State of Rhode Island

Comprehensive Police-Community Relationship Act of 2015 (CCPRA)

Traffic Stop Data Analysis and Findings, 2016

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A Study by
the Institute for Municipal & Regional Policy (IMRP)

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EXECUTIVE SUMMARY OF FINDINGS

On July 10, 2015 Governor Gina Raimondo signed House Bill, 2015-H 5819 Sub A, and Senate Bill, 2015-S 669 as Amended into law (R.I. Gen. Laws § 31-21.2-1 et seq.) The law, also known as the Comprehensive Police-Community Relationship Act of 2015 (CCPRA) "honors the community's desire for just stop and search procedures, while permitting law enforcement to maintain public safety and implement best practices."[1] One component of CCPRA requires the Rhode Island department of transportation to "conduct a study of routine traffic stops by the Rhode Island state police and each municipal police department in order to determine whether racial disparities in traffic stops exist, and to determine whether searches of vehicles and motorists are being conducted in a disparate manner." The following report is produced in fulfillment of this requirement.

CCPRA requires Rhode Island police departments to collect and report information on all traffic stops. Traffic stop data collection is completed for each routine traffic stop. The officer, directly following the stop, typically collects the information electronically. There are a total of sixteen data elements collected which gather information on the driver (race, ethnicity, age, gender) and the traffic stop (time of day, result of stop, search, etc.). Data is then sent to the Rhode Island Department of Transportation (RIDOT) where, on a quarterly basis, a summary report of the monthly data provided by each department and the state police is published.

It is important to note that law enforcement training on implementation of CCPRA took place in January 2017. This training covered the accurate way to collect and report traffic stop records per the new law. Prior to this statewide training, departments did not always define data elements the same way. Therefore, data collected during this study period was not uniform across all departments[2]. However, although different interpretations of some data elements occurred during this study period, it did not appear to have a significant impact on the analysis.

This report presents the results from an analysis of approximately 237,000 traffic stops conducted between January 1, 2016 and December 31, 2016 by 37 municipal police departments[3], the Rhode Island State Police and two special police agencies[4]. This is the first analysis conducted by the Institute for Municipal and Regional Policy (IMRP) at Central Connecticut State University (CCSU) in Rhode Island and we strongly urge caution when comparing these findings to any previous findings published by other organizations. The specific methods used in this analysis are being applied for the first time in Rhode Island and therefore do not align directly to analyses in other reports.

The findings presented in this report are the first step – essentially the foundation – of a process to better understand how enforcement of traffic laws impact segments of Rhode Island's driving population. These initial analyses serve as a screening tool, essentially highlighting areas where disparities between races

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[1] http://www.dot.ri.gov/community/CCPRA/index.php

[2] As an example, some departments reported "residency" as the driver being a resident of RI, while others reported it as the driver being a resident of the town where they were stopped.

[3] The New Shoreham Police Department did not report traffic stop information during this period.

[4] The two special police agencies are the University of Rhode Island and the Department of Environmental Management.

and ethnicities are greatest in traffic enforcement throughout the state, thereby providing guidance as where to focus attention and resources for the next step of the process.

It is important that readers understand the context of the initial findings in this report. There are many reasons for disparities to exist. As the next stage in the process, further analysis will be conducted on those specific departments mentioned in this report. By examining factors such as the location of accidents, call for service records, crime patterns, and areas of major traffic generators, readers will gain a better understanding of the nature of policing and the variety of factors that influence traffic enforcement in each individual community. It is during this part of the process that policymakers, citizens and law enforcement can best come together to understand and address the disparities present in those departments traffic stops.

Although the next phase of the research work will focus attention and resources on specific departments identified in this report, all departments and communities would benefit from carefully reviewing the findings in this report. Addressing statewide racial and ethnic disparities will require a collective effort of all law enforcement and community stakeholders. An atmosphere of open-mindedness, empathy, and honesty from all stakeholders remains necessary to create sustained police legitimacy and a safer, more just society.

The authors of this report are hopeful that the information contained herein will be valuable to the citizens of Rhode Island as they seek to fulfill the promise of the Comprehensive Police-Community Relationship Act of 2015. We are both humbled and grateful for the opportunity to be part of this important effort.

E.1: THE METHODOLOGICAL APPROACH OF THE ANALYSIS

Assessing racial disparities in policing data has been used for the last two decades as a policy tool to evaluate whether there exists the possibility that racial and ethnic bias is occurring within a given jurisdiction. The statistical evaluation of policing data in Rhode Island is an important step towards developing a transparent dialogue between law enforcement and the public at large. As such, it is the goal of this report to present the results of that evaluation in the most transparent and unbiased manner possible.

The research strategy underlying the statistical analysis presented in this report was developed with three guiding principles in mind. Each principle was considered throughout the research process and when selecting the appropriate results to display publicly. A better understanding of these principles helps to frame the results presented in the technical portions of the analysis. In addition, by presenting these principles at the onset of the report, readers have a better context to understand the overall framework of the approach.

> *Principle 1: Acknowledge that statistical evaluation is limited to finding racial and ethnic disparities that are indicative of racial and ethnic bias but that, in the absence of a formal procedural investigation, cannot be considered comprehensive evidence.*
>
> *Principle 2: Apply a holistic approach for assessing racial and ethnic disparities in Rhode Island policing data by using a variety of approaches that rely on well-respected techniques from existing literature.*

Principle 3: Outline the assumptions and limitations of each approach transparently so that the public and policy makers can use their judgment in drawing conclusions from the analysis.

Six distinct analytical tools were used to evaluate whether racial and ethnic disparities are present in the Rhode Island policing data. In the analysis, the demography of motorists was grouped into four overlapping categories to ensure a large enough sample size for the statistical analysis. Although much of the analysis focuses on stops made of black (Hispanic or non-Hispanic) and Hispanic motorists (any race), the analysis was also conducted for aggregated groupings of all non-white motorists (Hispanic or non-Hispanic) as well as a combined sample of black and Hispanic motorists. In terms of identifying departments or state police barracks in individual tests, the estimated disparity (i.e. the higher likelihood of stopping a minority motorist) must have been estimated with at least a 95 percent level of statistical significance for either black or Hispanic motorists alone. Put simply, under the rigorous conditions set by each test, there must have been at least a 95 percent chance that either black or Hispanic motorists were more likely to be stopped (or searched) at a higher rate relative to white non-Hispanic motorists.

First, a method referred to as the Solar Visibility analysis, also known as Veil of Darkness, was used to assess the existence of racial and ethnic disparities in stop data. The test is a statistical technique that was developed by Jeffery Grogger and Greg Ridgeway (2006) and published in the *Journal of the American Statistical Association*. The Solar Visibility analysis examines a restricted sample of stops occurring during the “inter-twilight window” and assesses relative differences in the ratio of minority to non-minority stops that occur in daylight as compared to darkness. The inter-twilight window restricts stops to a fixed window of time throughout the year when visibility varies due to seasonality as well as the discrete daylight savings time shift. This technique relies on the idea that, if police officers are profiling motorists, they are better able to do so during daylight hours when race and ethnicity is more easily observed. After restricting the sample of stops to the inter-twilight window and controlling for things like the time of day and day of week, any remaining difference in the likelihood a minority motorist is stopped during daylight is attributed to disparate treatment. This analytical approach is considered the most rigorous and broadly applicable of all the tests presented in this report.

The second analytical tool used in the analysis is the synthetic control where the number of minority traffic stops in a given department is evaluated against a benchmark constructed using stops made by all other departments in Rhode Island. Since departments differ in terms of their enforcement activity (i.e. time of stops, reason for stops, etc.) and the underlying demographics of the population on the roadway, this analysis relies on the rich statistical literature on propensity scores. Here, a propensity score is a measure of how similar a stop made outside a given department is to a stop made by the department being analyzed. These measures of similarity are used to weight stops when constructing an individual benchmark for each department. For example, if the department being analyzed has a high minority population and makes most of their stops on Friday nights at 7PM for speeding violations then stops made for speeding violations by departments with a similar residential population at this time and day will be given more weight when constructing the benchmark. This methodology ensures that there is an apples-to-apples comparison between the number of minorities stopped in a given town relative to their benchmark and allows for the interpretation of any remaining differences to be attributed to possible disparate treatment.

The three techniques contained in Section V are descriptive in nature and compare department-level data to three benchmarks (statewide average, estimated commuter driving populations, and resident population). These methods are referred to as population benchmarks and are commonly used to evaluate racial disparities in police data across the country. The statewide average comparison provides a simple and effective way to establish a baseline for all departments from which the relative differences between department stop numbers and the average for the state are compared. A comparison to the statewide average is presented alongside the context necessary to understand differences between local jurisdictions. Next, researchers adjust "static" residential census data to approximate the estimated driving demographics in a particular jurisdiction. Residential census data can be modified to create a reasonable estimate of the possible presence of many nonresidents likely to be driving in a given community because they work there and live elsewhere. This estimate is a composition of the driving population during typical commuting hours based on data provided by the U.S. Census Bureau. The final population benchmark comparison limits the analysis to stops involving only residents of the community and compares them to the community demographics based on the 2010 decennial census for residents age 16 and over. Although any one of these benchmarks cannot provide by itself a rigorous enough analysis to draw conclusions regarding racial disparities, if taken together with the more rigorous statistical methods they do serve as a useful tool.

Lastly, an analysis of post-stop outcomes using a hit-rate approach following a technique published in the *Journal of Political Economy* by Knowles, Persico and Todd (2001). The hit-rate approach relies on the idea that motorists rationally adjust their propensity to carry contraband in response to their likelihood of being searched by police. Similarly, police officers rationally decide whether to search a motorist based on visible indicators of guilt and an expectation of the likelihood that a given motorist might have contraband. According to the model, a demographic group of motorists would be searched by police more often than white non-Hispanic motorists if they were more likely to carry contraband. However, the higher level of searches should be exactly proportional to the higher propensity for this group to carry contraband. Thus, in the absence of racial animus, we should expect the rate of successful searches (i.e. the hit-rate) to be equal across different demographic groups regardless of differences in their propensity to carry contraband. [5] In this test, discrimination is interpreted as a preference for searching minority motorists that shows up statistically as a lower hit-rate relative to Caucasian motorists. Note that this test inherently says nothing about disparate treatment in the decision to stop motorists as it is limited in scope to vehicular searches.

E.2: FINDINGS FROM THE ANALYSIS OF POLICING DATA, 2016

Across Rhode Island's municipal departments and state police barracks, a total of 11.4 percent of motorists stopped during the analysis period were observed to be black while 13.0 percent of stops were Hispanic motorists. The results from the Solar Visibility analysis indicate that stopped motorists were more likely to be minorities during daylight relative to darkness suggesting the existing of a racial or ethnic

[5] Although some criticism has risen concerning the technique and extensions have suggested that more disaggregated groupings of searches be used in the test, the ability to implement such improvements is limited by the small overall sample of searches in a single year of traffic stops. Despite these limitations, the hit-rate analysis is still widely applied in practice and contributes to the overall understanding of post-stop police behavior in Rhode Island.

disparity in terms of the treatment of minority motorists relative to white motorists. The statewide results from the Solar Visibility analysis were found to be robust to the addition of a variety of controls. The level of statistical significance remained relatively consistent when the sample is reduced to only moving violations. It is important to note that it is impossible to clearly link these observed disparities to racial profiling as they may be driven by any combination of policing policy, heterogeneous enforcement patterns, or individual officer behavior. The results from the post-stop analysis confirm that the statewide disparity carries through to post-stop behavior across all racial and ethnic groups. In aggregate, Rhode Island police departments exhibit a tendency to be less successful in motorist searches across all minority groups.

Solar Visibility Analysis Findings, 2016

In an effort to better identify the source of these racial and ethnic disparities, each analysis was repeated at the department level. Although there is evidence of a disparity at the state level, it is important to note that it is likely that specific departments are driving these statewide trends. The threshold for identifying individual departments was the presence of a disparity that was statistically significant at the 95 percent level in the black or Hispanic alone categories. The departments that were identified as having a statistically significant disparity[6] are, by nature, the largest contributors to the overall statewide results. Here, the unit of analysis is a municipal department or state police barracks where disparities could be a function of a number of factors including institutional culture, departmental policy, or individual officers.[7]

The three municipal departments[8] and one state police barrack identified to exhibit a statistically significant racial or ethnic disparity include:

Cranston

The Cranston municipal police department was observed to have made 38.9 percent minority stops of which 21.1 percent were Hispanic and 13.7 percent were black motorists in 2016. The Solar Visibility analysis indicated a statistically significant disparity in the rate that both black and Hispanic motorists were stopped during daylight relative to darkness. Within the inter-twilight window, the odds that a stopped motorist was black increased by 1.24 while the odds that a stopped motorist was Hispanic increased by 1.31 during daylight. These results were statistically significant at a level greater than 95 percent and robust to the inclusion of a variety of controls, officer fixed-effects, and a restricted sample of moving violations.

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[6] A disparity must have been estimated with at least a 95 percent level of statistical significance to be considered a statistically significant disparity. Put simply, there must have been at least a 95 percent chance that the motorists were more likely to be stopped at a higher rate relative to white non-Hispanic motorists.

[7] Since department or state police barrack estimates represent an average effect of stops made by individual officers weighted by the number of stops that they made in 2016, it is possible that officer-level disparities exist in departments which were not identified.

[8] These results for the Warren Police Department were statistically significant at a level greater than 95 percent, however, the magnitude of the coefficient estimate for Hispanic motorists suggests that it may simply be a function of the small number of minority motorists stopped during this period. Therefore, the department was not included in this list.

Narragansett

The Narragansett municipal police department was observed to have made 10.3 percent minority stops of which 4.3 percent were Hispanic and 4.8 percent were black motorists in 2016. The Solar Visibility analysis indicated a statistically significant disparity in the rate of Hispanic motorists stopped during daylight relative to darkness. Within the inter-twilight window, the odds that a stopped motorist was Hispanic increased by 2.6 during daylight. These results were statistically significant at a level greater than 95 percent and robust to the inclusion of a variety of controls, officer fixed-effects, and a restricted sample of moving violations.

Providence

The Providence municipal police department was observed to have made 66.5 percent minority stops of which 36.0 percent were Hispanic and 27.0 percent were black motorists in 2016. The Solar Visibility analysis indicated a statistically significant disparity in the rate that both black and Hispanic motorists were stopped during daylight relative to darkness[9]. Within the inter-twilight window, the odds that a stopped motorist was black increased by 1.3 while the odds that a stopped motorist was Hispanic increased by 1.2 during daylight. These results were statistically significant at a level greater than 95 percent for black motorists and robust to the inclusion of a variety of controls, officer fixed-effects, and a restricted sample of moving violations.

