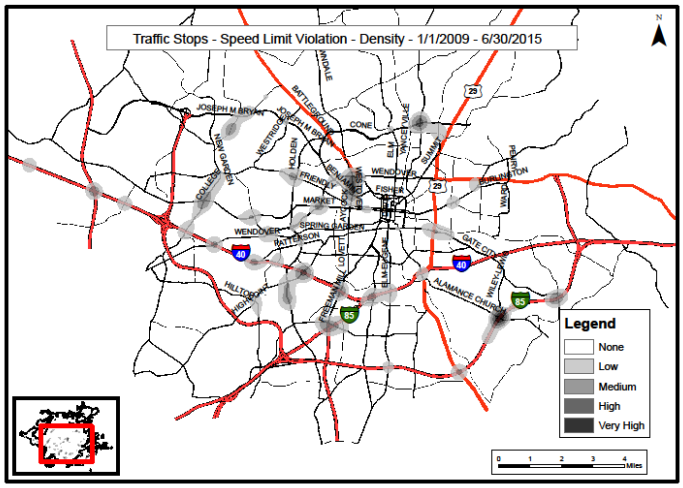

Figure 26. Traffic Stops – Speed Limit Violation Stops – Density – 1/1/2009 – 6/30/2015

Figure 27 shows the density associated with seat belt violations for all traffic stops. The density of seat belt violations is associated with thoroughfares and major intersections.

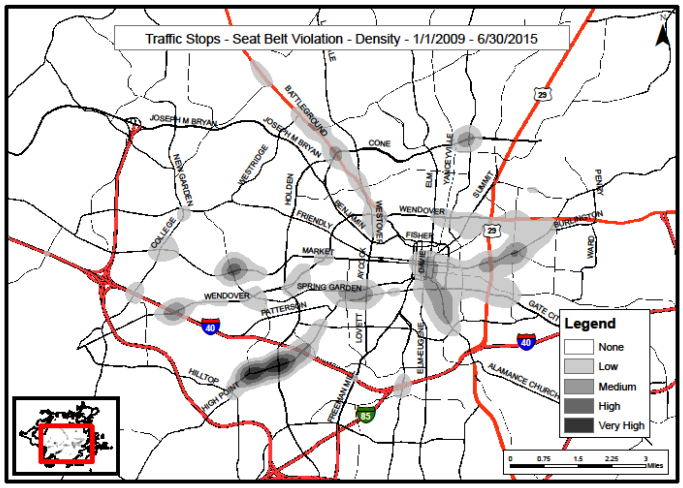

Figure 27. Traffic Stops – Seat Belt Violation Stops – Density – 1/1/2009 – 6/30/2015

Figure 28 shows the density associated with stop light/sign violations for all traffic stops. The density of violations is associated with the central business district, thoroughfares, and major intersections.

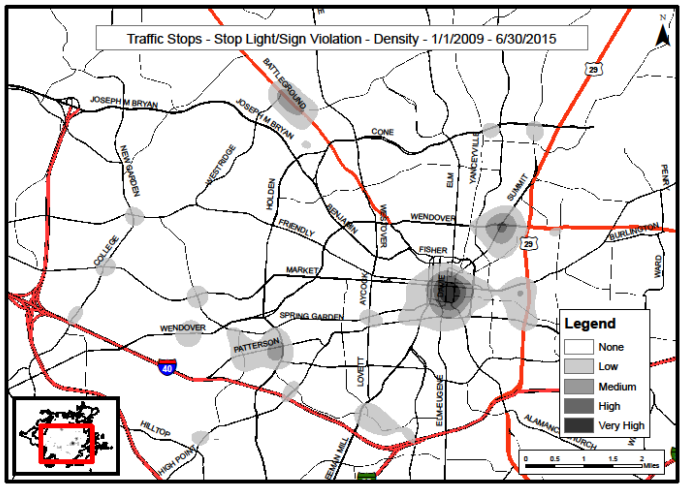

Figure 28. Traffic Stops – Stop Light/Sign Violation Stops – Density – 1/1/2009 – 6/30/2015

Figure 29 shows the density of vehicle equipment violations for all drivers. The density of violations is associated with the central business district, thoroughfares, major intersections, and limited residential areas.

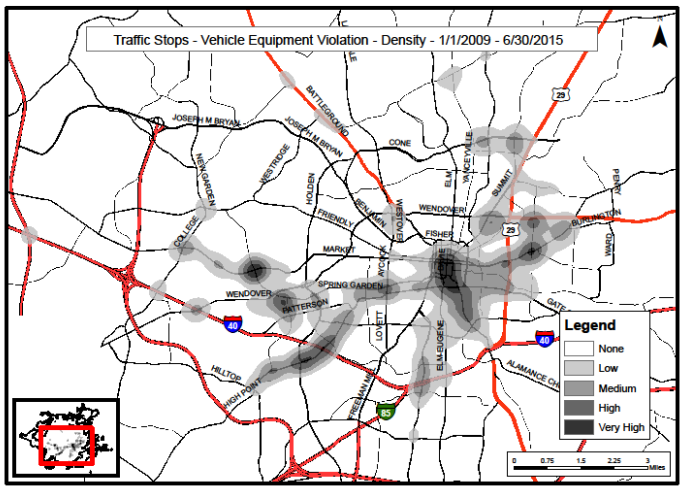

Figure 29. Traffic Stops – Vehicle Equipment Violation Stops – Density – 1/1/2009 – 6/30/2015

Figure 30 shows the density of vehicle regulatory violations for all traffic stops. Regulatory violations are registration, license, or insurance compliance related. The density of violations is associated with the central business district, thoroughfares, major intersections, and residential areas.

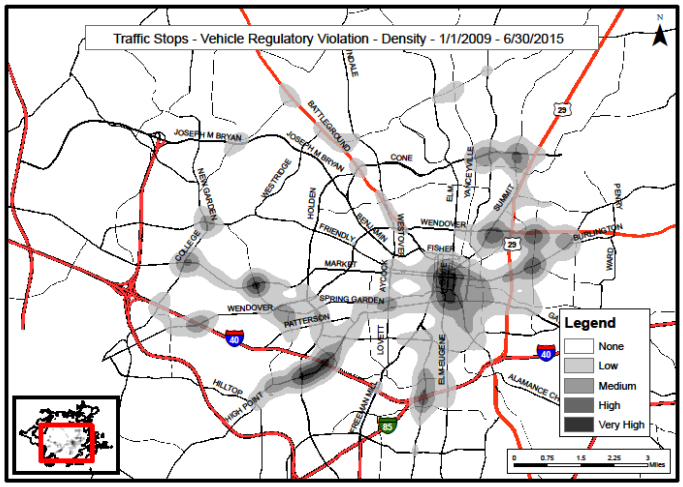

Figure 30. Traffic Stops – Vehicle Regulatory Violation Stops – Density – 1/1/2009 – 6/30/2015

Findings from Spatial Correlations

The full methodology has been described in the previous section, and Table 2 shows the results of the correlations. Table 3 shows the correlation ranges used to determine the strength of the relationship or interaction between the two variables. The significance value for the correlations was less than .001, indicating that there is a low likelihood of error in the statistical analysis. Table 2 contains the resulting correlation data and is discussed below.