RISP- Hope Valley

The RISP- Hope Valley state police barracks was observed to have made 37.4 percent minority stops of which 16.8 percent were Hispanic and 16.7 percent were black motorists in 2016. The Solar Visibility analysis indicated a statistically significant disparity in the rate that both black and Hispanic motorists were stopped during daylight relative to darkness. Within the inter-twilight window, the odds that a stopped motorist was black increased by 1.5 while the odds that a stopped motorist was Hispanic increased by 1.6 during daylight. These results were statistically significant at a level greater than 95 percent and robust to the inclusion of a variety of controls, officer fixed-effects, and a restricted sample of moving violations.

Other Statistical and Descriptive Measure Analysis Findings, 2016

In addition to the three municipal police departments and one state police barrack identified to exhibit statistically significant racial or ethnic disparities in the Solar Visibility analysis, seven other departments were identified using either the synthetic control method, descriptive tests, or KPT hit-rate analysis. Identification in any one of these tests alone is not, in and of itself, sufficient to be identified for further analysis. However, these additional tests are designed as an additional screening tool to identify the jurisdictions where consistent disparities exceed certain thresholds that appear in the data. Although it is understood that certain assumptions have been made in the design of each of these measures, it is reasonable to believe that departments with consistent data disparities that separate them from the

[9] The Solar Visibility analysis relies on the date and time of the stop. An indeterminate number of Providence stops were reported with an incorrect date and/or time. Please see the "Note to the Reader" on page 1 for more information.

majority of other departments should be subject to further review and analysis with respect to the factors that may be causing these differences.

The results from estimating whether individual departments stopped more minority motorists relative to their requisite synthetic control found 12 municipal police departments to have a disparity that was statistically significant at the 95 percent level in the black or Hispanic alone categories. However, the disparities did not persist in all 12 departments through robustness checks with a more restrictive modeling specification. In total, there were only six municipal police departments that withstood this more rigorous estimation procedure. Those departments are *Cumberland, Foster, Johnston, Lincoln, Middletown,* and *North Smithfield.*

The descriptive tests are designed as an additional tool to identify disparities that exceed certain thresholds that appear in a series of census-based benchmarks. Those three benchmarks are: (1) statewide average, (2) the estimated commuter driving population, and (3) resident-only stops. Although 18 municipal police departments were identified with racial and ethnic disparities when compared to one or more of the descriptive measures, only *Providence* and *North Smithfield* exceeded the disparity threshold in more than half the benchmark areas.

Finally, the results of the KPT Hit-Rate test, applied to the aggregate search data for all departments in Rhode Island show that departments are less successful in motorist searches across all minority groups, which is a potential indicator of disparate treatment. However, there was only one municipal police department found to have a disparity in the hit-rate of minority motorists relative to white non-Hispanic motorists, which was statistically significant at the 95 percent level. The one municipal department identified to exhibit a statistically significant racial or ethnic disparity in searches is:

> *Pawtucket*
>
> The Pawtucket municipal police department was observed to have made 47.6 percent minority stops of which 25.7 percent were Hispanic and 20.8 percent were black motorists in 2016. The hit-rate for Caucasian non-Hispanic motorists was 17.2 percent while that for black motorists was approximately 0 percent and Hispanic motorists was 4.9 percent. The results for black motorists were statistically significant at a level greater than 95 percent.

E.3: CONCLUSIONS AND NEXT STEPS

The entirety of the initial 2016 statewide traffic stop data analysis as presented in this report should be utilized as a screening tool by which researchers, law enforcement administrators, community members and other appropriate stakeholders focus resources on those departments displaying the greatest level of disparities in their respective stop data. As noted previously, racial and ethnic disparities in any traffic stop analysis do not, by themselves, provide conclusive evidence of racial profiling. Statistical disparities do, however, provide significant evidence of the presence of idiosyncratic data trends that warrant further analysis.

By conducting additional in-depth analyses on the departments identified through the screening process, the public can have a better understanding as to why and how disparities exist. This transparency is intended to assist in achieving the goal of increasing trust between the public and law enforcement. A follow-up analysis is designed to be a collaborative effort between research staff, the police department and the community. The analysis is tailored based on the department and community's unique characteristics. Traffic stop disparities can be influenced by many factors such as the location of accidents, high call for service volume areas, high crime rate areas, and areas with major traffic generators such as shopping and entertainment districts, to name a few. In order to understand how these factors are contributing to racial and ethnic disparities, we first need to better understand where traffic enforcement occurs within a community. The best way to complete this task is to map traffic stops for each identified community. After completing the mapping exercise, we would proceed with a descriptive analysis of traffic stops at the neighborhood level.

Researchers have the ability to better understand the demographics of a subsection of a community by breaking down traffic stops into neighborhoods and allows researchers to focus on the unique attributes of a subsection of a community. Neighborhoods can vary greatly within a community and a more detailed analysis will help to better understand the information presented in the initial analysis. The follow-up analysis also includes a much more in-depth post-stop data review to examine differences in citation rates, contraband found as a result of a search, and stop reasons.

In order to determine if a departments racial and ethnic disparities warrant additional in-depth analysis, researchers review the results from the four analytical sections of the report (Solar Visibility, Synthetic Control, Descriptive Statistics, and KPT Hit-Rate). The threshold for identifying significant racial and ethnic disparities for departments is described in each section of the report (ex. departments with a disparity that was statistically significant at the 95 percent level in the black or Hispanic alone categories in the Solar Visibility methodology were identified as statistically significant). A department is identified for a follow-up analysis if they meet any one of the following criteria:

1. A statistically significant disparity in the Solar Visibility analysis
2. A statistically significant disparity in both the synthetic control and descriptive statistics analyses.
3. A statistically significant disparity in both the synthetic control and KPT hit-rate analyses.
4. A statistically significant disparity in both the KPT hit-rate and descriptive statistics analyses.

Based on the above listed criteria it is recommended that an in-depth follow-up analysis be conducted for the following departments: **(1) Cranston, (2) Narragansett, (3) Providence, (4) North Smithfield,** and **(5) RISP- Hope Valley**. Although the Warren police department was identified with statistically significant disparities in the Solar Visibility analysis that would meet the criteria for recommendation, the magnitude of the coefficient estimate for Hispanic motorists suggests that it may simply be a function of the small number of minority motorists stopped during this period. Therefore, it is not recommended that a follow-up analysis be conducted at this time and we suggest additional review of their data in 2017 with a larger data sample.

Although further analysis is important, a major component of addressing concerns about the possibility of racial profiling in Rhode Island is bringing law enforcement officials and community members together in an effort to build trust by discussing relationships between police and the community. Public forums should be held in each identified community to bring these groups together. They serve as an important tool to inform the public of the findings and outline steps for moving forward with additional analysis.

NOTE TO THE READER

The Providence Police Department reported conducting approximately 9,800 traffic stops during the 12-month period covered in this report. Providence police use a different system for collecting and reporting traffic stop records than all other departments in Rhode Island. Unfortunately, the design of this system caused an indeterminate number of traffic stop records to be reported with the incorrect date and/or time.

Prior to May 2017, the system recorded the date and time of the stop based on the date and time when the officer completed the stop survey. In many cases, the officer completed the stop survey immediately following the stop. However, there were circumstances where officers may not have completed the stop survey until much later. (For example, if a stop was conducted on January 1, 2016 at 12:00 p.m. and the officer did not complete the stop survey until 7:00 p.m., the latter time would have been recorded.) In those cases, the date and time of the stop were not accurate. In May 2017, the system was modified to address this problem by requiring officers to enter the incident date and time manually.

I: METHODOLOGICAL APPROACH UNDERLYING THE ANALYSIS

Assessing racial disparities in policing data has been used for the last two decades as a policy tool to evaluate whether racial bias exists within a given jurisdiction. Although there has always been widespread public support for the equitable treatment of individuals of all races, recent national headlines have brought this issue to the forefront of American consciousness and prompted a contentious national debate about policing policy. The statistical evaluation of policing data in Rhode Island is an important step towards developing a transparent dialogue between law enforcement and the public. As such, this report's goal is to present the results of that evaluation in a transparent and unbiased manner.

As an increasing number of jurisdictions have passed laws mandating the collection of policing data, researchers have become involved in the process by providing new and increasingly sophisticated analytical techniques. Prior to the development of these empirical methods, traditional policing data assessments relied principally on population-based benchmarks. Although population-based benchmarks are still frequently applied in practice because of their intuitive appeal and inherent cost-effectiveness, these test statistics cannot withstand strict scrutiny. In an effort to achieve the goal of a transparent and unbiased evaluation, the analysis in this report applies a series of sophisticated econometric tests as the primary diagnostic mechanism.

The research strategy underlying this statistical analysis was developed with consideration to three guiding principles. Each principle served as an important foundation for the research process, particularly when selecting the appropriate results to disseminate to the public. A better understanding of these principles helps to frame the results in the technical portions of the analysis. Further, presenting these principles at the outset of the report provides readers with the appropriate context to understand our overall approach.

> *Principle 1: Acknowledge that statistical evaluation is limited to finding racial and ethnic disparities that are indicative of racial and ethnic bias but that, in the absence of a formal procedural investigation, cannot be considered comprehensive evidence.*
>
> *Principle 2: Apply a holistic approach for assessing racial and ethnic disparities in Rhode Island policing data by using a variety of approaches that rely on well-respected techniques from existing literature.*
>
> *Principle 3: Outline the assumptions and limitations of each approach transparently so that the public and policy-makers can use their judgment in drawing conclusions from the analysis.*

This report is organized to lead the reader through a host of descriptive and statistical tests that vary in their assumptions and level of scrutiny. The intent behind this approach is to apply multiple tests as a screening filter for the possibility that any one test (1) produces false positive results or (2) reports a false negative. Six distinct analytical tools were used to evaluate whether racial and ethnic disparities are present in the Rhode Island policing data. In the analysis, the demography of motorists was grouped into four overlapping categories to ensure a large enough sample size for the statistical analysis. Although much of the analysis focuses on stops made of black (Hispanic or non-Hispanic) and Hispanic motorists (any race), the analysis was also conducted for aggregated groupings of all non-white motorists (Hispanic or non-Hispanic) as well as a combined sample of black and Hispanic motorists. In terms of identifying departments or state police barracks in individual tests, the estimated disparity (i.e. the higher likelihood of stopping a minority motorist) must have been estimated with at least a 95 percent level of statistical significance for either black or Hispanic motorists alone. Put simply, under the rigorous conditions set by each test, there must have been at least a 95 percent chance that either black or Hispanic motorists were more likely to be stopped (or searched) at a higher rate relative to Caucasian non-Hispanic motorists.

The analysis begins by first presenting the analysis of racial and ethnic disparities in the rate of motor vehicle stops by applying a well-respected methodology colloquially known as the "Veil of Darkness." It is referred to as the Solar Visibility analysis in this report. The next method illustrates the application of the synthetic control analysis that has the same intuitive appeal as traditional population-based benchmarks but remains grounded in rigorous statistical theory. The third component of the analysis uses descriptive statistics from the Rhode Island policing data along with several intuitive measures that evaluate racial and ethnic disparities. These intuitive measures are considered less stringent tests, but provide a useful context for viewing the data.

The last section assesses post-stop behavior, particularly the incidence of vehicular searches. The report is concluded by summarizing our analysis of disparities in the rate of motor vehicle stops and post-stop behavior at the state and department-levels. The findings presented in the conclusion draw from each of our evaluation mechanisms and identify only those departments where statistically significant racial and ethnic disparities across multiple tests are observed. Detailed descriptions of all methodologies can be found in Appendix A.

In short, we move forward with the overall goal of identifying the statistically significant racial and ethnic disparities in Rhode Island policing data. A variety of statistical tests are applied to the data in the hope of providing a comprehensive approach based on the lessons learned from academic and policy applications. Our explanations of the mechanisms and assumptions that underlie each of the tests are intended to provide policymakers and the public with enough information to assess the data and draw their own conclusions from the findings.

Finally, we emphasize the message that any statistical test is only truly capable of identifying racial and ethnic disparities. Such findings provide a mechanism to indicate possible racial profiling but they cannot, without further investigation, provide sufficient evidence that racial profiling exists.

II: CHARACTERISTICS OF TRAFFIC STOP DATA

This section examines general patterns of traffic enforcement activities in Rhode Island for the study period of January 1, 2016 to December 31, 2016. Statewide information can be used to identify variations in traffic stop patterns to help law enforcement and local communities understand more about traffic enforcement. Although some comparisons can be made between similar communities, we caution against comparing agencies' data in this section of the report. Please note that the tables included in this report present information from only a limited number of departments. Complete tables for all agencies are included in the technical appendix B.

In Rhode Island, more than 237,000 traffic stops were conducted during the 12-month study period. Almost 80 percent of the total stops were conducted by the 37 municipal police departments, 19.5 percent of the total stops were conducted by state police, and the remaining 0.5 percent of stops were conducted by the two special police agencies[10]. Figure 1 shows the aggregate number of traffic stops by month along with each demographic category. As can be seen below, the volume of traffic stops varies seasonally.

Figure 1: Aggregate Traffic Stops by Month of the Year

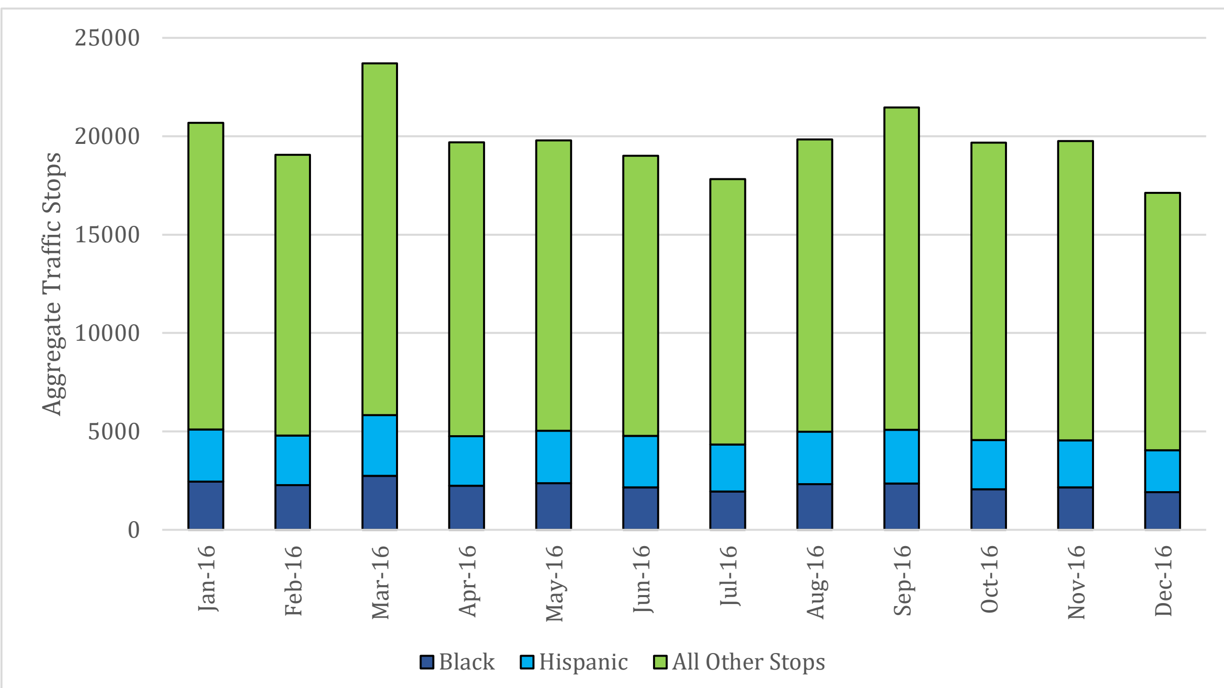


Figure 2 displays traffic stops by time of day for the entire analysis period. As can be seen from the figure, the total volume of traffic stops fluctuates significantly across different times of the day. The highest hourly volume of traffic stops in the sample occurred from five to six in the evening and accounted for 6.3 percent of all stops. It is not surprising that the volume of traffic stops increases between these hours as this is a peak commuting time in Rhode Island. The lowest volume of traffic stops occurred between four and five in the morning and continued at a suppressed level during the morning commute. The low level

[10]The special police agencies are the University of Rhode Island and the Department of Environmental Management.

of traffic stops during the morning commute is likely due to an interest in maintaining a smooth flow of traffic during these hours. However, traffic enforcement does increase following morning commutation hours between 9:00 a.m. and 11:00 a.m.