	Total Crime	Part 1 Crime	Part 2 Crime	Quality of Life	Traffic Stops	Stops of Blacks	Stops of Whites	All Searches	Black Searches	White Searches	Contraband	Black Contraband	White Contraband
Total Crime	1.00	0.93	0.95	0.84	0.64	0.68	0.42	0.71	0.68	0.61	0.71	0.70	0.56
Part 1 Crime	0.93	1.00	0.78	0.60	0.46	0.48	0.31	0.48	0.46	0.42	0.48	0.47	0.39
Part 2 Crime	0.95	0.78	1.00	0.87	0.71	0.73	0.51	0.74	0.69	0.70	0.76	0.73	0.64
Quality of Life	0.84	0.60	0.87	1.00	0.69	0.78	0.39	0.88	0.86	0.70	0.86	0.86	0.63
Traffic Stops	0.64	0.46	0.71	0.69	1.00	0.94	0.85	0.83	0.75	0.85	0.85	0.79	0.82
Stops of Blacks	0.68	0.48	0.73	0.78	0.94	1.00	0.62	0.92	0.89	0.76	0.90	0.89	0.72
Stops of Whites	0.42	0.31	0.51	0.39	0.85	0.62	1.00	0.50	0.37	0.78	0.58	0.46	0.77
All Searches	0.71	0.48	0.74	0.88	0.83	0.92	0.50	1.00	0.98	0.80	0.96	0.96	0.72
Black Searches	0.68	0.46	0.69	0.86	0.75	0.89	0.37	0.98	1.00	0.67	0.92	0.96	0.60
White Searches	0.61	0.42	0.70	0.70	0.85	0.76	0.78	0.80	0.67	1.00	0.84	0.73	0.93
Contraband	0.71	0.48	0.76	0.86	0.85	0.90	0.58	0.96	0.92	0.84	1.00	0.98	0.81
Black Contraband	0.70	0.47	0.73	0.86	0.79	0.89	0.46	0.96	0.96	0.73	0.98	1.00	0.67
White Contraband	0.56	0.39	0.64	0.63	0.82	0.72	0.77	0.72	0.60	0.93	0.81	0.67	1.00

Table 2: Correlation matrix of spatial densities

Strength	Correlation (+-)
None	.0 < r < .1
Low	.1< r < .3
Moderate	.3 < r < .5
High	.5 < r < 1

Table 3: Correlation Strength Values

Key results of the analysis are:

1. Among the crime categories, traffic stops are most highly correlated with Part 2 crime (0.71) and quality of life crime (0.69). This means that traffic stops are more likely to occur in areas with a high incidence of Part 2 crimes and quality of life crimes because police focus their efforts where they are most needed to prevent victimization. Quality of life crimes include: disorderly conduct, drugs, fraud, prostitution, vandalism, and weapons.
2. Traffic stops of blacks are geographically correlated to areas with high numbers of quality of life crime (0.78). Conversely, stops of whites only have a moderate correlation to quality of life crimes (0.39).
3. When searches are conducted, quality of life crimes are strongly correlated to both searches of blacks (0.86) and whites (0.70). This means that searches are more likely to occur, for both black and white drivers, when a traffic stop occurs in an area with a high incidence of quality of life crimes.
4. Traffic stops for black and white drivers are correlated with each other (0.62). This means that black and white drivers are in large part stopped in the same areas of the city. However, this correlation is not as strong as others. Black drivers are more frequently stopped in the east and southeast areas of the city, and whites are more frequently stopped in west and southwest areas of the city. This pattern reflects census data for those areas.
5. Quality of life crimes are correlated with all contraband seized (0.86), contraband from black drivers (0.86), contraband from white drivers (0.63), and searches (0.88). This means that the seizure of contraband is more likely to occur in areas of the city with a high incidence of quality of life crimes. The primary types of contraband found are drugs and weapons.
6. In general terms, there is a greater association of traffic stops involving black drivers, searches, and contraband to areas with a higher incidence of crime. In other words, where there are higher densities of crime occurring, there is a corresponding increase in the number of traffic stops and searches of black drivers.
7. There is not a strong correlation between traffic stops or searches and Part 1 crime. This is a function of Part 1 crime being skewed due to the majority of crime falling into the category of larceny shoplifting and these areas are associated with several commercial locations in the city. In other words, the fact that an area has a higher incidence of Part 1 crime is not a strong predictor that the same area will have a higher concentration of traffic stops, searches, or seizures of contraband.
8. There is a geographic correlation (or association) between the number of traffic stops and concentrations of quality of life crimes.

Traffic Stop Tables

The following tables show a number of summary statistics from the Greensboro traffic stop data. The time frame for these tables is January 1, 2009 through June 30, 2015. Due to inconsistencies with the Traffic Stop Module, the numbers may differ from other reported sources such as Baumgartner and Weisel. A complete version of the traffic stop data will be made available for researchers to recreate these steps or to conduct their own analyses of the data. As noted earlier, we cannot conclude, from the available traffic stop data, that racial bias exists in police officers' traffic stop and search decisions. Every decision that an officer makes during a stop is predicated on information and circumstances that we cannot fully examine with the current dataset. However, because such a large amount of research has been conducted on this issue, we can use previous discussions to help guide our efforts to draw the most helpful conclusions possible from the available data.

Traffic Stops by Police Division

Differences in the racial disparities in traffic stops and search rates exist across the Division in the Department. While rates vary by Patrol officers, Traffic officers, and Vice/Narcotics officers, disparity stills exists.

Table 4 shows traffic stops by police division for the City of Greensboro, from January 1, 2009 through June 30, 2015. GPD is divided into a number of administrative units, bureaus, and divisions. The Patrol Bureau contains four geographically-oriented divisions (Division 1, Division 2, Division 3, Division 4). Patrol officers respond to calls for service, help deter and detect criminal activity, and work alongside citizens to improve quality of life and public safety. The Special Operations Division (SOD) is part of the Support Bureau. One of SOD's units is the Traffic Safety Unit, which is responsible for specific traffic enforcement activities and managing major roadway accidents. The Vice/Narcotics Division is part of the Investigative Bureau. It includes squads focused on investigating illegal narcotic and controlled substance sales, possession, and use, and investigating and enforcing vice laws (e.g., laws focused on activities such as gambling, prostitution, and liquor law violations).

Table 4 also shows the search rates, hit rates, and disparities for white and black drivers. For all officers, black drivers are searched at twice the rate of white drivers, and white drivers are 9% more likely to have contraband than black drivers when a search is conducted. For Vice/Narcotics officers, the search disparity and the hit rate disparity are the lowest. They search black drivers 46% more frequently than white drivers, and white drivers are only 3% more likely to have contraband than black drivers when a search is conducted.

The majority of traffic stops and searches are conducted by Patrol officers. Traffic officers (identified in the tables as SOD) stop a high number of cars, but rarely conduct searches. Vice/Narcotics officers do not stop a high number of vehicles, but will more frequently conduct a search after a stop.

	Black Drivers					White Drivers					Black:White	
	Traffic Stops	*Searches Conducted*	*Search Rate*	*Contraband Found*	*Hit Rate*	*Traffic Stops*	*Searches Conducted*	*Search Rate*	*Contraband Found*	*Hit Rate*	*Search Disparity*	*Hit Rate Disparity*
Patrol	111,010	6,719	6.05%	1,910	28.43%	74,741	2,516	3.37%	753	29.93%	1.80	0.95
SOD	29,471	229	0.78%	108	47.16%	39,291	145	0.37%	74	51.03%	2.11	0.92
Vice	1,994	376	18.86%	148	39.36%	2,230	288	12.91%	117	40.63%	1.46	0.97
Other	11,756	714	6.07%	161	22.55%	8,805	271	3.08%	71	26.20%	1.97	0.86
Total	154,231	8,038	5.21%	2,327	28.95%	125,067	3,220	2.57%	1,015	31.52%	2.02	0.92

Table 4. Traffic Stops by Police Division

Traffic Stops by Crime Area

One theory that may explain the disparity in traffic searches is related to the geographic context of the traffic stop. Searches are more likely to be conducted in higher crime areas, and high crime areas are correlated with higher concentrations of minority populations. Tables 5 - 7 examine disparity within low crime, medium crime, and high crime areas in Greensboro. Crime here is defined as Part 1 crime (violent and property crime categories, excluding shoplifting). This includes murder, rape, robbery, aggravated assault, burglary, larceny (except shoplifting), and auto theft.