The evening commute, in contrast to the morning commute, represents a period when a significant proportion of traffic stops are made. The surge seen between the hours of four and seven at night represents a significant period of traffic enforcement. In aggregate, stops occurring between these hours represented 16.7 percent of total stops.

Figure 2: Aggregate Traffic Stops by Time of Day

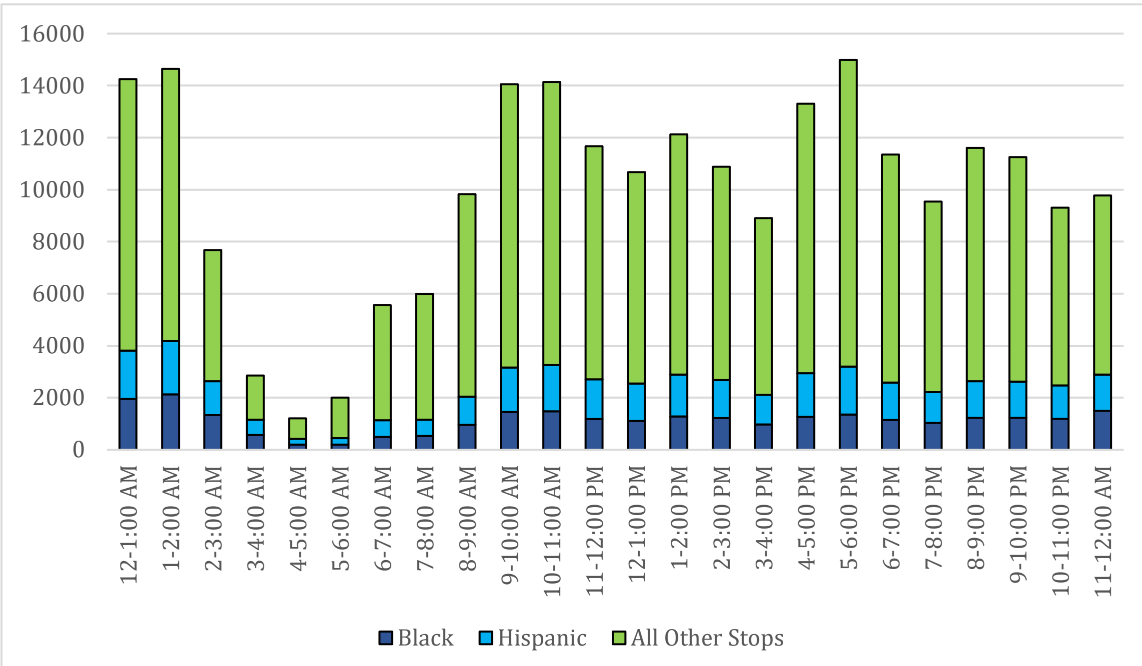
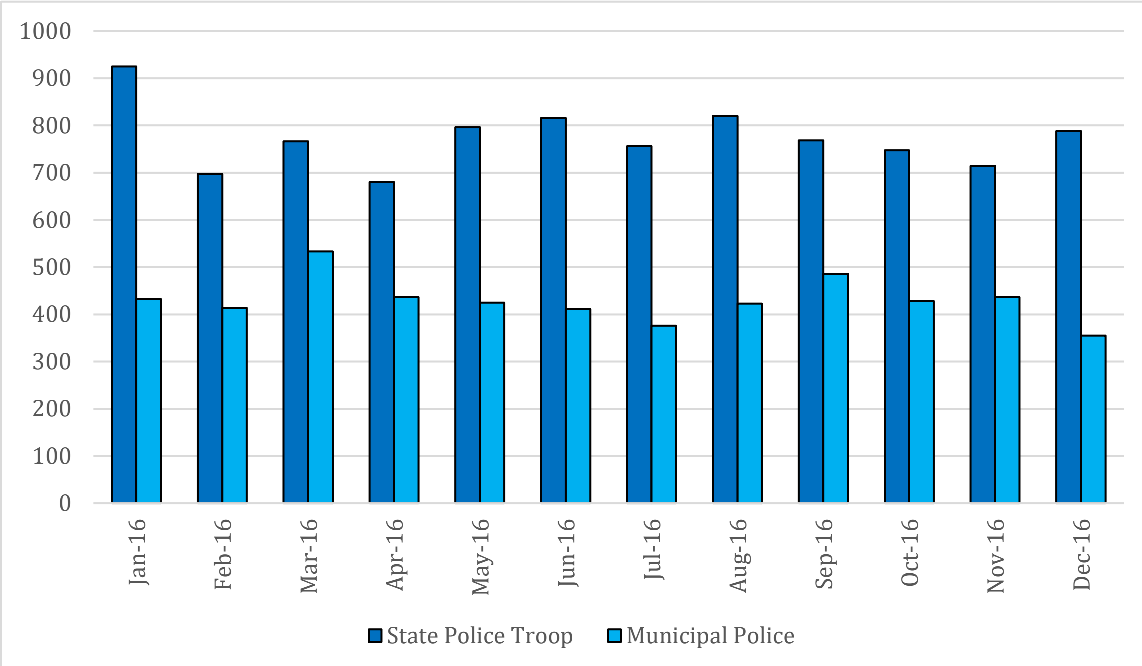


Figure 3 illustrates the average number of traffic stops by month for municipal police agencies and the state police. The data illustrates that municipal traffic stops peaks in March and September. The average number of traffic stops for municipal department's ranges from 355 to 533 each month for each agency. State police traffic stops by barracks are fairly stable each month and range from a low of 680 to a high of 925.

Figure 3: Average Number of Traffic Stops by Month for Police Agencies



The level of and reason for traffic stop enforcement varies greatly across agencies throughout the state for a number of reasons. For example, some enforcement is targeted to prevent accidents in dangerous areas, combat increased criminal activity, or respond to complaints from citizens. Those agencies with active traffic units may produce a higher volume of traffic stops. The rate of traffic stops per 1,000 residents in the population helps to compare the stop activity between agencies. The five municipal police agencies with the highest stop rate per 1,000 residents are Foster, Portsmouth, Little Compton, Jamestown, and Narragansett. Conversely, Providence, Woonsocket, Lincoln, Scituate, and North Providence have the lowest rate of stops per 1,000 residents. Table 1 shows the distribution of stops for the highest and lowest level of enforcement per 1,000 residents for police agencies.

Table 1: Municipal Police, Highest and Lowest Rates of Traffic Stops

Town Name	16+ Population*	Traffic Stops	Stops per 1,000 Residents
Rhode Island	854,478	237,591	278
Municipal Departments with the Highest Rate of Traffic Stops			
Foster	3,662	3,715	1,014
Portsmouth	13,901	8,919	642
Little Compton	2,865	1,510	527
Jamestown	4,355	2,062	473
Narragansett	13,911	6,461	464
Hopkinton	6,443	2,688	417
Middletown	12,812	5,277	412
Barrington	13,292	4,895	398
Glocester	7,839	2,853	364
East Providence	39,044	12,450	319
Municipal Departments with the Lowest Rate of Traffic Stops			
Providence	141,375	9,787	69
Woonsocket	32,338	4,035	125
Lincoln	16,911	2,240	132
Scituate	8,282	1,119	135
North Providence	27,231	4,222	155
Johnston	23,899	3,784	158
Pawtucket	56,546	9,833	174
Coventry	28,241	5,603	198
Cumberland	26,912	5,467	203
Warwick	68,876	14,104	205

* The population 16 years of age and older was obtained from the United States Census Bureau 2010 Decennial Census.

Table 2 presents some basic demographic data on persons stopped in Rhode Island between January 1, 2016 and December 31, 2016. Nearly two-thirds (63.4 percent) of motorists stopped were male. Almost half (46 percent) of motorists stopped were under the age of 30 compared to 20 percent over 50. The vast majority of stops in Rhode Island were white non-Hispanic motorists (73.4 percent); 11.4 percent were black non-Hispanic motorists; 13.0 percent were Hispanic motorists; and 2.0 percent were all other races non-Hispanic motorists.

Table 2: Statewide Driver Characteristics

<table>
<tr><th colspan="2">Race and Ethnicity</th><th colspan="2">Gender</th><th colspan="2">Residency</th><th colspan="2">Age</th></tr>
<tr><td rowspan="2">White</td><td rowspan="2">73.4%</td><td rowspan="3">Male</td><td rowspan="3">63.4%</td><td rowspan="3">Resident</td><td rowspan="3">26.7%</td><td>16 to 20</td><td>10.8%</td></tr>
<tr><td>21 to 30</td><td>35.6%</td></tr>
<tr><td>Black</td><td>11.4%</td><td>31 to 40</td><td>19.4%</td></tr>
<tr><td rowspan="2">All Other Races</td><td rowspan="2">2.2%</td><td rowspan="3">Female</td><td rowspan="3">36.6%</td><td rowspan="3">Nonresident</td><td rowspan="3">73.3%</td><td>41 to 50</td><td>14.2%</td></tr>
<tr><td>51 to 60</td><td>12.0%</td></tr>
<tr><td>Hispanic</td><td>13.0%</td><td>Older than 61</td><td>8.1%</td></tr>
</table>

Table 3 presents data on the characteristics of the traffic stops in the state. Most traffic stops were made for a violation of the motor vehicle laws (95 percent) as opposed to a stop made for an investigatory purpose or motorist assist. The most common violation drivers were stopped for was speeding (35.9 percent). After a driver was stopped, almost half were given a ticket while most of the remaining drivers received some kind of a warning. Statewide, less than 3 percent of traffic stops resulted in the arrest of a driver and only 3.4 percent of stops resulted in a search being conducted.

Table 3: Statewide Stop Characteristics

Reason for Stop		Basis for Stop	
Investigatory	3.7%	Speeding	35.9%
Violation	94.9%	APB	0.2%
Assist	1.4%	Call for Service	3.5%
Outcome of Stop		Equipment/Inspection Violation	18.5%
		Motorist Assist	0.6%
Citation	45.3%	Other Traffic Violation*	27.3%
Warning	46.9%	Registration Violation	5.3%
Notice of Demand	1.6%	Seatbelt Violation	6.3%
Arrest Driver	2.9%	Suspicious Person	1.0%
Arrest Passenger	0.2%	Violation of Ordinance	0.5%
No Action	3.1%	Warrant	0.1%
Search Conducted	3.4%	Special Detail/Directed Patrol	0.8%

*If a stop was made for a reason other than one of the 11 categories listed as the basis for the stops, it is recorded as “other traffic violation.” Some examples of stops that might be recorded as “other traffic violation” include: a traffic light violation or stop sign violation.

In addition to the difference in the volume of traffic stops across communities, agencies stopped motorists for a number of different reasons. Police record the reason that lead to the motor vehicle stop. Those reasons are identified in 12 categories from speeding to registration violation to seatbelt violation. Although speeding is the most often cited reason for stopping a motor vehicle statewide, the results vary by jurisdiction. The average municipal police department stops for speeding violations was 42 percent compared to the state police average of 40 percent. In 11 departments more than 50 percent of the traffic stops were for speeding violations. On the other hand, there were five departments that stopped motorists for speeding less than 20 percent of the time. Table 4 shows the top 10 departments where speeding (as a percentage of all stops) was the most common reason for the traffic stop.

Table 4: Highest Speeding Stop Rates across All Departments

Department Name	Total Stops	Speeding Violations
Glocester	2,853	83.0%
Foster	3,715	76.8%
Charlestown	1,955	70.4%
West Greenwich	1,067	64.9%
Burrillville	3,314	64.9%
Scituate	1,119	58.4%
East Greenwich	2,847	57.8%
Richmond	1,480	57.1%
Hopkinton	2,688	54.8%
North Kingstown	5,097	51.7%

Other traffic violations are the next largest category for stopping motorists in Rhode Island. Although it is not clear what the specific "other" violation is, if a stop was made for a reason other than one of the 11 categories listed as the basis for the stops, it is recorded as "other traffic violation. As an example, this can include stops for traffic light violations or stop sign violations. Statewide over 27 percent of all motorists were stopped for this reason. Table 5 presents the top 10 departments with the highest percentage of stops for other traffic violations.

Table 5: Highest Other Traffic Violation Rates across All Departments

Department Name	Total Stops	Other Traffic Violation
University of Rhode Island	996	49.9%
Newport	5,519	48.6%
Pawtucket	9,833	46.0%
Providence	9,787	43.5%
Cranston	19,529	39.1%
Bristol	5,801	38.9%
Warwick	14,104	37.4%
RISP- HQ	2,763	37.0%
North Providence	4,222	33.4%
Woonsocket	4,035	33.4%

Some communities throughout the country have expressed concern about the stops made for violations that are perceived as more discretionary in nature; therefore potentially making the driver more susceptible to possible police bias. Those stops are typically referred to as pretext stops and might include stops for defective lights, excessive window tint, or a display of plate violation each of which, though a possible violation of state law, leaves the police officer with considerable discretion with respect to actually making the stop. Equipment and inspection related violations were the third most common reason for stopping a vehicle in the state. A statewide combined average for stopping a motorists for an equipment or inspection violation is 18.5 percent. Seventeen police departments exceeded the statewide average. Table 6 presents the top 10 departments with the highest percentage of stops for equipment or inspection violations.

In communities with a larger proportion of stops due to these violations, it is recommended that the departments be proactive in discussing the reasons for these stops with members of the community and examine for themselves whether or not such stops produce disparate enforcement patterns.

Table 6: Highest Equipment/Inspection Violation Rates across All Departments

Department Name	Total Stops	Equipment/Inspection Violations
North Smithfield	2,600	37.0%
East Providence	12,450	29.4%
Newport	5,519	28.8%
Portsmouth	8,919	28.5%
North Providence	4,222	28.3%
West Warwick	5,525	27.3%
Coventry	5,603	27.2%
Jamestown	2,062	25.7%
University of Rhode Island	996	25.3%
Little Compton	1,510	25.0%

Many have argued that it is difficult for police to determine the defining characteristics about a driver prior to stopping and approaching the vehicle. Similar to variations found across departments for the reason for the traffic stop, there are variations that occur with the outcome of the stop. These variations illustrate the influence that local police departments have on the enforcement of state traffic laws. Some communities may view infraction tickets as the best method to increase traffic safety, while others may consider warnings to be more effective. This analysis should help police departments and local communities understand their level and type of traffic enforcement when compared to other communities.

Almost half (45 percent) of motorists stopped in Rhode Island received a citation, while 47 percent received a warning. Individual jurisdictions varied in their post-stop enforcement actions. Johnston issued infraction tickets in 81 percent of all traffic stops, which is the highest in the state. Newport only issued infraction tickets in 7.2 percent of all traffic stops, which is the lowest rate in the state. For state police, officers assigned to the Wickford Barracks issued the highest infractions (71 percent) and the Headquarters Barracks issued the lowest number of infractions (56 percent). Table 7 presents the highest infraction rates across all departments.

Table 7: Highest Citation Rates across All Departments

Department Name	Total Stops	Citations Issued
Johnston	3,784	81.3%
Pawtucket	9,833	74.6%
RISP-Wickford	12,539	71.2%
RISP-Chepachet	8,463	70.8%
Richmond	1,480	69.2%
RISP-Hope Valley	9,973	69.2%
RISP-Lincoln	12,619	66.8%
Central Falls	3,350	63.7%
Warren	2,603	60.6%
Smithfield	4,216	60.1%

On the other hand, Newport issued warnings 92 percent of the time (the highest rate) and Johnston issued warnings 12 percent of the time (the lowest rate). Table 8 presents the highest warning rates across all departments.

Table 8: Highest Warning Rates across All Departments

Department Name	Total Stops	Warnings Issued
Newport	5,519	92.4%
Little Compton	1,510	86.6%
Barrington	4,895	76.0%
South Kingstown	5,731	70.6%
Coventry	5,603	69.8%
Jamestown	2,062	68.7%
University of Rhode Island	996	68.3%
Narragansett	6,461	67.4%
Foster	3,715	64.3%
Charlestown	1,955	64.1%

Statewide, less than 3 percent of all traffic stops resulted in the driver being arrested and less than 0.5 percent of passengers were arrested. As with infraction tickets and warnings, municipal departments varied in the percentage of arrests associated with traffic stops. The North Smithfield Police Department arrested the most people as a result of a traffic stop, with 11.1 percent of all stops resulting in an arrest. Table 9 presents the highest arrest rates across all departments.

Table 9: Highest Arrest Rates across All Departments

Department Name	Total Stops	Arrests
North Smithfield	2,600	11.1%
Central Falls	3,350	8.4%
Scituate	1,119	8.0%
Providence	9,787	6.0%
Tiverton	3,339	5.8%
West Warwick	5,525	5.6%
Cumberland	5,467	5.3%
Woonsocket	4,035	5.2%
Warwick	14,104	5.1%
RISP-Lincoln	12,619	4.9%

Rarely do traffic stops in Rhode Island result in the search of a vehicle, passenger or driver. During the study period, only 3.4 percent of all traffic stops resulted in a search. Although searches are rare in Rhode Island, they do vary across jurisdictions and the data provides information about enforcement activity throughout the state. Seventeen departments exceeded the statewide average for searches, but the highest percentage was found in Cumberland (12.1 percent), Warren (8.4 percent), and Providence (8.1 percent). Of the remaining departments, five searched vehicles more than 5 percent of the time, 11 searched vehicles between 3 percent and 5 percent of the time, and the remaining departments searched vehicles less than 3 percent of the time. Table 10 presents the highest search rates across all departments.

Table 10: Highest Searches Rates across All Departments

Department Name	Total Stops	Resulted in Search
Cumberland	5,467	12.1%
Warren	2,603	8.4%
Providence	9,787	8.1%
Woonsocket	4,035	7.3%
North Smithfield	2,600	7.2%
Hopkinton	2,688	5.6%
East Providence	12,450	5.4%
Pawtucket	9,833	5.0%
Tiverton	3,339	4.7%
Richmond	1,480	4.7%

III: ANALYSIS OF TRAFFIC STOPS, SOLAR VISIBILITY

The Solar Visibility test of racial and ethnic disparities in police traffic stop data operates under the key assumption that police officers are marginally better able to observe the race and ethnicity of motorists during daylight relative to darkness (Grogger and Ridgeway 2006; Ridgeway 2009; Horace and Rohlin 2016; Kalinowski et al. 2017).[11] The test relies on seasonal variation in the timing of sunset as well as the discrete daylight savings time shift to compare stops made at the same time in darkness vs. daylight. The advantage of this methodology, relative to population-based benchmarks, is that it does not require any assumptions about the underlying risk-set of motorists on the roadway. Rather, the test presumes that the composition of motorists, within a restricted sample of stops, does not vary in response to changes in visibility.[12] Here, the racial composition of stops in darkness serves as a counterfactual for those made in daylight, i.e. when officers can better observe race.

More specifically, the Solar Visibility method evaluates whether there exist statistically significant disparities in the likelihood that a stopped motorists is a minority during daylight relative to darkness. As detailed explicitly in Appendix A.2, Grogger and Ridgeway (2006) illustrate that under certain conditions the odds-ratio of a stopped motorist being a minority in daylight vs. darkness is equivalent to the odds-ratio that a minority motorist is stopped during daylight vs. darkness. In a practical context, these assumptions are that variation in travel and enforcement patterns (abject of discrimination) do not change differentially by race in response to daylight. To ensure that these conditions are met, the estimates condition on time and day of week. To further control for inherent differences in daylight and darkness, the sample is restricted to the inter-twilight window, a period when solar visibility varies throughout the year (i.e. between the earliest eastern sunset and the latest western end to civil twilight). Conveniently, this window of time falls within the evening commute where we might expect the risk-set of motorists to be less susceptible to seasonal variation.

III.A: AGGREGATE ANALYSIS WITH SOLAR VISIBILITY, 2016

Table 11 presents the results from the *solar visibility method* applied at the state-level during the inter-twilight window. These results were estimated using Equation 4 of Appendix A.2 with the standard errors clustered by department. The estimates include controls for time of day, day of week, and department fixed-effects. The estimates rely on four definitions of minority status that are compared to white non-Hispanics and annotated accordingly. The minority definitions across each specification are not mutually exclusive in that the first specification includes all non-Caucasian motorists (regardless of ethnicity) while the third includes all Hispanic motorists (regardless of race). The second specification is restricted to only

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[11] The Solar Visibility approach, also known as Veil of Darkness, has recently become the new gold standard for researchers and practitioners evaluating traffic stop data. The test has been used in many jurisdictions including Oakland, CA (Grogger and Ridgeway 2006); Cincinnati, OH (Ridgeway 2009); Minneapolis, MN (Ritter and Bael 2009; Ritter 2017); Syracuse, NY (Worden et al. 2010; Worden et al. 2012; Horace and Rohlin 2016); Portland, OR (Renauer et al. 2009); Connecticut (Ross et al. 2015, 2017), Durham, NC (Taniguchi et al. 2016a); Greensboro, NC (Taniguchi et al. 2016b); Raleigh, NC (Taniguchi et al. 2016c); Fayetteville, NC (Taniguchi et al. 2016d); New Orleans, LA (Masher 2016); and San Diego, CA (Chanin et al. 2016).

[12] Note that this assumption allows for differential rates of traffic stops to exist across races and the potential for differences in guilt and driving behavior.

black motorists (regardless of ethnicity, i.e. a subset of the first specification) and the fourth specification includes both black and Hispanic motorists (i.e. combines the second and third specifications).The control across all specifications includes only stops made of motorists who were observed to be white and non-Hispanic.

As shown below, the coefficient estimates are positive indicating that the odds a stopped motorist is a minority increases during daylight. As previously mentioned and discussed in detail in Appendix A.2, we should expect that (under the assumption of a constant relative risk-set) there will be a direct correspondence between changes to the odds-ratio for stopped motorists and that of motorists at risk of being stopped. The disparity was found to be statistically significant across each of the racial and ethnic groups and persists through the inclusion of officer fixed-effects, as shown in Appendix C, Table C.1. This disparity could be the product of explicit or implicit police discrimination as well as changes to enforcement activity that are correlated with both race/ethnicity and daylight.

Table 11: Logistic Regression of Minority Status on Daylight with Department Fixed-Effects, All Traffic Stops 2016

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
Daylight	Coefficient	0.103**	0.128***	0.184***	0.148***
	Standard Error	(0.050)	(0.043)	(0.040)	(0.036)
Sample Size		46,096	45,018	45,037	50,070
Pseudo R^2		0.119	0.130	0.167	0.150

Note 1: The coefficients are presented along with standard errors clustered at the department level. A coefficient concatenated with * represents a p-value of .1, ** represents a p-value of .05, and *** represents a p-value of .01 significance.
Note 2: All specifications include controls for time of the day, day of the week, analysis year, inter-twilight window (e.g. morning and night), volume, and department fixed-effects.
Note 3: Sample includes all traffic stops made during the inter-twilight window in 2016.

Table 12 presents the results estimated from the subsample of all municipal police departments during the inter-twilight window in 2016. As before, the results control for time of day, day of week, and department fixed-effects. Standard errors are clustered by department. Here again, the coefficient estimates are positive indicating that the odds a stopped motorist is a minority increases during daylight. The disparity is statistically significant across all specifications and robust to the inclusion of officer fixed-effects, as shown in Appendix C, Table C.2. The estimates from Table 12 provide strong evidence suggesting that there is a disparity in the rate that minority motorists are stopped by municipal police. As noted previously, this disparity could be the product of explicit or implicit police discrimination as well as changes to enforcement activity that are correlated with both race/ethnicity and daylight.

Table 12: Logistic Regression of Minority Status on Daylight, Municipal Traffic Stops 2016

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
Daylight	Coefficient	0.121***	0.117***	0.178***	0.139***
	Standard Error	(0.041)	(0.044)	(0.043)	(0.036)
Sample Size		41,443	40,566	40,711	44,936
Pseudo R^2		0.126	0.139	0.183	0.162

Note 1: The coefficients are presented along with standard errors clustered at the department level. A coefficient concatenated with * represents a p-value of .1, ** represents a p-value of .05, and *** represents a p-value of .01 significance.

Note 2: All specifications include controls for time of the day, day of the week, analysis year, inter-twilight window (e.g. morning and night), volume, and department fixed-effects.
Note 3: Sample includes all traffic stops made during the inter-twilight window in 2016.

Table 13 presents the results estimated from a subsample of all State Police barracks during the inter-twilight window in 2016. As before, the results control for time of day, day of week, and department fixed-effects. Standard errors are clustered by barrack. Here, the coefficient estimates are positive which indicates that the odds a stopped motorist is a minority increases during daylight. The estimates are not statistically significant across any of the specifications. However, including a high-dimensional set of officer fixed-effects does produce results that are both positive in sign and highly significant. Those results are contained in Table C.3 of Appendix C and provide evidence suggesting the presence of a disparity in State Police traffic stops. Although more noisy than the previous estimates for municipal departments, this disparity could be the product of explicit or implicit police discrimination as well as changes to enforcement activity that are correlated with both race/ethnicity and daylight.

Table 13: Logistic Regression of Minority Status on Daylight, State Police Traffic Stops 2016

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
Daylight	Coefficient	0.151	0.179	0.228	0.200
	Standard Error	(0.170)	(0.174)	(0.145)	(0.149)
Sample Size		4,327	4,171	4,040	4,828
Pseudo R^2		0.012	0.014	0.023	0.017

Note 1: The coefficients are presented along with standard errors clustered at the department level. A coefficient concatenated with * represents a p-value of .1, ** represents a p-value of .05, and *** represents a p-value of .01 significance.
Note 2: All specifications include controls for time of the day, day of the week, analysis year, inter-twilight window (e.g. morning and night), volume, and department fixed-effects.
Note 3: Sample includes all traffic stops made during the inter-twilight window in 2016.

As mentioned, these estimates aggregate all traffic stops across multiple departments and years. As such, they should be considered an average effect across all departments in 2016. Although the results from this section find a statistically significant disparity in the rate of minority traffic stops in Rhode Island, these results do not identify the geographic source of that disparity. The results of a department-level analysis are presented in a later section and better identify the source of specific department-wide disparities.

III.B: AGGREGATE ROBUSTNESS CHECKS WITH SOLAR VISIBILITY, 2016

This section presents robustness checks on the initial specifications using a more restrictive subsample of traffic stops. Analysis using all violations is potentially biased by specific violations that are correlated with visibility and minority status. To see why this might be a problem, imagine that minority motorists are more likely to have a headlight or taillight out and that these violations are only observable to police during darkness. In that instance, comingling equipment violations with other violations might make it more likely to observe more minorities stopped at night, thus biasing the results downward. In contrast, if minority motorists are more likely to talk on their cellphone or drive without a seatbelt and those violations are more easily observed during daylight, the results would be biased upwards. Since both of these scenarios seem reasonable and the net direction of the bias is unclear, a reasonable robustness check is to limit the sample of traffic stops to moving violations.

Table 14 presents the aggregate results estimated from a sample of moving violations made during the inter-twilight window in 2016. As before, these results were estimated with the standard errors clustered by department. The estimates include controls for time of day, day of week, and department fixed-effects. The coefficient estimates are positive which indicates that the odds a stopped motorist is a minority increases during daylight. These estimates are statistically significant for the specifications where minority status is defined as motorists who are black, Hispanic, and black or Hispanic. Adding a high-dimensional set of officer fixed-effects, as shown in Appendix C, Table C.4, increases the precision of the estimates such that all of the specifications are highly significant. As before, we note that this disparity could be the product of explicit or implicit police discrimination as well as remaining unobserved changes to speed enforcement that are correlated with both race/ethnicity and daylight.

Table 14: Logistic Regression of Minority Status on Daylight with Department Fixed-Effects, All Moving Violations 2016

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
Daylight	Coefficient	0.080	0.103**	0.147***	0.118***
	Standard Error	(0.058)	(0.051)	(0.048)	(0.043)
Sample Size		33,097	32,263	32,129	35,417
Pseudo R^2		0.123	0.136	0.168	0.153

Note 1: The coefficients are presented along with standard errors clustered at the department level. A coefficient concatenated with * represents a p-value of .1, ** represents a p-value of .05, and *** represents a p-value of .01 significance.
Note 2: All specifications include controls for time of the day, day of the week, analysis year, inter-twilight window (e.g. morning and night), volume, and department fixed-effects.
Note 3: Sample includes all moving violations made during the inter-twilight window in 2016.