After controlling for the level of crime, the disparity in searches does decrease; however, it does not vanish. Additionally, there is little change to the disparities in hit rates. Among all police stops in high crime areas, black drivers are 68% more likely to be searched than white drivers, and white drivers are 10% more likely than black drivers to have contraband when a search is conducted.

These results are similar for both Patrol and other police divisions. While non-Patrol police stops have higher rates of search disparity, these ratios are still associated with the level of crime in the area.

	Black Drivers					White Drivers					Black:White	
Crime	*Traffic Stops*	*Searches Conducted*	*Search Rate*	*Contraband Found*	*Hit Rate*	*Traffic Stops*	*Searches Conducted*	*Search Rate*	*Contraband Found*	*Hit Rate*	*Search Disparity*	*Hit Rate Disparity*
Low	27,022	843	3.12%	237	28.11%	43,027	750	1.74%	234	31.20%	1.79	0.90
Medium	71,188	4,107	5.77%	1,161	28.27%	45,300	1,389	3.07%	408	29.37%	1.88	0.96
High	45,636	2,769	6.07%	819	29.58%	21,713	783	3.61%	255	32.57%	1.68	0.91
Total	143,846	7,719	5.37%	2,217	28.72%	110,040	2,922	2.66%	897	30.70%	2.02	0.94

Table 5. Traffic Stops By Crime Area - All Officers

	Black Drivers					White Drivers					Black:White	
Crime	*Traffic Stops*	*Searches Conducted*	*Search Rate*	*Contraband Found*	*Hit Rate*	*Traffic Stops*	*Searches Conducted*	*Search Rate*	*Contraband Found*	*Hit Rate*	*Search Disparity*	*Hit Rate Disparity*
Low	18,377	707	3.85%	189	26.73%	27,749	635	2.29%	189	29.76%	1.68	0.90
Medium	52,899	3,482	6.58%	982	28.20%	28,089	1,132	4.03%	314	27.74%	1.63	1.02
High	36,279	2,400	6.62%	710	29.58%	14,756	662	4.49%	219	33.08%	1.47	0.89
Total	107,555	6,589	6.13%	1,881	28.55%	70,594	2,429	3.44%	722	29.72%	1.78	0.96

Table 6. Traffic Stops By Crime Area - Patrol Officers

	Black Drivers					White Drivers					Black:White	
Crime	*Traffic Stops*	*Searches Conducted*	*Search Rate*	*Contraband Found*	*Hit Rate*	*Traffic Stops*	*Searches Conducted*	*Search Rate*	*Contraband Found*	*Hit Rate*	*Search Disparity*	*Hit Rate Disparity*
Low	8,645	136	1.57%	48	35.29%	15,278	115	0.75%	45	39.13%	2.09	0.90
Medium	18,289	625	3.42%	179	28.64%	17,211	257	1.49%	94	36.58%	2.29	0.78
High	9,357	369	3.94%	109	29.54%	6,957	121	1.74%	36	29.75%	2.27	0.99
Total	36,291	1,130	3.11%	336	29.73%	39,446	493	1.25%	175	35.50%	2.49	0.84

Table 7. Traffic Stops By Crime Area - All Non-Patrol Officers

Traffic Stops by Enforcement Action

Examining the actions taken by police as a result of traffic stops – also referred to as the outcome of the stop – provides another view of various disparities reflected in the data.

Table 8 shows the enforcement actions that resulted from traffic stops and searches in the City of Greensboro. As can be seen, the vast majority of traffic stops result in either a citation or a verbal warning (86.4% of stops of black drivers, 87.6% of stops of white drivers). An arrest is the least likely enforcement action of a traffic stop (1.75% of stops of black drivers, 1.10% of stops of white drivers).

However, following a traffic stop, black drivers are 58% more likely than white drivers to be arrested. Over the six-and-a-half year period we analyzed, 2,692 black drivers were arrested after traffic stops, while 1,379 white drivers were arrested. White drivers are 14% more likely than black drivers to receive a citation. Black drivers are 16% more likely than white drivers to receive a warning or to have no action taken after a traffic stop. This result can be interpreted in a number of different ways. If black drivers are more likely to receive a warning (or no action at all) instead of a citation, it raises the possibility that officers are initiating stops of black drivers in situations where a white driver might not be stopped. The data does not allow us to determine whether that possibility does in fact exist.

When a search is conducted, white drivers are 22% more likely to be arrested than black drivers. We know that black drivers are searched at higher rates than white drivers. If white drivers are more likely to be arrested after a search, this could suggest that white drivers are more likely to be engaged in serious criminal activity than black drivers when a search is conducted. Again, this raises the possibility that officers may be searching black drivers in situations where a white driver might not be searched.

	Black Drivers			White Drivers		
	Traffic Stops	*Searches Conducted*	*Contraband Found*	*Traffic Stops*	*Searches Conducted*	*Contraband Found*
Arrest	2,692	1,689	792	1,379	824	336
Citation	78,572	3,758	1,284	72,517	1,428	547
No Action	6,690	188	16	3,835	66	8
Verbal Warning	54,696	1,982	164	37,048	648	68
Written Warning	11,581	421	71	10,288	254	56
Total	154,231	8,038	2,327	125,067	3,220	1,015

	Black Drivers			White Drivers			Black:White Outcome Disparities		
	Traffic Stops	*Searches Conducted*	*Contraband Found*	*Traffic Stops*	*Searches Conducted*	*Contraband Found*	*Traffic Stops*	*Searches Conducted*	*Contraband Found*
Arrest	1.75%	21.01%	34.04%	1.10%	25.59%	33.10%	1.58	0.82	1.03
Citation	50.94%	46.75%	55.18%	57.98%	44.35%	53.89%	0.88	1.05	1.02
No Action	4.34%	2.34%	0.69%	3.07%	2.05%	0.79%	1.41	1.14	0.87
Verbal Warning	35.46%	24.66%	7.05%	29.62%	20.12%	6.70%	1.20	1.23	1.05
Written Warning	7.51%	5.24%	3.05%	8.23%	7.89%	5.52%	0.91	0.66	0.55
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%			

Table 8. Traffic Stops By Enforcement Action

Low Discretion Searches

One of Engel's critiques of the outcome test is that many searches are conducted by law (a "low discretion" search) as opposed to officer discretion (a "high discretion" search) (2008). Officers do not always have the discretion not to search a driver. For example, if illegal contraband is observed in a vehicle, the officer may have probable cause to search, and would be remiss in his or her duties to not initiate a search. Similarly, if a police officer arrests the driver, they will conduct a search of the driver as part of their protocol following an arrest. If a vehicle is seized, it will be searched as part of police protocol. These searches are based on officer training and legal requirements

Table 9 shows these "low discretion" searches and success rates for the City of Greensboro. For all officers, black drivers are 111% more likely to be the subject of a low discretion search than a white driver. White drivers were 2% more likely to have contraband following a low discretion search than black drivers.

For Patrol officers, who conducted almost 80% of low discretion searches, black drivers were 87% more likely to be the subject of a low discretion search, and were 7% more likely to have contraband following a low discretion search than white drivers. For all other officers (not Patrol), black drivers were 138% more likely to be the subject of a low discretion search, and white drivers were 23% more likely than black drivers to have contraband following a low discretion search.

These low discretion searches also have a relatively high degree of success. For all officers, low discretion searches were successful 44% of the time. As comparison, the success rate for all searches is around 30%.