Table 15 presents the aggregate results estimated from a sample of municipal moving violations made during the inter-twilight window in 2016. As before, these results were estimated with the standard errors clustered by department. The estimates include controls for time of day, day of week, and department fixed-effects. The coefficient estimates are positive which indicates that the odds a stopped motorist is a minority increases during daylight. These estimates are statistically significant for the specifications where minority status is defined as motorists who are Hispanic and black or Hispanic combined. Adding a high-dimensional set of officer fixed-effects, as shown in Appendix C, Table C.5, increases the precision of the estimates such that all of the specifications are highly significant. As before, we note that this disparity could be the product of explicit or implicit police discrimination as well as remaining unobserved changes to speed enforcement that are correlated with both race/ethnicity and daylight.

Table 15: Logistic Regression of Minority Status on Daylight, Municipal Moving Violations 2016

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
Daylight	Coefficient	0.098*	0.087	0.151***	0.110**
	Standard Error	(0.052)	(0.058)	(0.055)	(0.049)
Sample Size		29,784	29,113	29,100	31,828
Pseudo R^2		0.128	0.144	0.184	0.165

Note 1: The coefficients are presented along with standard errors clustered at the department level. A coefficient concatenated with * represents a p-value of .1, ** represents a p-value of .05, and *** represents a p-value of .01 significance.
Note 2: All specifications include controls for time of the day, day of the week, analysis year, inter-twilight window (e.g. morning and night), volume, and department fixed-effects.

Note 3: Sample includes all moving violations made during the inter-twilight window in 2016.

Table 16 presents the results from the subsample of State Police moving violations during the inter-twilight window. As before, these results were estimated with the standard errors clustered by state police barracks. The estimates include controls for time of day, day of week, and department fixed-effects. The coefficient estimates are positive which indicates that the odds a stopped motorist is a minority increases during daylight. These estimates are statistically significant for the specifications only where minority status is defined as black or Hispanic. Adding a high-dimensional set of officer fixed-effects, as shown in Appendix C, Table C.6, increases the precision of the estimates such that the non-Caucasian and Hispanic specifications also become significant. As before, we note that this disparity could be the product of explicit or implicit police discrimination as well as remaining unobserved changes to speed enforcement that are correlated with both race/ethnicity and daylight.

Table 16: Logistic Regression of Minority Status on Daylight, State Police Moving Violations 2016

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
Daylight	Coefficient	0.187	0.179	0.159	0.175**
	Standard Error	(0.163)	(0.136)	(0.099)	(0.088)
Sample Size		3,061	2,940	2,818	3,361
Pseudo R^2		0.014	0.016	0.020	0.017

Note 1: The coefficients are presented along with standard errors clustered at the department level. A coefficient concatenated with * represents a p-value of .1, ** represents a p-value of .05, and *** represents a p-value of .01 significance.
Note 2: All specifications include controls for time of the day, day of the week, analysis year, inter-twilight window (e.g. morning and night), volume, and department fixed-effects.
Note 3: Sample includes all moving violations made during the inter-twilight window in 2016.

The results presented in the state-level analysis provide strong evidence that a disparity exists in the rate of minority traffic stops by both municipal and State Police departments in 2016. Throughout, the disparity persists through the inclusion of both municipal departments as well as officer fixed-effects. Further, the level of significance grows across all specifications when the sample is restricted to moving violations. In the preceding section, the test will be applied to individual municipal departments and State Police barracks.

III.C: DEPARTMENT ANALYSIS WITH SOLAR VISIBILITY, 2016

The analysis presented at the state-level shows that the odds a stopped motorist is a minority increases in daylight relative to darkness. As noted in the introduction and detailed in Appendix A.2, we can directly attribute this disparity to a change in the odds that a minority motorist is stopped in daylight relative to darkness under reasonable conditions about the counterfactual. By construction, the aggregate analysis does not investigate the source of these disparities in terms of specific municipal police departments or State Police barracks. The analysis presented in this section seeks to better identify the sources of that disparity by running the same test for individual departments and state police barracks. Here, Equation 4 of Appendix A.2 is estimated separately for each municipal department and state police barracks. Thus, each set of estimates includes a vector of town-specific controls for time of day, day of week, and department fixed-effects. We identify all departments and state police barracks found to have a disparity that is statistically significant at the 95 percent level in either of the Hispanic or Black alone minority groups. The full set of results are contained in Table C.7 of Appendix C. Although we do not include officer fixed or restrict the sample to moving violations here, Appendix C, Tables C.8, C.9 and C.10 contain results with these more rigorous specifications. As discussed in detail below, we annotate those departments that do not withstand the scrutiny of the robustness checks.

Table 17 presents the results from estimating the Solar Visibility test statistic for individual departments using the 2016 sample. There were five municipal departments, one special department, and three State Police barracks found to have a disparity that was statistically significant at the 95 percent level in the black or Hispanic categories. As noted, the disparity for all departments in Table 17 did not persist through all of the robustness checks that included officer fixed-effects, the moving violation subsample, and the combination of these specifications. In total, the disparity persisted through these robustness checks for four municipal departments and one State Police barrack: Cranston, Narragansett, Providence, Warren, and RISP- Hope Valley. In particular, Narragansett and Warren are observed to have a disparity for Hispanic motorists alone. The remaining three departments had a disparity for both black and Hispanic motorists, as did RISP- Hope Valley, though the disparity did not persist for Hispanic motorists in the latter case.

Table 17: Logistic Regression of Minority Status on Daylight, Select Department Traffic Stops 2016

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
Cranston	Coefficient	0.154*	0.219**	0.268***	0.213***
	Standard Error	(0.091)	(0.099)	(0.093)	(0.078)
	Sample Size	4002	3790	3964	4676
	Pseudo R^2	0.005	0.007	0.010	0.007
DEM+	Coefficient	-0.224	30.428***	2.709	3.018**
	Standard Error	(1.073)	(1.954)	(1.709)	(1.470)
	Sample Size	107	102	108	115
	Pseudo R^2	0.406	0.471	0.306	0.264
East Providence+	Coefficient	0.187*	0.164	0.315**	0.194*
	Standard Error	(0.109)	(0.113)	(0.151)	(0.101)
	Sample Size	3674	3597	3270	3914
	Pseudo R^2	0.018	0.019	0.024	0.019
Narragansett	Coefficient	0.347	0.442	0.946***	0.628**
	Standard Error	(0.292)	(0.324)	(0.345)	(0.246)
	Sample Size	1723	1705	1684	1755
	Pseudo R^2	0.033	0.042	0.054	0.022
Providence[13]	Coefficient	0.298**	0.259**	0.214*	0.234**
	Standard Error	(0.123)	(0.125)	(0.127)	(0.111)
	Sample Size	1623	1542	1526	2100
	Pseudo R^2	0.014	0.014	0.012	0.010

[13] The Solar Visibility analysis relies on the date and time of the stop. Please see the "Note to the Reader" regarding a data issue within Providence Police Department.

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
RISP - Chepachet+	Coefficient	-0.006	0.123	0.664**	0.383
	Standard Error	(0.299)	(0.324)	(0.300)	(0.246)
	Sample Size	680	654	678	777
	Pseudo R^2	0.034	0.040	0.034	0.026
RISP - Hope Valley	Coefficient	0.400**	0.402**	0.464**	0.436**
	Standard Error	(0.189)	(0.205)	(0.220)	(0.174)
	Sample Size	1082	1035	987	1171
	Pseudo R^2	0.028	0.029	0.036	0.027
RISP - Wickford+	Coefficient	0.327	0.511**	0.178	0.388**
	Standard Error	(0.211)	(0.229)	(0.244)	(0.188)
	Sample Size	1027	991	946	1123
	Pseudo R^2	0.023	0.025	0.024	0.021
Warren	Coefficient	0.411	0.499	16.030***	1.135*
	Standard Error	(0.643)	(0.752)	(0.178)	(0.582)
	Sample Size	724	716	705	745
	Pseudo R^2	0.126	0.119	0.152	0.096

Note 1: The coefficients are presented along with robust standard errors. A coefficient concatenated with * represents a p-value of .1, ** represents a p-value of .05, and *** represents a p-value of .01 significance.
Note 2: All specifications include controls for time of the day and day of the week.
Note 3: Sample includes all traffic stops made during the inter-twilight window in 2016.
+ Results are not robust across subsequent specifications.

As noted previously, only a select five of the six municipal departments and one of the three State Police barracks in Table 17 persisted through the additional robustness checks contained in the Appendix. For these departments and state police barrack, we conclude that there is strong evidence that a disparity exists in the rate of minority traffic stops made during high visibility conditions. For the three departments where the disparity did not persist through the robustness checks, it is impossible to say if the more restrictive specifications invalidated the initial findings or whether the power was diminished by reducing the sample size. Thus, we annotate the results for those departments but caution against any undue interpretation about the fact that these results did not withstand more rigorous estimation.

One overarching observation is that the largest and most persistent disparities driving the results statewide are likely coming from these municipal departments. In terms of sample size alone, these six municipal departments represent between 27.7 to 29.6 percent of the overall municipal inter-twilight sample meaning that they exert a lot of influence on the overall aggregate effect. Again, it is impossible to clearly link these observed disparities to racial profiling as these differences could be driven by any combination of policing policy, heterogeneous enforcement patterns, or individual bad actors.

IV: ANALYSIS OF TRAFFIC STOPS, SYNTHETIC CONTROL

Traditional approaches that rely on population-based benchmarks to evaluate policing data must make a variety of very strong assumptions about the underlying risk-set of motorists. These approaches, despite their flaws, are intuitively appealing because they offer tangible descriptive measures of racial and ethnic disparities. This section presents the results of a synthetic control analysis that has the same intuition as traditional population-based benchmarks but remains grounded in rigorous statistical theory. A synthetic control is a unique benchmark constructed for each individual department using various stop-specific and town-level demographic characteristics as captured through inverse propensity score weighting. The synthetic control is then used to assess the effect of treatment on an outcome variable(s). In the present context, treatment is defined as a traffic stop made by a specific municipal police department and the outcome variable(s) indicates whether a motorist is a racial or ethnic minority.[14]

Put simply, departments differ in terms of their enforcement activity (i.e. timing of stops and types of violations ect.) and the underlying demographics of the population on the roadway. This analysis accounts for these differences by estimating a measure of similarity called a propensity score. Here, a propensity score is a measure of how similar a stop made outside a given department is to a stop made by the department being analyzed. These measures of similarity are used to weight stops when constructing an individual benchmark for each department. For example, if the department being analyzed has a high minority population and makes most of their stops on Friday nights at 7PM for speeding violations then stops made for speeding by departments with a similar residential population at this time and day will be given more weight when constructing the benchmark. This methodology ensures that there is an apples-to-apples comparison between the number of minorities stopped in a given town relative to their benchmark and allows for the interpretation of any remaining differences to be attributed to possible disparate treatment.

Weighting the observations by the inverse of the propensity score ensures that the distribution of observable characteristics is consistent between department of interest and the so-called “synthetic control”. As long as these observed variables fully capture selection into treatment, inverse propensity score weighting allows for an unbiased estimate of the effect of treatment on the outcome of interest. In the present context, constructing a synthetic control using inverse propensity score weights allows for an assessment of whether specific departments are disproportionately stopping minority motorists. A detailed description of the mechanics underlining this methodology as well as the current application can be found in Appendix A.3. Generally speaking, the synthetic control approach follows a rich and extensive literature spanning the fields of statistics, economics, and public policy. The application of similar methodologies to policing data have recently entered the criminal justice literature through notable applications by McCaffrey et al. (2004), Ridgeway (2006), and Ridgeway and MacDonald (2009).

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[14] In the proceeding methodological discussion, the details of the estimation procedure are presented as if a single treatment effect were estimated using a single outcome variable. However, the estimates were constructed for each municipal department using four different outcome variables.

IV.A: AGGREGATE ANALYSIS WITH SYNTHETIC CONTROL, 2016

Each individual municipal police department and State Police barrack was examined independently by weighting observations with inverse propensity scores estimated using Equation 7 of Appendix A.3. The variables used to estimate the propensity scores are detailed in Table A.2 (1) of Appendix A.3. Treatment effects were estimated using Equation 8 of Appendix A.3 for individual departments and State Police barracks across four demographic subgroups relative to white non-Hispanics. As before, we identify all departments found to have a disparity that is statistically significant at the 95 percent level in either the Hispanic or Black alone minority group. The full set of results for all departments can be found in Table D.1 of Appendix D. Although we do not use doubly-robust estimation here, Table D.2 of Appendix D contains results with this more rigorous modeling specification. Note that significantly more departments are identified in these estimates than those using doubly-robust estimation which indicates that in some departments, the results fail on balance. Thus, we present results here for departments identified using the less rigorous specification but only confidently identify those that withstand the more rigorous approach.

Table 18 presents the results from estimating treatment effects of individual departments relative to their requisite synthetic control using the 2016 sample. There were 12 municipal departments found to have a disparity that was statistically significant at the 95 percent level in the black or Hispanic categories. As noted, the disparities in all of these departments did not persist through the more restrictive modeling specifications with doubly-robust estimation. In total, there were six municipal departments that withstood this more rigorous estimation procedure.