	Black Drivers					White Drivers				
	Traffic Stops	*Searches Conducted*	*Search Rate*	*Contraband Found*	*Hit Rate*	*Traffic Stops*	*Searches Conducted*	*Search Rate*	*Contraband Found*	*Hit Rate*
Patrol	111,010	2,065	1.86%	871	42.18%	74,741	743	0.99%	292	39.30%
Other	43,221	473	1.09%	233	49.26%	50,326	231	0.46%	140	60.61%
Total	154,231	2,538	1.65%	1,104	43.50%	125,067	974	0.78%	432	44.35%

	Black:White	
	Search Disparity	*Hit Rate Disparity*
Patrol	1.87	1.07
Other	2.38	0.81
Total	2.11	0.98

Table 9. Low Discretion Traffic Searches

Suspicious Activity

An additional critique from Engel of outcome tests is that the behavioral cues that officers in the United States commonly use to identify suspicious behavior are not racially and culturally universal (2008). In other words, some groups may be more likely to act in ways that police officers in the United States have been trained to identify as suspicious. Officers throughout the country look for a variety of verbal and nonverbal cues to identify whether or not a civilian is hiding something. These behaviors include avoiding eye contact, stuttering, fidgeting, and others. Additionally, officers may evaluate situational cues such as driver behavior or whether or not the driver is the owner of the vehicle. Research has suggested that "a number of the clues that state troopers and other law enforcement officers are trained to look for are highly suspicious and probably accurate at indicating illegal activities, certain verbal and nonverbal behaviors and contextual information may be far less unusual for minority drivers, and have been shown to be inaccurate clues of criminal activity" (Engel and Johnson, 2006).

Table 10 shows the stops and searches when the reported search basis was some type of suspicious activity. Overall, black drivers were 73% more likely to be searched based on suspicious activity. Specifically, 1.8% of stops of black drivers resulted in such a search, as compared to 1.04% of stops of white drivers. White drivers were almost 10% more likely to have contraband following a search based on observed suspicious activity. Specifically, 17.85% of suspicious activity searches of white drivers yielded contraband, as compared to 16.28% of such searches of black drivers.

It is noteworthy that these hit rates for searches based on suspicious activity are relatively low. This raises the possibility that police officers may be misidentifying behaviors as suspicious regardless of the race of the driver. This warrants further evaluation to determine, among other things, whether changes to training and procedures may lead to more productive policing, in which officers would engage less often in searches that have a lower likelihood of yielding contraband.

	Black Drivers					White Drivers				
	Traffic Stops	*Searches Conducted*	*Search Rate*	*Contraband Found*	*Hit Rate*	*Traffic Stops*	*Searches Conducted*	*Search Rate*	*Contraband Found*	*Hit Rate*
Patrol	111,010	2,325	2.09%	369	15.87%	74,741	1,024	1.37%	178	17.38%
Other	43,221	451	1.04%	83	18.40%	50,326	276	0.55%	54	19.57%
Total	154,231	2,776	1.80%	452	16.28%	125,067	1,300	1.04%	232	17.85%

	Black:White	
	Search Disparity	*Hit Rate Disparity*
Patrol	1.53	0.91
Other	1.90	0.09
Total	1.73	0.91

Table 10. Suspicious Activity Traffic Searches

Traffic Stops by Consent Search

The last issue discussed in the preceding section – whether police activity can be conducted more efficiently or productively – is an important one, because conducting fewer searches may lead to improvements in police-community relations and public perceptions of law enforcement officers, by reducing the number of potentially (and unintentionally) negative interactions.

One of the purposes of searching people and vehicles during a traffic stop is to locate evidence of criminal activity. Seizing illegal contraband provides a benefit to the city and its citizens. However, there is a balance between security and privacy that can be unique to each community.

Table 11 shows the consent searches for the City of Greensboro. Consent searches accounted for about 43% of all searches during the time period we examined. As can be seen by comparing the totals in Table 4 (all searches, by police division) with Table 11 (consent searches only), the search rate disparity is actually lower for consent searches than for all searches (1.89 (Table 11) as compared to 2.02 (Table 4)). However, the hit rate disparity moves further from an equal distribution (0.76 (Table 11) as compared to 0.92 (Table 4)). In other words, black drivers were 89% more likely to be searched than white drivers, but following a search white drivers were 31% more like to have contraband than black drivers. This means that consent searches reveal a disparity, both for search rates and for success rates, that bears further close examination.

The rate of success for consent searches also warrants further discussion. For black drivers, 11.74% of consent searches are successful; for white drivers, 15.37% of consent searches are successful. These are low success rates, as compared to the overall success rate for all searches (28.95% for searches of black drivers, 31.52% for searches of white drivers, according to Table 11). This warrants continued evaluation of the law enforcement value of conducting consent searches, as compared to the effect on the community and on GPD's officers with respect to time, convenience, and other factors. In other words, GPD, like all law enforcement agencies, should continually evaluate whether there are more effective actions that police can take to maintain public safety without damaging the relationship that the police have with the public, and make appropriate refinements to policies. This is not to say that consent searches do not have law enforcement value; they do. The question is whether consent searches are used in a manner that meets community expectations and legal requirements.

Finally, we note that, using the current Traffic Stop Module, we cannot tell when an officer requested a consent search but the driver refused. According to Engel, the rate at which civilians agree to a consent search at a traffic stop can differ based on the race of the driver (2008). It would be helpful to record when a driver refused a consent search, and whether or not the officer proceeded with a search for a different reason (e.g. probable cause). This issue may be addressed, at least in part, by new procedures being implemented with respect to the process for obtaining and documenting consent.

	Black Drivers					White Drivers					Black:White	
	Traffic Stops	*Searches Conducted*	*Search Rate*	*Contraband Found*	*Hit Rate*	*Traffic Stops*	*Searches Conducted*	*Search Rate*	*Contraband Found*	*Hit Rate*	*Search Disparity*	*Hit Rate Disparity*
Patrol	111,010	2,821	2.54%	336	11.91%	74,741	1,107	1.48%	162	14.63%	1.72	0.81
Other	43,221	536	1.24%	58	10.82%	50,326	331	0.66%	59	17.82%	1.89	0.61
Total	154,231	3,357	2.18%	394	11.74%	125,067	1,438	1.15%	221	15.37%	1.89	0.76

Table 11. Consent Searches

RAND Research

In 2009, the RAND Corporation Center on Quality Policing published a report entitled: *Cincinnati Police Department Traffic Stops: Applying RAND's Framework to Analyze Racial Disparities*. RAND Corporation was contracted to research and produce a series of reports on police-community relations in Cincinnati, Ohio. The work was part of an agreement between the U.S. Department of Justice and the City of Cincinnati, and followed a serious, violent confrontation with police and issues related to police practices (Ridgeway, 2009). The research report sought to answer three questions using Cincinnati's data:

- Is there a department-wide pattern of bias against black drivers in the decision to stop a vehicle?
- What fraction of officers disproportionally stop black drivers compared to other officers patrolling the same areas at the same time?
- Is there racial bias in post-stop outcomes, specifically stop duration, citation rates, and search rates?

RAND has developed and applied research methods to address these questions, and has done so for multiple agencies. The methodology is well developed and has been used by other researchers with data from other law enforcement agencies.

Of the three research tracks listed above, this report focuses on the first method. The decision to conduct research on the possibility of bias in relation to traffic stops is based on the data and time available. As discussed previously, an internal benchmark that would compare officers by patrol geography and time ranges (i.e., the second RAND method) cannot be conducted, because there has been little stability in personnel assignments over the past five years. This is due to the number of new officers and the redeployment of officers in conjunction with geographic redistricting of patrol districts. Data limitations and quality also prevented a complete analysis of post-stop outcomes (i.e. the third RAND method) at this time. There is other discussion in this report, however, regarding search rates and post-stop outcomes.