Table 18: Inverse Propensity Score Weighted Logistic Regression of Minority Status on Treatment, Select Department Traffic Stops 2016

Department	Estimate	Non-Caucasian	Black	Hispanic	Black or Hispanic
Barrington+	Coefficient	0.873***	4.181***	6.105***	-0.895***
	Standard Error	(0.054)	(0.064)	(0.065)	(0.050)
	Sample Size	163,493	163,493	163,493	163,493
Cumberland	Coefficient	-0.061	10.547***	0.499***	0.293***
	Standard Error	(0.048)	(0.051)	(0.044)	(0.037)
	Sample Size	189,856	189,856	189,856	189,856
East Providence+	Coefficient	0.151***	0.170***	-0.641***	-0.156***
	Standard Error	(0.022)	(0.023)	(0.031)	(0.020)
	Sample Size	161,886	161,886	161,886	161,886
Foster	Coefficient	0.773***	0.587***	0.686***	0.723***
	Standard Error	(0.074)	(0.089)	(0.094)	(0.068)
	Sample Size	92,854	92,854	92,854	92,854
Johnston	Coefficient	2.387***	16.522***	1.039***	0.491***
	Standard Error	(0.054)	(0.058)	(0.060)	(0.047)
	Sample Size	174,338	174,338	174,338	174,338

Department	Estimate	Non-Caucasian	Black	Hispanic	Black or Hispanic
Lincoln	Coefficient	0.326***	0.288***	1.136***	0.783***
	Standard Error	(0.065)	(0.071)	(0.060)	(0.051)
	Sample Size	189,856	189,856	189,856	189,856
Middletown	Coefficient	0.362***	0.425***	22.016***	0.148***
	Standard Error	(0.066)	(0.071)	(0.051)	(0.057)
	Sample Size	180,069	180,069	180,069	180,069
North Smithfield	Coefficient	1.111***	1.248***	1.383***	1.428***
	Standard Error	(0.167)	(0.208)	(0.206)	(0.157)
	Sample Size	170,229	170,229	170,229	170,229
Portsmouth+	Coefficient	0.987***	1.089***	0.477*	0.882***
	Standard Error	(0.333)	(0.402)	(0.288)	(0.286)
	Sample Size	174,308	174,308	174,308	174,308
Scituate+	Coefficient	5.210***	9.259***	0.625***	-10.473***
	Standard Error	(0.152)	(0.172)	(0.182)	(0.128)
	Sample Size	101,262	101,262	101,262	101,262
Westerly+	Coefficient	2.006***	-1.090***	1.378***	0.707***
	Standard Error	(0.056)	(0.066)	(0.079)	(0.053)
	Sample Size	72,286	72,286	72,286	72,286
Woonsocket+	Coefficient	-0.199***	3.819***	2.311***	-0.528***
	Standard Error	(0.048)	(0.044)	(0.039)	(0.041)
	Sample Size	70,030	70,030	70,030	70,030

Note 1: The coefficients are presented along with robust standard errors. A coefficient concatenated with * represents a p-value of .1, ** represents a p-value of .05, and *** represents a p-value of .01 significance.
Note 2: Propensity scores were estimated using principal components analysis of traffic stop characteristics as well as Census data selected using the Kaiser-Guttman stopping rule. Traffic stop characteristics include time of the day, day of the week, month, department traffic stop volume, officer traffic stop volume, and type of traffic stop. Census demographics for both the primary and border towns include retail employment, entertainment employment, commuting population, vacant housing, rental housing, median earnings, population density, gender, age, race, and ethnicity.
Note 3: Sample includes all traffic stops made by the primary department and an inverse propensity score weighted sample of all other departments from October 2013 to September 2016.
+ Results are not robust across subsequent specifications.

As noted previously, only a select number of these persisted through the additional robustness check contained in the Table D.2 of Appendix D. Although it is impossible to determine whether these robustness checks invalidated the findings in Table 18 or whether a balanced synthetic control is simply not able to be created, we annotate the results for those departments and caution against any undue interpretation. As before, the cautionary note here is due to the fact that it is impossible to clearly link the observed disparities to racial profiling as these differences may be driven by any combination of policing policy, heterogeneous enforcement patterns, or individual bad actors.

V: ANALYSIS OF TRAFFIC STOPS, DESCRIPTIVE STATISTICS AND INTUITIVE MEASURES

The descriptive statistics and benchmarks presented in this section help to understand patterns in Rhode Island policing data. Although these simple statistics present an intriguing story, conclusions should not be drawn from any one measure alone. The two previously applied statistical tests of racial and ethnic disparities in the policing data are based solely on the policing data itself and rely on the construction of a theoretically derived identification strategy and a natural experiment. These results have been applied by academic and police researchers in numerous areas across the country and are generally considered to be the most current and relevant approaches to assessing policing data.

In all the benchmark analysis, the demography of motorists was grouped into three overlapping categories to ensure a large enough sample size for the analysis. Much of the analysis focuses on stops made of black (Hispanic or non-Hispanic) and Hispanic motorists (any race), the analysis also was conducted for aggregated groupings of all non-white motorists (Hispanic or non-Hispanic).

V.A: STATEWIDE AVERAGE COMPARISON

Comparing town data to statewide average data is frequently the first thing the public does when trying to understand and assess how a police department may be conducting traffic stops. In this section, a comparison to the statewide average is presented alongside the context necessary to understand the information. This benchmark does provide a simple and effective way to establish a baseline for all towns from which the relative differences between town stop numbers become more apparent. A detailed explanation of the methodology can be found in Appendix A.4. The analysis presented in this report only identified the departments for which the statewide average comparison indicated the largest distances between the net stop percentage and net resident population using 10 or more points as a threshold. Tables showing the calculations for all departments, rather than just those showing distance measures of more than 10 points, can be found in Appendix E of this report. Readers should note that this section focuses entirely on departments that exceeded the statewide average for stops in these racial groups.

Comparison of Black Drivers to the State Average

For the study period, the statewide percentage of motorists stopped by police who were identified as Black was 11.4 percent. Nine departments stopped a higher percentage of Black motorists than the state average, none of which exceeded the statewide average by more than 10 percentage points. The statewide average for Black residents (16+) is 4.5 percent. Of the nine towns that exceeded the statewide average for Black motorists stopped, seven also have Black resident populations (16+) that exceeded the statewide average.

After the stop and resident population percentages were adjusted using the method described in Appendix A.4 (2), there were no towns found to have a relative distance between their net Black driver stop percentage and net Black population percentage of more than 10 points. Results for all departments are contained in the Table E.1 of Appendix E.

Comparison of Hispanic Motorists to the Statewide Average

For the study period, the statewide percentage of motorists stopped by police who were identified as Hispanic was 13 percent. Nine towns stopped a higher percentage of Hispanic motorists than the state average, three of which exceeded the statewide average by more than 10 percentage points. The statewide Hispanic resident population (16+) is 10.5 percent. The ratio of stopped Hispanic motorists to Hispanic residents (16+) on a statewide basis was slightly higher (13.0 percent Hispanic motorists' stopped/10.5 percent Hispanic residents). Of the nine towns that exceeded the statewide average for Hispanic motorists stopped, four also have Hispanic resident populations (16+) that exceeded the statewide average.

After the stop and resident population percentages were adjusted using the method described in Appendix A.4 (2), two towns were found to have a relative distance between their net Hispanic driver stop percentage and net Hispanic population percentage of more than 10 points. The two towns were North Smithfield and Lincoln. Table 19 shows the data for these two towns. All department results are contained in the Table E.2 of Appendix E.

Table 19: Statewide Average Comparisons for Hispanic Motorists for Selected Towns

Municipal Department	Hispanic Stops	Difference Between Town and State Average	Hispanic Residents Age 16+	Difference Between Town and State Average	Distance Between Net Differences
Lincoln	15.9%	2.9%	3.3%	-7.2%	10.1%
North Smithfield	16.8%	3.8%	1.8%	-8.7%	12.5%

Comparison of Minority Motorists to the State Average

The final category involves all motorists classified as "Minority." This Minority category includes all racial classifications except for white motorists. Specifically it covers Blacks, Hispanics, Asian/Pacific Islander, American Indian/Alaskan Native, and Other Race classifications included in the census data.

For the study period, the statewide percentage of stopped motorists who were identified as Minority was 26.6 percent. A total of eight departments stopped a higher percentage of Minority motorists than the state average, four of which exceeded the state average by more than 10 percentage points. The statewide average for Minority residents (16+) is 20.4 percent. Of the eight towns that exceeded the statewide average for Minority motorists stopped, four also have Minority resident populations (16 +) that exceeded the statewide average.

After the stop resident population percentages were adjusted using the method described in Appendix A.4 (2), a total of four departments were found to have a relative distance between their net Minority driver stop percentage and net Minority driving age population percentage of more than 10 points. Table 20 shows the data for these four towns. All department results are contained in the Table E.3 of Appendix E.

Table 20: Statewide Average Comparisons for Minority Motorists for Selected Towns

Municipal Department	Minority Stops	Difference Between Town and State Average	Minority Residents Age 16+	Difference Between Town and State Average	Distance Between Net Differences
North Smithfield	31.4%	4.8%	3.5%	-16.9%	21.7%
Cranston	38.9%	12.3%	20.3%	-0.1%	12.4%
Lincoln	26.6%	0.0%	8.2%	-12.2%	12.2%
Foster	18.2%	-8.4%	0.0%	-20.4%	12.0%

V.B: ESTIMATED COMMUTER DRIVING POPULATION COMPARISON

Adjusting "static" residential census data to approximate the estimated driving demographics in a particular jurisdiction provides a more accurate benchmark method than previous census-based approaches. At any given time, nonresidents may use any road to commute to work or travel to and from entertainment venues, retail centers, tourist destinations, etc. in a particular town. It is impossible to account for all driving in a community at any given time, particularly for the random, itinerant driving trips sometimes made for entertainment or recreational purposes. However, residential census data can be modified to create a reasonable estimate of the possible presence of many nonresidents likely to be driving in a given community because they work there and live elsewhere. This methodology is an estimate of the composition of the driving population during typical commuting hours. A detailed explanation of the methodology can be found in Appendix A.4.

The Estimated Commuter Driving Population (EDP) analysis was confined to the 37 municipal police departments in Rhode Island. The only traffic stops included in this analysis were stops conducted Monday through Friday from 6:00am to 10:00am and 3:00pm to 7:00pm (peak commuting hours).

Overall, when compared to their respective EDP, 32 departments had a disparity between the Minorities stopped and the proportion of non-whites estimated to be in the EDP. For many of these departments (17) the disparity was very small (less than five percentage points). In the remaining five communities, the disparity was negative, meaning that more whites were stopped than expected in the EDP numbers. However, the negative disparities were also very small in most communities. There were 36 departments with a disparity for Black motorists stopped and 28 departments with a disparity for Hispanic motorists stopped when compared to the respective EDPs.

Due to the margins of error inherent in the EDP estimates, we established a reasonable set of thresholds for determining if a department shows a disparity in its stops when compared to its EDP percentages. Departments that exceed their EDP percentages by greater than 10 percentage points in any of the three categories: (1) Minority (all race/ethnicity), (2) Black non-Hispanic, and (3) Hispanic, were identified in our tier one group. In addition, departments that exceeded their EDP percentage by more than five but less than 10 percentage points were identified in our tier two group for this benchmark if the ratio of the percentage of stops for the target group compared to the baseline measure for that group also was 1.75 or above (percentage of stops divided by benchmark percentage equals 1.75 or more) in any of the three categories: (1) Minority (all race/ethnicity), (2) Black non-Hispanic, or (3) Hispanic. All department results are contained in the Table E.4, Table E.5, and Table E.6 of Appendix E.

Table 21: Highest Ratio of Stops to EDP (Tier I)

Department Name	Number of Stops	Stops	EDP	Absolute Difference	Ratio
Minority (All Non-White)					
Providence	2,334	62.8%	40.3%	22.5%	1.56
North Smithfield	774	25.8%	7.4%	18.4%	3.49
Cranston	5,687	38.1%	19.9%	18.2%	1.92
Lincoln	581	24.8%	13.1%	11.7%	1.89
North Providence	1,367	27.1%	15.8%	11.3%	1.72
Foster	731	11.4%	1.0%	10.4%	11.35
Black (Non-Hispanic)					
Providence	2,334	25.1%	8.9%	16.1%	2.80
North Providence	1,367	14.5%	4.1%	10.4%	3.53
Hispanic (All Racial Groups)					
Cranston	5,687	20.9%	9.4%	11.5%	2.23
Providence	2,334	33.8%	22.9%	10.9%	1.47
North Smithfield	774	14.0%	3.7%	10.3%	3.80

Table 22: High Ratio of Stops to EDP (Tier II)

Department Name	Number of Stops	Stops	EDP	Absolute Difference	Ratio
Minority (All Non-White)					
Glocester	1,141	9.2%	2.3%	6.9%	4.00
Hopkinton	669	9.9%	3.4%	6.5%	2.90
Warren	1,048	11.7%	5.6%	6.1%	2.10
Black (Non-Hispanic)					
Cranston	5,687	13.6%	4.5%	9.0%	2.99
North Smithfield	774	9.9%	1.1%	8.9%	9.25
Central Falls	1,101	14.9%	6.7%	8.2%	2.23
East Providence	4,062	13.0%	4.9%	8.1%	2.65
Pawtucket	3,219	17.3%	9.5%	7.7%	1.81
Woonsocket	1,140	10.0%	4.5%	5.5%	2.20
Lincoln	581	8.1%	2.7%	5.4%	3.01
Middletown	1,106	9.1%	3.8%	5.4%	2.42
Warren	1,048	6.6%	1.4%	5.2%	4.82
Hispanic (All Racial Groups)					
Lincoln	581	14.6%	6.0%	8.6%	2.43
Woonsocket	1,140	18.2%	9.9%	8.3%	1.84
Cumberland	1,607	11.1%	5.6%	5.6%	2.00
Johnston	2,012	11.8%	6.3%	5.5%	1.88

V.C: RESIDENT ONLY STOP COMPARISON

The final population benchmark comparison limits the analysis to stops involving only residents of the community and compares them to the community demographics based on the 2010 decennial census for residents age 16 and over. While comparing resident-only stops to the resident driving age population eliminates the influence out-of-town motorists has on the roads at any given time, the mere existence of a disparity is not in and of itself significant unless it does so by a significant amount. Such disparities may exist for several reasons including high police presence in high crime areas. A detailed explanation of the methodology can be found in Appendix A.4.

The resident only stop comparison analysis was confined to the 37 municipal police departments in Rhode Island where decennial census information could be derived. The only traffic stops included in this analysis were stops where the driver was reported to be a resident of the town where they were stopped. For example, a resident of Providence stopped by Providence police would be included in the Providence analysis.

Overall, when compared to the census, 32 departments stopped more Minority resident motorists than their 16+ census population. Again, the disparity for many of these departments was very small. In the remaining five communities, the disparity was negative; meaning that more whites were stopped than expected based on the population numbers. However, the negative disparities were also very small in most communities. Almost all departments (35 of 37) had a disparity for Black motorists stopped and 24 departments had a disparity for Hispanic motorists stopped when compared to the resident driving age population.

Departments with a difference of 10 percentage points or more between the resident stops and the 16+ resident population in any of the three categories: (1) Minority (all race/ethnicity), (2) Black non-Hispanic, and (3) Hispanic, were identified in our tier one group. In addition, departments that exceeded their resident population percentage by more than five but less than 10 percentage points were identified in our tier two group for this benchmark if the ratio of the percentage of resident stops for the target group compared to the baseline measure for that group also was 1.75 or above(percentage of stopped residents divided by resident benchmark percentage equals 1.75 or more) in any of three categories: (1) Minority (all race/ethnicity), (2) Black non-Hispanic, and (3) Hispanic. All department results are contained in the Table E.7, Table E.8, and Table E.9 of Appendix E.