The RAND report reviews and describes the limitations of a traffic stop analysis, which are also outlined in this report. For example, using racial composition as a proxy for the population at risk of being stopped is not sufficient to prove that racial profiling is occurring (Ridgeway, 2009). Before a researcher can apply the bivariate model as shown in Figure 2, alternative variables that cause traffic stops, as shown in Figure 3, must be evaluated.

The RAND report discusses the range of alternative variables that need to be addressed (such as driving behavior and increased risk of being stopped, and the percentage of drivers who live within the jurisdiction versus outside the jurisdiction) and proposes the use of a different methodology for examining traffic stop data. The method is described as a natural experiment that involves analyzing traffic stops within the time period associated with daylight saving time. It takes advantage of twilight and darkness surrounding the change of times, assessing the distributions of the stops and comparing the racial distribution of the stops. This is also referred to as the "veil of darkness method," and it has

been used in prior research (Ridgeway, 2009). The RAND report describes the veil of darkness method this way:

> In its basic form, our analysis compares the racial distribution of stops made during daylight to the racial distribution of stops made at night. If there were a practice of targeting black drivers, the effects of this profiling would be most pronounced during daylight, when the driver's race is most visible to the officer. While the race of some nighttime drivers might be visible, the rate of police knowing driver race in advance of the stop must be smaller at night than during daylight (Ridgeway, 2009).

The approach is straightforward, at least theoretically: the ability to discern the race of a driver will vary from daytime to nighttime. The ability to identify the race of a driver should, theoretically, be much smaller at night. However, there are many other variables that come into play in a simple comparison of stops during the night versus stops during the day. To limit the impact of other variables, the veil of darkness method compares stops in the shorter timeframe that is affected by the time change associated with daylight saving time (DST). Ridgeway describes the method:

> [T]o assess bias in the decision to stop, we took advantage of a natural experiment, DST, comparing stops immediately before and immediately after changes to and from DST. Every spring and fall, Cincinnati switches between Eastern DST and Eastern standard time. Put simply, on one Monday, it is light at 6:30 p.m., while, on the following Monday (one week later, after DST goes into effect), it is dark at 6:30 p.m. During both of these periods (in the spring and fall), we hypothesize that the mix of black and nonblack drivers on the road would not drastically change, the kinds of drivers who commit offenses for which police make stops would not change, and the patterns of police allocation would not change. The major difference between these two periods is the officers' ability to identify race in advance of the stop. As a result, such a comparison does not require explicit information on the characteristics of drivers at risk of being stopped.
>
> In this way, we can separate out the differential rates of offending and exposure to police ... and concentrate on whether we see racial bias in stops... Drivers at 7:00 p.m. are exposed to the same distribution of police on either side of the DST switch. While incidents will, from time to time, draw police to particular locations, according to CPD [Cincinnati Police Department], the allocation of police effort does not suddenly change following the time change. As a result, this method is not as prone to errors from differential police exposure. The drivers who are likely to offend during daylight are also likely to be the ones who offend at nighttime. At night, the overall rate of offending might decrease (e.g., speeding in poorly lit areas might decrease). However, we assume that there is not a differential change in relative offending rates by race as daylight moves into nighttime (2009).

Exploratory analysis of GPD Traffic Stop Data – Dr. Rychtar

Utilizing the RAND methodology, GPD evaluated traffic data with assistance from Dr. Jan Rychtar and colleagues from the Department of Mathematics and Statistics at the University of North

Carolina at Greensboro. Dr. Rychtar used data obtained from the NC DOJ database. This is the same data the state uses to report to the public via its website. (Note, therefore, that the data is affected by the processing issues discussed previously in this report.) The data provided was a subset of the state data, to only include those stops that occurred within the City of Greensboro conducted by the Greensboro Police Department. Dr. Rychtar was provided with data covering 2002 through 2013, but due to time constraints associated with organizing and preparing the data for analysis, only the years 2008 through 2013 could be analyzed, in one year intervals, within the timeframe. Appendix D contains Dr. Rychtar's complete report.

The statistical analysis conducted using the veil of darkness method "did not find any indication of a GPD department-level racial pattern in initiating vehicles stops during the years 2008-2013" (Rychtar and Saini, 2016). The analysis showed some variations from year to year, such as variation in time, or in certain days of the week that had a higher stop rate for whites. Given these variations the overall conclusion is that, statistically, there is no evidence of department-level racial bias in the traffic stop data.

Exploratory analysis of GPD Traffic Stop Data – Dr. Jackson

Two sets of data were analyzed by Dr. Karen Jackson and her colleagues at North Carolina Agricultural and Technical State University. Her report is located at Appendix E. These two sets of data were processed using geographic information systems to add additional attributes to the data. The first set of data is an excel table listing every traffic stop contained in GPD's records management system between the dates of 1 January 2009 and 30 June 2015. This set of data was extracted from GPD's records management system and therefore is not affected by the issues inadvertently introduced by NC DOJ; the data retains the amounts, counts, categories, and selections entered by the officer. For all 295,227 traffic stops, census information from the 2010 Census was appended to each record. Using the GIS point in polygon function, the values from the census block group were appended to each traffic stop record. This set of data allows for analysis of the traffic stop variables and census block group variables.

The second set of data is the reverse orientation of the first set of data. These two sets of data allow researchers to analyze traffic stops in association with geographic context. Individual or sets of traffic stop occurrences can be compared to census variables. Conversely, the count of traffic stops, crime, and calls for service are known for each census block group. These data sets are being made available to any individual or group that would like to conduct further analysis.

The research Dr. Jackson conducted was exploratory in nature, focused on descriptive and multivariate analysis, and generated several conclusions. Dr. Jackson's report summarizes the analysis, discusses implications, and makes recommendations for future research. Given the number of variables and complex nature of the data and linking it back to human behaviors related to each traffic stop, more time is needed to conduct a systematic analysis.

The first part of the report replicates the analysis conducted by Baumgartner, using GPD's data instead of NC-DOJ's data. Tables 1 – 6 in Dr. Jackson's report summarize: stops by race and gender, stops by

type of violation, searches conducted by race, searches by specific search type and race, searches by specific basis of search and race, and searches of person or vehicle by race. Key findings include:

- 59.3% of stops are of male drivers, and 40.7% of stops are of female drivers.
- 53.8% of stops are of black drivers, and 43.4% of stops are of white drivers.
- White drivers are stopped more than drivers from other racial/ethnic groups for driving under the influence (55.2%) and speed limit violations (51.3%).
- Black drivers are stopped more than drivers from other racial/ethnic groups for investigative (58.8%), other motor vehicle violation (54.3%), safe movement violation (52.7%), seat belt violation (54.4%), vehicle equipment violation (63.1%), and vehicle regulatory violation (60.4%).
- Traffic stops of black drivers account for 69.9% of all vehicle searches, and stops of white drivers account for 28.6% of all vehicle searches.
- Traffic stops of black drivers account for 70.2% of all driver searches, and stops of white drivers account for 28.3% of all driver searches.
- Consent searches are conducted on 1.82% of black drivers that are stopped and 0.77% of white drivers that are stopped.
- Probable cause searches are conducted on 1.23% on black drivers that are stopped and 0.45% of white that are stopped.
- For black drivers, the most frequent bases for a search are erratic/suspicious behavior, observation of suspected contraband, and other official information.

Dr. Jackson also used the census data to evaluate other aspects of the data. The analysis of census block groups and traffic stops (Table 7 for stops and Table 8 for searches in Dr. Jackson's report) show the following:

- Twelve census block groups each had more than 1.5% of the traffic stops occur within their boundaries – representing 21.9% of all traffic stops. Subsequent analysis was conducted on these twelve census block groups.
- Twelve census block groups each had more than 1.5% of the searches occur. These are the same twelve census block groups as had the highest percentages of stops. 22.4% of all searches occur in these twelve census block groups.
- Of these twelve census block groups, four of the twelve census block groups are majority white and the other eight are majority black.
- Table 9 integrates the twelve census block groups with field interviews, crime counts, Part 1 crime counts, calls for service, police initiated calls for service, and citizen initiated calls for service.
- Table 10 is an analysis of missing data. It notes that driver ethnicity was missing from 2.1% of the records, and officer ID was missing from other records. There is no way to determine if officers mis-keyed their ID number when completing the form.

Tables 11-14 in Dr. Jackson's report are a series of regression analyses. Regression analysis examines the relationship between two or more variables to determine if one or more variables are predictors. For

example, regression analysis can help determine whether race, location, or crime level – individually or in combination – is a predictor for traffic stops. A summary of Dr. Jackson's results indicate:

- Race is a positive indicator of traffic stops for blacks and a negative indicator for whites. This holds true when the age is over 18.
- Location, using the census block groups, is not an indicator of traffic stops.
- Calls for service initiated by police are a predictor for traffic stops of blacks over the age of 18.
- Calls for service initiated by citizens are a predictor for traffic stops of blacks over the age of 18.
- Race is a positive indicator of searches for blacks and a negative indicator of searches for whites.
- Location, using the census block groups, is not an indicator of searches.
- The number of field interviews, count of reported crime, and police initiated calls for service are positive indicators of traffic stop searches.

Tables 15-16 analyze census block group attributes against field interviews, crime counts, part 1 crime counts, all calls for service, calls for service police initiated, calls for service citizen initiated, traffic stops, and searches from traffic stops. These tables focus on percent of majority race and percent below the poverty level by census block group. There are significant proportions of poverty represented in the top three frequencies for crime count: 25.48%, 35.65%, and 41.11% respectively. This is suggestive of a relationship between poverty, crime, traffic stops, and traffic searches.

In the summary section of her report, Dr. Jackson discusses the topic of traffic stops in the larger context of policing, the criminal justice system, and historical issues of race and policing. The Greensboro Police Department operates within this larger context and Dr. Jackson advises that it should "continue in the work of examining organizational practices" (Jackson, 2016). The report concludes with a discussion of other factors that could contribute to traffic stops (such as demographics, driving behaviors, and socio-economic factors), recommendations for future research, and additional questions to consider.

Section VI: Discussion

This report examined data on traffic stops and searches by GPD officers, in the context of considering whether the data contains evidence of racial bias. This data shows that Greensboro officers stop and search more black drivers than white drivers, compared to the proportions of the population in the City of Greensboro that are black and white. These conditions have raised a concern by the public that the Greensboro Police Department is either institutionally biased or has individual officers that are biased in how they identify, initiate, and conduct traffic stops and searches.

Existing traffic stop data cannot tell us whether or not police bias is occurring. Even without the data flaws that exist, the data cannot show all the detail that takes place at a traffic stop. We know that disparities exist in stop rates, search rates, and hit rates. Black drivers are stopped and searched more frequently, but white drivers are more likely than black drivers to have contraband when a search is conducted. This is evident in the correlation table (Table 2) and supported by the research conducted by Jackson (2015) and Rychter (2015).

The search disparity is partially explained by the level of crime in an area. But we cannot identify every reason for all of the disparity at this time and with this data. The possibility of police bias accounting for a portion of the observed disparity may exist. However, we cannot say for certain how much of the disparity, if any, is accounted for by bias.

A large part of the problem is that we cannot say for certain what police bias would look like in the data that we have. It is true that black drivers are searched to a much higher degree than white drivers, but the hit rate disparities are much closer to being even than the search rate disparity. It can be tempting to look at a single statistic to identify the presence or absence of bias, but unfortunately the data in this report can support no such claim. Police bias could theoretically exist even when search or hit rate disparities are equal between white and black drivers. Conversely, no bias may be occurring even in the presence of large search or hit rate disparities. For example, low discretion searches, when the officer conducts a search based on procedure and not discretion, result in a high search disparity between black and white drivers.

Our inability to completely answer the question of whether or not police bias exists with the data at hand should not deter us from taking thoughtful action to address the issue. By looking at outcomes in traffic stops, we can continue to see persistent patterns related to race. Outcomes are different for black and white drivers, based on how frequently they are cited, arrested, or warned. For searches that are based solely on perceived suspicious actions, or searches that are conducted only at the consent of the driver, we see larger differences in the rates of successful searches. Further, during a consent search, white drivers are over 30% more likely than black drivers to have contraband, even as black drivers are almost 90% more likely to be the subject of a consent search than white drivers.

We can also see where police actions may be creating a schism with the communities they serve. Traffic stops are considered by law enforcement to be a valuable tool in removing illegal contraband from the street. Weapons and drugs are routinely seized and destroyed as a direct result of traffic stops. However, searches usually do not yield any contraband. Overall, about 3 in 10 searches are successful.

With consent searches, that number drops to about 1 in 10. By focusing on specific types of searches, police officers may be able to conduct fewer searches with higher rates of success.

The police need to identify a balance of searches with community relations. Too many searches will damage the relationship that the police have with the community; too few searches will result in a greater availability of weapons and drugs in communities. Neither of these outcomes is desirable. This balance should be based on continued conversations with the public to determine an appropriate level of police contact, without compromising the safety and security of citizens.

This report has attempted to explain several points that are important to understanding the issues related to traffic stops. First, this is a complex issue that has been studied for decades by a multitude of organizations and researchers. Second, many reports containing best practices and recommendations have been published to assist state and local governments, residents, and law enforcement to address concerns related to traffic stops. These reports discuss data and analysis methods, and set expectations regarding the limitations inherent in attempting to determine if a law enforcement agency is biased with regards to traffic stops. Third, the methodologies and analyses used to complete this report follow these best practice guides as much as possible, and recognize the limitations in drawing evidence-based conclusions from the underlying data.

Key findings and conclusions from this research include:

- The data we analyzed provided no statistical proof of bias using generally accepted research methodologies. None of the analyses performed, including the RAND Corporation's "veil of darkness" methodology, identified a pattern of bias in traffic stops. Nonetheless, there are disparities in traffic stop and search rates, as discussed throughout this report.

- Searches for contraband are more frequently conducted in areas of the city with a higher incidence of quality of life crimes (drugs, fraud, vandalism, prostitution, weapons, disorderly conduct).

- Combining the search data with demographic data, the search disparity between black and white drivers is partially explained by the level of crime in an area. This does not explain all of the disparity seen in the data, however.

- The reallocation and redeployment of officers over the past five years, and other demographic factors within GPD, did not allow any reliable analysis to be undertaken with respect to potential bias in individual officers.

- The fact that low discretion searches result in a high search disparity would suggest that the overall search disparity may not be due to individual officer behavior. Najafi found that both black and white officers search black drivers more than twice as often as white drivers. In fact, the disparity was higher with black officers (who search black drivers 75.88% of the time and white drivers 24.12% of the time) than white officers (who search black drivers 67.98% of the

time and white drivers 32.02% of the time). This analysis does not include drivers identified as Native American, Asian, or Other in the traffic stop reports. This data warrants further analysis.

- The general statistics and ratios of disparity reported by Baumgartner have been validated. Research conducted internally and by outside researchers has replicated and generally confirmed the study's statistical results of GPD's racial disparities. There are slight variations in proportions, due to the use of different time periods, but overall Baumgartner's statistical results are generally supported.

- Black drivers are more likely to be searched, and contraband is more likely to be found during the search of a white driver. Most searches do not yield any contraband. Overall, about 3 in 10 searches are successful in locating contraband. With consent searches, that number drops to about 1 in 10. Through a review of search policies and training, officers may be able to conduct fewer searches with higher rates of success and no negative impact on public safety. This would mean more effective policing, less disruption to the travelling public, and better resource allocation. These decisions may be informed by continued conversations with the public to determine an appropriate level of police contact, without compromising the safety and security of the community. This issue warrants further consideration.