Table 23: Highest Ratio of Resident Population to Resident Stops (Tier I)

Department Name	Number of Residents	Resident s	Resident Stops	Minority Resident Stops	Difference	Ratio
Minority (All Non-White)						
Providence	141,375	56.9%	6,102	80.6%	23.8%	1.42
Woonsocket	32,338	23.3%	1,935	42.2%	18.9%	1.81
Pawtucket	56,546	38.7%	4,082	57.5%	18.7%	1.48
Black (Non-Hispanic)						
Providence	141,375	12.4%	6,102	33.0%	20.5%	2.65
Pawtucket	56,546	11.1%	4,082	26.1%	15.0%	2.35
East Providence	39,044	5.2%	2,198	18.1%	12.9%	3.48
Newport	21,066	6.1%	2,147	18.1%	12.0%	2.96
Hispanic (All Racial Groups)						
Woonsocket	32,338	10.7%	1,935	24.7%	14.0%	2.32
Pawtucket	56,546	17.4%	4,082	30.7%	13.3%	1.77
Providence	141,375	33.5%	6,102	44.3%	10.7%	1.32
Central Falls	14,248	57.6%	1,169	68.0%	10.4%	1.18

Table 24: High Ratio of Resident Population to Resident Stops (Tier II)

Department Name	Number of Residents	Residents	Resident Stops	Minority Resident Stops	Difference	Ratio
Minority (All Non-White)						
Middletown	12,812	12.5%	1,043	21.9%	9.3%	1.75
Black (Non-Hispanic)						
Middletown	12,812	4.2%	1,043	13.7%	9.5%	3.23
Woonsocket	32,338	4.9%	1,935	13.6%	8.8%	2.80
South Kingstown	25,918	2.1%	678	10.5%	8.4%	4.94
North Providence	27,231	3.9%	1,353	11.8%	7.9%	3.03

V.D: SUMMARY OF THE DESCRIPTIVE COMPARISONS

The descriptive tests outlined in the above sections are designed to be used as a screening tool to identify those jurisdictions with consistent data disparities that exceed certain thresholds. The tests compare stop data to three different benchmarks: (1) statewide average, (2) the estimated commuter driving population, and (3) resident-only stops that each cover three demographic categories: Black non-Hispanic, Hispanic, and Minority (all non-white). Department data is then measured against the resulting nine descriptive measures for evaluation purposes.

In order to weight the disparities within the descriptive benchmarks, any disparity greater than 10 percentage points for a measure was given a weight of one (1) point. Any disparity of more than 5, but less than 10 percentage points accompanied by a disparity ratio of 1.75 or above was given a weight of 0.5 points. Therefore, a department could score no more than nine (9) total points.

Table 25 identifies the three departments with significant disparities divided into two tiers. The first tier includes the two jurisdictions whose stop data was found to exceed the disparity threshold levels in at least two of the three-benchmark areas and a weighted total score of 4.5 or more. The second tier of Table 25 shows the one department that exceeded the disparity threshold in two of the three-benchmark areas, but only scored a four (4) out of a possible nine (9) points. All department results are contained in the Table E.10 of Appendix E.

Table 25: Departments with the Greatest Number of Disparities Relative to Descriptive Benchmarks

Department Name	Statewide Average			Estimated Driving Population			Resident Population			Point Total
	M	B	H	M	B	H	M	B	H	
Tier 1										
Providence				22.5	16.1	10.9	23.8	20.5	10.7	6
North Smithfield	21.7		12.5	18.4	8.9	10.3				4.5
Tier 2										
Lincoln	12.2		10.1	11.7	5.4	8.6				4

Note 1: M=Minority, B=Black, H=Hispanic (Numbers of 10 or above yield one point, numbers less than 10 equal 0.5 points)

VI. ANALYSIS OF VEHICULAR SEARCHES, KPT HIT-RATE

This section contains the results of an analysis of post-stop outcomes using a hit-rate approach following Knowles, Persico and Todd (2001). The hit-rate approach relies on the idea that motorists rationally adjust their propensity to carry contraband in response to their likelihood of being searched by police. Similarly, police officers rationally decide whether to search a motorist based on visible indicators of guilt and an expectation of the likelihood that a given motorist might have contraband. According to the model, a demographic group of motorists would be searched by police more often than Caucasians if they were more likely to carry contraband. However, the higher level of searches should be exactly proportional to the higher propensity for this group to carry contraband. Thus, in the absence of racial animus, we should expect the rate of successful searches (i.e. the hit-rate) to be equal across different demographic groups regardless of differences in their propensity to carry contraband. [15]

In this test, discrimination is interpreted as a preference for searching minority motorists that shows up in the data as a statistically lower hit-rate relative to white motorists. In more technical terms, the testable implication derived from this model is that the equilibrium search strategy, in the absence of group bias, will result in an equalization of the rate of contraband that is found relative to the total number of searches (i.e. the hit-rate) across motorist groups. In our application, we test for the presence of a disparity in the rate of successful searches using a nonparametric test, the Pearson X^2 test. Note that this test inherently says nothing about disparate treatment in the decision to stop motorists as it is limited in scope to vehicular searches.

VI.A: AGGEGATE ANALYSIS WITH HIT-RATES, 2016

The analysis begins by aggregating all search data for Rhode Island by demography and performing the non-parametric test of hit-rates. The rate that discretionary searches end in contraband being found for white non-Hispanic motorists is compared to each minority subgroup. Discretionary searches are defined as those characterized as probable cause, terry frisk, frisk, odor of drugs/alcohol, reasonable suspicion, consent, and unknown. Searches excluded from the discretionary category include plain view contraband, incident to arrest, and inventory/tow. The results of this test, applied to the aggregate search data for all departments in Rhode Island, can be seen in Table 26. As seen below, the rate of successful searches for white non-Hispanic motorists was 6.03 percent in 2016. Relative to white non-Hispanic motorists, the hit-rate for each of the four minority subgroups was lower and ranged from 1.64 to 1.98 percent. The difference in hit-rates for each group was statistically significant at the 99 percent level. In aggregate, Rhode Island police departments are less successful in motorist searches across all minority groups, which is a potential indicator of disparate treatment.

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[15] Although some criticism has risen concerning the technique and extensions have suggested that more disaggregated groupings of searches be used in the test, the ability to implement such improvements is limited by the small overall sample of searches in a single year of traffic stops. Despite these limitations, the hit-rate analysis is still widely applied in practice and contributes to the overall understanding of post-stop police behavior in Rhode Island.

Table 26: Chi-Square Test of Hit-Rate, All Discretionary Searches 2016

Variable:	White	Non-White	Black	Hispanic	Black or Hispanic
Hit-Rate	6.03%	1.98%***	1.64%***	1.84%***	1.95%***
Chi^2	N/A	22.48	26.22	18.75	29.64
ESS	1,476	959	916	705	1,332

Note: Sample includes all discretionary searches in 2016.

Table 27 provides the results of a hit-rate analysis for discretionary searches made in aggregate by municipal departments (top panel) and State Police (bottom panel) in 2016. The hit-rate in municipal departments for white non-Hispanic motorists was 6.27 percent. Relative to white non-Hispanic motorists, the hit-rate for each of the four minority subgroups was lower and ranged from 1.44 to 2.06 percent. Each of these differences were statistically significant at the 99 percent level. Similarly, the aggregate hit-rate for all State Police was 4.62 percent for white non-Hispanic motorist. Relative to white non-Hispanic motorists, the hit-rate for each of the four minority subgroups was lower and ranged from 0.83 to 2.74 percent. However, the hit-rate for minority groups were smaller than that of Caucasian non-Hispanics but this difference was statistically indistinguishable from zero, which may be the result of a relatively small overall sample size.

Table 27: Chi-Square Test of Hit-Rate, Municipal and State Police Discretionary Searches 2016

Municipal Police Departments					
Variable:	White	Non-White	Black	Hispanic	Black or Hispanic
Hit-Rate	6.27%	1.88%***	1.44%***	2.06%***	1.88%***
Chi^2	N/A	21.77	26.34	15.08	28.41
ESS	1,291	799	766	582	1,115
State Police Departments					
Variable:	White	Non-White	Black	Hispanic	Black or Hispanic
Hit-Rate	4.62%	2.58%	2.74%	0.83%*	2.35%
Chi^2	N/A	0.97	0.78	3.46	1.52
ESS	173	155	146	121	213

Note: Sample includes all discretionary searches made by municipal departments and State Police in 2016.

VI.B: DEPARTMENT ANALYSIS WITH HIT-RATES, 2016

In this subsection, differences in hit-rates are estimated independently for each municipal department and State Police barrack. Here, we identify and present only those departments found to have a disparity that is statistically significant at the 95 percent level in either the Hispanic or Black alone minority groupings. The full set of results can be found in Table F.1 of Appendix F. Table 28 presents the results from estimating the hit-rate test for individual departments using the 2016 sample. There was only one municipal departments found to have a disparity in the hit-rate of minority motorists relative to white non-Hispanic motorists which was statistically significant at the 95 percent level.

Table 28: Chi-Square Test of Hit-Rate, Select Department Discretionary Searches 2016

KPT Hit-Rate		White	Non-White	Black	Hispanic	Black or Hispanic
Pawtucket	Hit-Rate	17.24%	0%***	0%***	4.88%*	3.08%**
	Chi^2	N/A	7.97	7.97	2.88	5.84
	Sample Size	29	43	43	41	65

Note 1: Sample includes all discretionary searches in 2016.
Note 2: The test was only estimated when the combined sample of white and minority motorists exceeded 30 searches.
+ Results are not robust across subsequent specifications.

VII: FINDINGS FROM THE 2016 ANALYSIS

This section represents a summary of the findings from the analysis of traffic stops conducted between January 1, 2016 and December 31, 2016.

VII.A: AGGREGATE FINDINGS FOR RHODE ISLAND, 2016

Across Rhode Island's municipal departments and state police barracks, a total of 11.4 percent of motorists stopped during the analysis period were observed to be Black while 13.0 percent of stops were Hispanic motorists. The results from the Solar Visibility analysis indicate that stopped motorists were more likely to be minorities during daylight relative to darkness suggesting the existing of a racial or ethnic disparity in terms of the treatment of minority motorists relative to Caucasians. The statewide results from the Solar Visibility analysis were found to be robust to the addition of a variety of controls. The level of statistical significance remained relatively consistent when the sample is reduced to only moving violations. It is important to note that it is impossible to clearly link these observed disparities to racial profiling as they may be driven by any combination of policing policy, heterogeneous enforcement patterns, or individual officer behavior. The results from the post-stop analysis confirm that the statewide disparity carries through to post-stop behavior across all racial and ethnic groups. In aggregate, Rhode Island police departments exhibit a tendency to be less successful in motorist searches across all minority groups.

VII.B: SOLAR VISIBILITY ANALYSIS FINDINGS, 2016

In an effort to better identify the source of these racial and ethnic disparities, each analysis was repeated at the department level. Although there is evidence of a disparity at the state level, it is important to note that it is likely that specific departments are driving these statewide trends. The threshold for identifying individual departments was the presence of a disparity that was statistically significant at the 95 percent level in the black or Hispanic alone categories. The departments that were identified as having a statistically significant disparity[16] are, by nature, the largest contributors to the overall statewide results. Here, the unit of analysis is a municipal department or State Police barracks where disparities could be a function of a number of factors including institutional culture, departmental policy, or individual officers.[17]

The three municipal departments[18] and one state police barrack identified to exhibit a statistically significant racial or ethnic disparity include:

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16 A disparity must have been estimated with at least a 95 percent level of statistical significance to be considered a statistically significant disparity. Put simply, there must have been at least a 95 percent chance that the motorists were more likely to be stopped at a higher rate relative to white non-Hispanic motorists.

17 Since department or state police barrack estimates represent an average effect of stops made by individual officers weighted by the number of stops that they made in 2016, it is possible that officer-level disparities exist in departments which were not identified.

18 These results for the Warren Police Department were statistically significant at a level greater than 95 percent, however, the magnitude of the coefficient estimate for Hispanic motorists suggests that it may simply be a function of the small number of minority motorists stopped during this period. Therefore, the department was not included in this list.

Cranston

The Cranston municipal police department was observed to have made 38.9 percent minority stops of which 21.1 percent were Hispanic and 13.7 percent were black motorists in 2016. The Solar Visibility analysis indicated a statistically significant disparity in the rate that both black and Hispanic motorists were stopped during daylight relative to darkness. Within the inter-twilight window, the odds that a stopped motorist was black increased by 1.24 while the odds that a stopped motorist was Hispanic increased by 1.31 during daylight. These results were statistically significant at a level greater than 95 percent and robust to the inclusion of a variety of controls, officer fixed-effects, and a restricted sample of moving violations.

Narragansett

The Narragansett municipal police department was observed to have made 10.3 percent minority stops of which 4.3 percent were Hispanic and 4.8 percent were black motorists in 2016. The Solar Visibility analysis indicated a statistically significant disparity in the rate of Hispanic motorists stopped during daylight relative to darkness. Within the inter-twilight window, the odds that a stopped motorist was Hispanic increased by 2.6 during daylight. These results were statistically significant at a level greater than 95 percent and robust to the inclusion of a variety of controls, officer fixed-effects, and a restricted sample of moving violations.

Providence

The Providence municipal police department was observed to have made 66.5 percent minority stops of which 36.0 percent were Hispanic and 27.0 percent were black motorists in 2016. The Solar Visibility analysis indicated a statistically significant disparity in the rate that both black and Hispanic motorists were stopped during daylight relative to darkness[19]. Within the inter-twilight window, the odds that a stopped motorist was black increased by 1.3 while the odds that a stopped motorist was Hispanic increased by 1.2 during daylight. These results were statistically significant at a level greater than 95 percent for black motorists and robust to the inclusion of a variety of controls, officer fixed-effects, and a restricted sample of moving violations.

RISP- Hope Valley

The RISP- Hope Valley state police barracks was observed to have made 37.4 percent minority stops of which 16.8 percent were Hispanic and 16.7 percent were black motorists in 2016. The Solar Visibility analysis indicated a statistically significant disparity in the rate that both black and Hispanic motorists were stopped during daylight relative to darkness. Within the inter-twilight window, the odds that a stopped motorist was black increased by 1.5 while the odds that a stopped motorist was Hispanic increased by 1.6 during daylight. These results were statistically significant at a level greater than 95 percent and robust to the inclusion of a variety of controls, officer fixed-effects, and a restricted sample of moving violations.

[19] The Solar Visibility analysis relies on the date and time of the stop. An indeterminate number of Providence stops were reported with an incorrect date and/or time. Please see the "Note to the Reader" on page 1 for more information.

VII.C: OTHER STATISTICAL AND DESCRIPTIVE MEASURE FINDINGS, 2016

In addition to the three municipal police departments and one state police barrack identified to exhibit statistically significant racial or ethnic disparities in the Solar Visibility analysis, seven other departments were identified using either the synthetic control method, descriptive tests, or KPT hit-rate analysis. Identification in any one of these tests alone is not, in and of itself, sufficient to be identified for further analysis. However, these additional tests are designed as an additional screening tool to identify the jurisdictions where consistent disparities exceed certain thresholds that appear in the data. Although it is understood that certain assumptions have been made in the design of each of these measures, it is reasonable to believe that departments with consistent data disparities that separate them from the majority of other departments should be subject to further review and analysis with respect to the factors that may be causing these differences.