- Limitations in the accuracy and uniformity of data collection impede a thorough analysis of traffic stops and searches, which in turn limits the conclusions that can be reached from the data. Some of these limitations arise at the local level, such as training and usage of the Traffic Stop Module, and inconsistencies in determining and recording the ethnicity of stopped drivers. Other limitations arise at the state level, such as the incorrect assumption that law enforcement agencies are submitting reports for *all* traffic stops conducted by the jurisdiction, error propagation of state data for three categories (reason for conducting a search, rounding down the reported weight of seized contraband, and conflating the basis for a search), and incorrect or duplicate locally-generated officer identification numbers that may be replicated across more than one agency. Any single limitation, or combination of limitations, affects the reported data from GPD or NC-DOJ and any subsequent analysis, including our own.

- GPD officers do not always complete a Traffic Stop Report for all vehicle stops. This can be due to human error, training inconsistencies, or requirements outlined in existing policies. These discrepancies contribute to incomplete data being generated locally and thereafter being published by the state, and limit the accuracy of any conclusions that are generated. Evaluating completion rates is difficult since there is no reliable method to cross-check the nature of a traffic stop when no report exists.

Members of the Greensboro Police Department recognize that the existence of racial disparities in traffic stops and searches is a complex issue. There is no simple solution to ending the disparity, because there are no simple and discrete causes of the disparity. Nor is there a simple solution to ensuring that GPD, NC-DOJ, and others have the most complete and accurate data with which conduct further

analyses. Understanding that, GPD has taken a holistic approach to addressing traffic stops and searches, in order to best serve the public.

Continue to Review and Revise Policies When Appropriate

GPD routinely reviews and updates its policies. Sometimes these reviews occur as part of a systematic cycle. Other reviews are triggered by specific events or the identification of potential improvements in the Department's practices. The on-going in-depth look at how we conduct and document traffic stops and searches has resulted in the following updates to policies:

- Require the completion of a traffic stop report for all traffic stops
- Document a person's consent to search through either body worn camera or a Consent to Search form, including reporting the reasons for seeking consent to search
- Keep the Special Order by Chief Scott eliminating vehicle stops solely on the basis for vehicle equipment infractions in place for the immediate future
- Implement training on procedural justice and additional bias awareness training as a part of Neighborhood Oriented Policing
- Increase training and standardization for officers in filling out traffic stop reports

Continue to Emphasize Neighborhood Oriented Policing in Greensboro

As society and law enforcement evolve, so must the Greensboro Police Department continue to evolve its methods and its organizational structure. As an organization dedicated to excellence, the Department continuously looks for and adopts emerging practices and law enforcement philosophies that work best for this city. The Department is taking steps to revise its approach to traffic stops. These efforts follow suggestions by Epp, Maynard-Moddy, and Haider-Markel to emphasize traffic stops related to criminal behavior, develop guidelines and oversight for the decision to conduct a traffic stop, and review the initiation of high discretion searches (Epp, Maynard-Moddy, and Haider-Markel, 2014). Several significant shifts in GPD's methods and organizational structure are already underway.

One of the most recent and significant initiatives shifting GPD's culture is the adoption of Neighborhood Oriented Policing (NOP). NOP combines a philosophy of problem-solving with geographic ownership by police units serving defined areas. NOP also includes focused crime analysis with structured accountability for problem-solving and crime reduction throughout the Department. It encourages officers to engage in more frequent and constructive communications with the public. This improved contact and better geographic alignment, in turn, will allow the Department to discover and address crime and public safety issues more rapidly through, among other things, decreased response times, increased time spent proactively, and increased and aligned deterrent presence. We believe that NOP will have an effect on when and where traffic stops are conducted by better focusing resources and enforcement actions on areas where crimes are occurring and where key community stakeholders want a police presence.

In fact, recent data (which is not included in the scope of this report's statistical analysis) shows that the overall number of traffic stops has been declining over the past year, as has the number of citations issued after traffic stops. This may be due to the transition to Neighborhood Oriented Policing and

accompanying redeployment of police resources. This warrants further study as more data is collected over time.

Continue to Improve Training

Training provides GPD's officers the opportunity for enhanced skills, greater self-awareness, and a common frame of reference for addressing emerging issues. GPD has a tradition of providing first-rate training on emerging best practices. Leaders in the Department also see opportunities to train when processes need to be strengthened. Based on the findings from the traffic stop data research, GPD is:

- Improving training on how to complete a traffic stop report as part of existing traffic stop training conducted during the Police Academy, field training, and in-service training. Doing so will provide consistency in how reports are completed.

- Developing further training on when to conduct "high discretion" searches. As discussed in this report, there is a relatively low success rate for locating contraband from a consent search. This suggests that training can be improved in this area so that law enforcement resources are utilized more efficiently.

Procedural Justice is another emerging best practice in law enforcement. Sometimes called procedural fairness or rightful policing, this philosophy of policing builds trust by providing officers with a technique for ensuring all points of view are understood during an interaction. GPD has developed a program of instruction on procedural justice, and is providing it to police recruits, sworn officers, and non-sworn employees. It will also be offered to members of the community. Research related to procedural justice has identified that people are often more concerned about the fairness of an interaction with law enforcement or the criminal justice system and their treatment than the outcome. "[S]omeone who receives a traffic ticket or 'loses' his case in court will rate the system favorably if he feels that the outcome is arrived at fairly" (Procedural Justice Curriculum, 2015). Using the Procedural Justice model during a traffic stop, an officer should introduce himself, explain the reason for the stop, listen to the driver, answer any questions, address any anxiety or issues on the part of the driver, and explain the process or steps for the remainder of the traffic stop. We believe that this type of dialogue between officers and motorists can be especially beneficial in allaying misperceptions of bias.

Additionally, GPD will continue to train all employees on Understanding Implicit Bias. Since 2013, every police employee has received this four-hour block of instruction. It has also been incorporated into the Police Academy curriculum. This training helps employees understand that all people have biases, bias has a human organizational basis, and biases are primarily subconscious or "implicit." These biases can influence thinking, actions, and decision-making. Everyone, including police officers, should strive to acknowledge and address bias, because it affects one's behavior and perceptions (Understanding the Science of Bias, 2014).

Continue to Increase Transparency

The men and women of the Greensboro Police Department believe that mutual understanding is a key to building community trust and strong partnerships. Communicating with each other and sharing

information are among the first steps in creating understanding. Specific to the topic of traffic stops, GPD is increasing transparency in the following ways:

- Making the traffic stop data analyzed in this report available to the public and researchers.
- Exploring participation in the White House Open Government Initiative. This initiative provides avenues to access data, reports, and information directly by residents through a web-based data portal being developed by the City of Greensboro.
- Publishing crime data more frequently on GPD's website.
- Promoting existing means for people to find out about crime trends in their neighborhood.
- Continuing to inform residents when and where traffic and crime reduction campaigns will be occurring and the reason for the effort.

Along the lines of the last two bulleted points above, the implementation of Neighborhood Oriented Policing carries with it increased opportunities for GPD to inform specific communities as to why police resources are being used in specific ways in specific areas.

Continue to Use and Improve Data Collection

Thorough and accurate data is needed in order to better assess a variety of issues affecting law enforcement, including the disparity in traffic stops and searches, and to provide greater transparency of police operations. GPD supports adopting the recommendations of Weisel (2014) for improving the quality of traffic stop reporting data for its own department and other agencies. These include:

1. Requirements for initial stop purpose should be reviewed.

2. The severity of the offense for which the driver was initially stopped should be documented; for example, the officer should document both the recorded speed and the posted speed.

3. Document location of stop. Traffic stop reports should include a place variable – roadway, intersection, or other marker; when occurring within a municipality, this data should include the 100-block or nearest intersection.

4. Revisit documentation of race/ethnicity classification. Most data collection systems in the United States require officers to determine either the race or ethnicity of the driver, but not both. We recommend combining race and ethnicity into a single racial/ethnicity indicator for drivers, for reporting purposes, as recommended by Northeastern University.

5. Document home jurisdiction (city and county) of all drivers stopped.

6. Specify the arrest charge (highest charge if multiple) arising from the stop and document the factors that lead to the arrest, such as an outstanding warrant.

7. Document requests for consent searches and record if the request was declined. As discussed above, GPD is in the process of implementing a policy change that will require requests for consent to be documented through the use of body-worn cameras or a Consent to Search Form.

8. Audit data reported by law enforcement agencies to make sure it is accurate and that it is timely submitted.

9. Audit Traffic Stop Reports for accuracy and analyze data to shed light on variations between and within jurisdictions.

In addition to the above nine points, GPD recommends all departments adopt GPD's method of providing XY coordinates for every traffic stop. Knowing the location of traffic stops will allow a more thorough analysis of the data to be conducted. As demonstrated in this report, knowing the locations allows for augmenting analysis with geographic variables. This technique is also recommended by the ACLU, Baumgartner, and Weisel.

Continue the Work

The research associated with this report is preliminary, and should continue in order to gain a better understanding of this issue as GPD continues to gather more data over time. This is especially important because the implementation of new or revised policies (e.g., the Special Order regarding equipment violations, Neighborhood Oriented Policing, and the requirement to document consent) may lead to changes in traffic stop and search rates. Reviewing those kinds of trends in the data may provide helpful insight on the effectiveness of various policy changes. Several follow-on items include:

- Continuing to work with researchers on the datasets and conduct further analyses. This would include completing the range of analyses developed by the RAND Corporation, when sufficient data is available, integrating census data more thoroughly, and looking at aspects of economics and poverty.
- Obtaining data from NC DMV to further research into driver and driving behaviors.
- Ensuring Traffic Stop Reports are completed by developing procedures for compliance and audits.
- Conducting analysis related to traffic crash reports and traffic stops.
- Developing memorandums of understanding with universities and looking for grant opportunities to fund future research or develop cooperative research, such as using advanced data analytics for analyzing traffic stop data for outliers or indicators of bias.
- Developing data portals and automate reporting for public access.
- Developing analytical tools to review traffic stop data on an individual officer basis.
- Leading a regional effort to review state statutes and processes related to traffic stops and searches and data collection in order to recommend appropriate legislative changes. This includes a standardized statewide ID system for all law enforcement officers, consistent training, and expanded uniform data collection methods.
- Reviewing existing training curricula related directly or indirectly to traffic stops, to ensure it reflects the current best practice methods.

Section VII: References

American Civil Liberties Union of North Carolina. (2014). Road work ahead. Retrieved January 26, 2016, from http://www.acluofnorthcarolina.org/files/Road_Work_Ahead_-_Data_collection_report_2014.pdf

Baumgartner, F. R., & Epp, D. A. (2012). *North Carolina traffic stop statistical analysis* (Rep.). North Carolina Advocates for Justice Task Force on Racial and Ethnic Bias.

Baumgartner, F. R., Epp, D. A., Shoub, K., & Love, B. (2015). *Driving while black: it's getting worse* (Rep.). University of North Carolina at Chapel Hill, Department of Political Science.

Baumgartner, F. R., Epp, D. A., & Shoub, K. (2014). *Police searches of black and white motorists* (Rep.). University of North Carolina at Chapel Hill, Department of Political Science.

Baumgartner, F. R., Epp, D. A., & Shoub, K. (2015). *Analysis of black-white differences in traffic stops and searches in Greensboro, NC, 2002-2013* (Rep.). University of North Carolina at Chapel Hill, Department of Political Science.

Dixon, T. L., Schell, T. L., Giles, H., & Drogos, K. L. (2008). The influence of race in police-civilian interactions: a content analysis of videotaped interactions taken during Cincinnati Police traffic stops. *Journal of Communication, 58*(3), 530-549.

Engel, R. S. (2008). A critique of the "outcome test" in racial profiling research. *Justice Quarterly, 25*(1), 1-36.

Epp, C.R., Maynard-Moody, S., & Haider-Markel, D. (2014). *Pulled Over: How Police Stops Define Race and Citizenship*. Chicago, IL: The University of Chicago Press.

Fridell, L., Lunney, R., Diamond, D., & Kubu, B. (2001). *Racially biased policing: a principled response* (Rep.). Washington, DC: Police Executive Research Forum.

Fridell, L. (2004). *By the numbers: a guide for analyzing race data from vehicle stops* (Rep.). Washington, DC: Police Executive Research Forum.

Fridell, L. (2005). *Understanding race data from vehicle stops: a stakeholder's guide* (Rep.). Washington, DC: Police Executive Research Forum.

Greensboro Police Department. (2013). *Vehicle Stops and Traffic Reporting* (Rep.). Greensboro, NC.

Greensboro Police Department. (2014). *Understanding the science of bias* [Training Curriculum]. Greensboro, NC.

Greensboro Police Department. (2015). *Procedural justice curriculum* [Training Curriculum]. Greensboro, NC.

Jackson, K. (2016). *Implicit bias, traffic stops & searches: searching for understanding* (Rep.). Greensboro Police Department.

Knowles, J., Persico, N., & Todd, P. (2001). Racial bias in motor vehicle searches: theory and evidence. *Journal of Political Economy, 109*(1), 203-229.

McMahon, J. S. (2002). *How to correctly collect and analyze racial profiling data your reputation depends on it!* Washington, D.C.: U.S. Dept. of Justice, Office of Community Oriented Policing Services.

Najafi, A. (2015). *Traffic Stops analytics and racial profiling* (Rep.). Greensboro Police Department.

Persico, N., & Todd, P. (2006). Generalising the hit rates test for racial bias in law enforcement, with an application to vehicle searches in Wichita. *The Economic Journal, 116*(515).

Rychtar, J. & Saini, J. (2016). *Analysis of the GPD department-level racial pattern in initiating vehicle stops during the years 2008-2013* (Rep.). Greensboro Police Department

Ridgeway, G., & RAND Corporation. (2009). *Cincinnati Police Department traffic stops: applying RAND's framework to analyze racial disparities* (Rep.). Santa Monica, CA: RAND, Center on Quality Policing.

Schmitt, E. L., Langan, P. A., & Durose, M. R. (2002). *Characteristics of drivers stopped by police, 1999* (Rep.). Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics.

Sunshine, J., & Tyler, T. R. (2003). The role of procedural justice and legitimacy in shaping public support for policing. *Law Society Review, 37*(3), 513-548.

Tillyer, R., Engel, R. S., & Wooldredge, J. (2008). The intersection of racial profiling research and the law. *Journal of Criminal Justice, 36*(2), 138-153.

Tomaskovic-Devey, D., Mason, M., & Zingraff, M. (2004). Looking for the driving while black phenomena: conceptualizing racial bias processes and their associated distributions. *Police Quarterly, 7*(1), 3-29.

Weisel, D.L. (2014). R*acial and ethnic disparity in traffic stops in North Carolina, 2000-2011: examining the evidence* (Rep.). North Carolina Association of Chiefs of Police.

Appendices

Appendix A: General Statute § 143B-902, *Collection of traffic law enforcement statistics*

Appendix B: SBI Form 122 Traffic Stop Report

Appendix C: Set of Maps

Appendix D: Analysis of the GPD department-level racial pattern in initiating vehicle stops during the years 2008-2013

Appendix E: Implicit Bias, Traffic Stops & Searches: Searching for Understanding: Report

Appendix F: Traffic Stop Analytics and Racial Profiling