VII.C. (1): Synthetic Control Analysis:

The results from estimating whether individual departments stopped more minority motorists relative to their requisite synthetic control found 12 municipal police departments to have a disparity that was statistically significant at the 95 percent level in the black or Hispanic alone categories. However, the disparities did not persist in all 12 departments through robustness checks with a more restrictive modeling specification. In total, there were only six municipal police departments that withstood this more rigorous estimation procedure. Those departments are *Cumberland, Foster, Johnston, Lincoln, Middletown,* and *North Smithfield.*

VII.C. (2): Descriptive Statistics Analysis:

The descriptive tests are designed as an additional tool to identify disparities that exceed certain thresholds that appear in a series of census-based benchmarks. Those three benchmarks are: (1) statewide average, (2) the estimated commuter driving population, and (3) resident-only stops. Although 18 municipal police departments were identified with racial and ethnic disparities when compared to one or more of the descriptive measures, only *Providence* and *North Smithfield* exceeded the disparity threshold in more than half the benchmark areas.

VII.C. (3): KPT Hit-Rate Analysis:

The results of this test, applied to the aggregate search data for all departments in Rhode Island show that departments are less successful in motorist searches across all minority groups, which is a potential indicator of disparate treatment. However, there was only one municipal police department found to have a disparity in the hit-rate of minority motorists relative to white non-Hispanic motorists, which was statistically significant at the 95 percent level. The one municipal department identified to exhibit a statistically significant racial or ethnic disparity in searches is:

Pawtucket

The Pawtucket municipal police department was observed to have made 47.6 percent minority stops of which 25.7 percent were Hispanic and 20.8 percent were black motorists in 2016. The hit-rate for white non-Hispanic motorists was 17.2 percent while that for black motorists was approximately 0 percent and Hispanic motorists was 4.9 percent. The results for black motorists were statistically significant at a level greater than 95 percent.

VII.D: FOLLOW-UP ANALYSIS

The entirety of the initial 2016 statewide traffic stop data analysis as presented in this report should be utilized as a screening tool by which researchers, law enforcement administrators, community members and other appropriate stakeholders focus resources on those departments displaying the greatest level of disparities in their respective stop data. As noted previously, racial and ethnic disparities in any traffic stop analysis do not, by themselves, provide conclusive evidence of racial profiling. Statistical disparities do, however, provide significant evidence of the presence of idiosyncratic data trends that warrant further analysis.

By conducting additional in-depth analyses on the departments identified through the screening process, the public can have a better understanding as to why and how disparities exist. This transparency is intended to assist in achieving the goal of increasing trust between the public and law enforcement. A follow-up analysis is designed to be a collaborative effort between research staff, the police department and the community. The analysis is tailored based on the department and community's unique characteristics. Traffic stop disparities can be influenced by many factors such as the location of accidents, high call for service volume areas, high crime rate areas, and areas with major traffic generators such as shopping and entertainment districts, to name a few. In order to understand how these factors are contributing to racial and ethnic disparities, we first need to better understand where traffic enforcement occurs within a community. The best way to complete this task is to map traffic stops for each identified community. After completing the mapping exercise, we would proceed with a descriptive analysis of traffic stops at the neighborhood level.

Researchers have the ability to better understand the demographics of a subsection of a community by breaking down traffic stops into neighborhoods and allows researchers to focus on the unique attributes of a subsection of a community. Neighborhoods can vary greatly within a community and a more detailed analysis will help to better understand the information presented in the initial analysis. The follow-up analysis also includes a much more in-depth post-stop data review to examine differences in citation rates, contraband found as a result of a search, and stop reasons.

In order to determine is a departments racial and ethnic disparities warrant additional in-depth analysis, researchers review the results from the four analytical sections of the report (Solar Visibility, Synthetic Control, Descriptive Statistics, and KPT Hit-Rate). The threshold for identifying significant racial and ethnic disparities for departments is described in each section of the report (ex. departments with a disparity that was statistically significant at the 95 percent level in the black or Hispanic alone categories in the Solar Visibility methodology were identified as statistically significant). A department is identified for a follow-up analysis if they meet any one of the following criteria:

1. A statistically significant disparity in the Solar Visibility analysis
2. A statistically significant disparity in both the synthetic control and descriptive statistics analyses.
3. A statistically significant disparity in both the synthetic control and KPT hit-rate analyses.
4. A statistically significant disparity in both the KPT hit-rate and descriptive statistics analyses.

Based on the above listed criteria it is recommended that an in-depth follow-up analysis be conducted for the following departments: **(1) Cranston, (2) Narragansett, (3) Providence, (4) North Smithfield,** and **(5) RISP- Hope Valley**. Although the Warren police department was identified with statistically significant disparities in the Solar Visibility analysis that would meet the criteria for recommendation, the magnitude of the coefficient estimate for Hispanic motorists suggests that it may simply be a function of the small number of minority motorists stopped during this period. Therefore, it is not recommended that a follow-up analysis be conducted at this time and we suggest additional review of their data in 2017 with a larger data sample.

Although further analysis is important, a major component of addressing concerns about the possibility of racial profiling in Rhode Island is bringing law enforcement officials and community members together in an effort to build trust by discussing relationships between police and the community. Public forums should be held in each identified community to bring these groups together. They serve as an important tool to inform the public of the findings and outline steps for moving forward with additional analysis. The IMRP is committed to utilizing both data and dialogue to enhance relationships between the police and community.

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TECHNICAL APPENDICES

All tables in the technical appendix are identified by the section and table number where they can be found in the report. A complete listing is provided below.

Appendix A: Detailed Analysis Methodology

Appendix B: Section II, Characteristics of Stops Tables

Appendix C: Section III, Solar Visibility Tables

Appendix D: Section IV, Synthetic Control Tables

Appendix E: Section V, Descriptive Statistics Tables

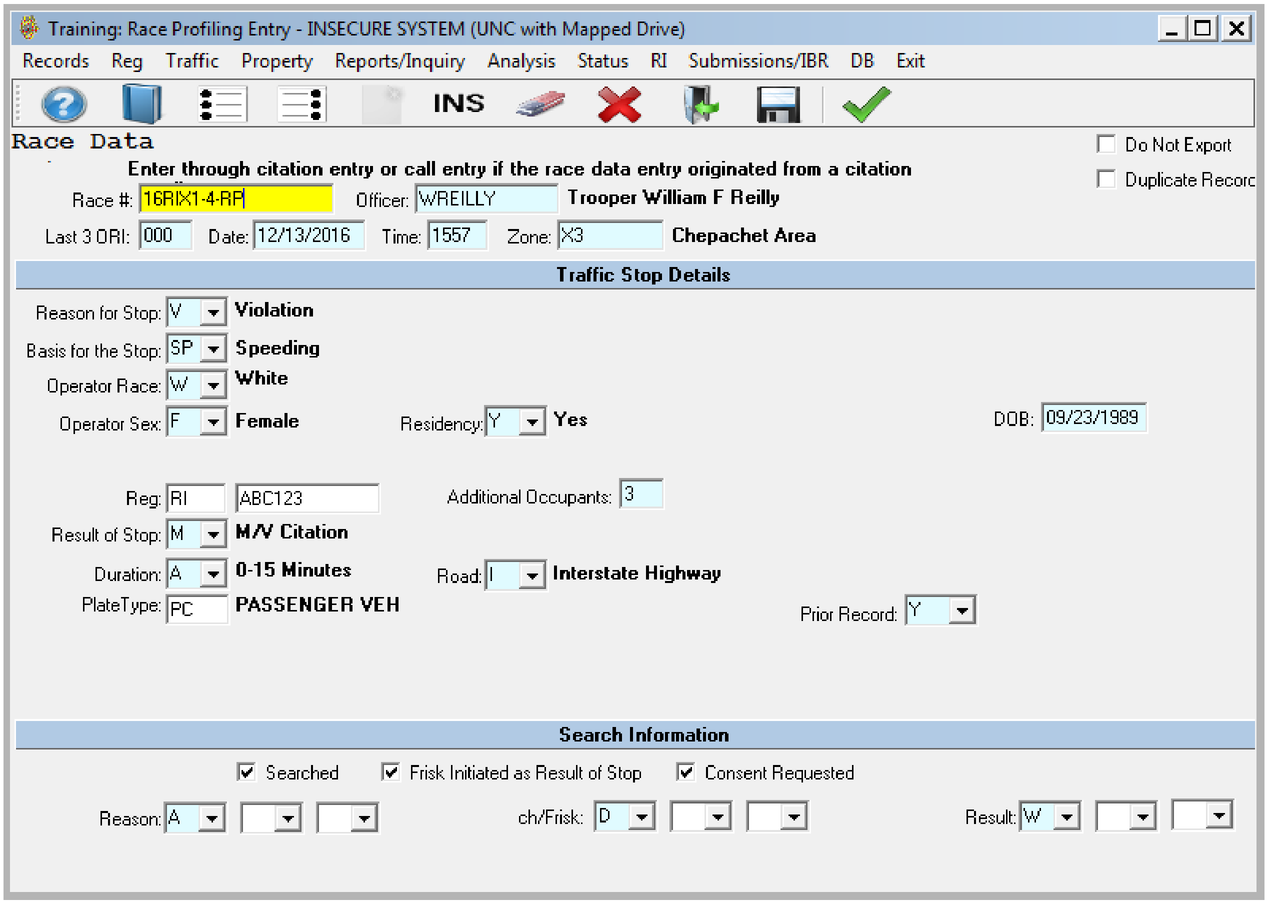
Appendix F: Section VI, KPT Hit-Rate Tables

APPENDIX A

A.1: DEPARTMENT DATA COLLECTION MODULE

Figure A.1 is a screenshot of the module used by Rhode Island police departments for collecting traffic stop records.

Figure A.1: Data Collection Module Screenshot



A.2: SOLAR VISIBILITY METHODOLOGY

Let the parameter K_{ideal} capture the true level of disparate treatment for minority group *m* relative to majority group *w:*

$$K_{ideal} = \frac{P(S|V',m)P(S|V,m)}{P(S|V',w)P(S|V,w)} \tag{1}$$

The parameter captures the odds that a minority motorist is stopped during perfect visibility (V') relative to those in complete darkness (V). The parameter $K_{ideal} = 1$ in the absence of discrimination and $K_{ideal} > 1$ when minority motorists face adverse treatment.

Applying Baye's rule to Equation 1 such that:

$$K_{ideal} = \frac{P(m|V',S)P(w|V,S)}{P(w|V',S)P(m|V,S)} * \frac{P(m|V)P(w|V')}{P(w|V)P(m|V')} \tag{2}$$

The first term in K_{ideal} is the ratio of the odds that a stopped motorist is a minority during daylight relative to the same odds in darkness. Unlike Equation 1 which would detailed data on roadway demography, the odds ratio in Equation 2 can be estimated using data on stop outcomes. The second term in K_{ideal} is a measure of the relative risk-set of motorists on the roadway which captures any differences in the demographic composition of motorists associated with visibility. The second term will be equal unity if the composition of motorists is uncorrelated with solar visibility.

Assuming that the risk-set of motorists is uncorrelated with variation in solar visibility, a test statistic for K_{ideal} is then simply:

$$K_{vod} = \frac{P(m|S,\delta = 1)P(w|S,\delta = 0)}{P(w|S,\delta = 1)P(m|S,\delta = 0)} \tag{3}$$

Since we do not have continuous data on visibility, the variable δ is a binary indicator representing daylight.

The test statistic K_{vod} will be greater than or equal to the parameter K_{ideal} and exceed unity if the following conditions hold:

1) $K_{ideal} > 1$; The true parameter shows that there is a racial or ethnic disparity in the rate of minority police stops.
2) $P(V|\delta = 0) < P(V|\delta = 1)$; Darkness reduces the ability of officers to discern the race and ethnicity of motorists.
3) $\frac{P(m|V)P(w|V\prime)}{P(w|V)P(m|V\prime)} = 1$; The relative risk-set is constant across the analysis window.

Estimating the test statistic K_{vod} does not provide a quantitative measure for evaluating disparate treatment in policing data but does qualitatively identify the presence of disparate treatment. More concretely, the test identifies the presence of a racial or ethnic disparity if the test statistic K_{vod} is greater than one. Given the restrictive nature of the test statistic, it is reasonable (but not conclusive) to attribute the existence of this disparity to racially biased policing practices.

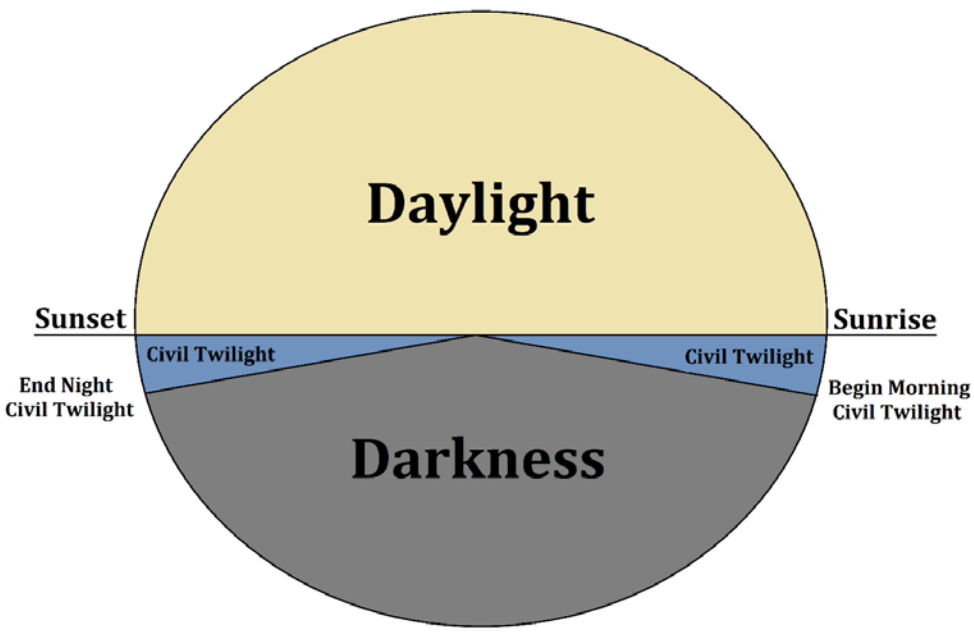
Assuming that the assumptions outlined above hold, Equation 4 can be estimated using a logistic regression in the following form:

$$ln\left(\frac{P(m|\delta)}{1-P(m|\delta)}\right) = \beta_0 + \delta + \mu \quad (4)$$

In practice, it is unlikely that the third assumption (a constant relative risk-set) will hold without including additional controls in Equation 4. Thus, we amend Equation 4 by including controls for time of day (indicators capturing 15 minute intervals), day of week, and statewide daily traffic stop volume. In estimates using data from all departments across the state, we also include department fixed-effects. The aggregate three-year sample also allows for the inclusion of officer fixed-effects.

The analysis requires that periods of darkness and daylight be properly identified. Following Grogger and Ridgeway (2006), the analysis is restricted to stops made within the inter-twilight window- that is, the time between the earliest sunset and latest end to civil twilight. As is shown in Figure A.2 (1), civil twilight is defined as the period when the sun is between zero and six degrees below the horizon and where its luminosity is transitioning from daylight to darkness. The motivation for limiting the analysis to the inter-twilight window is to help control for possible differences in the driving population.

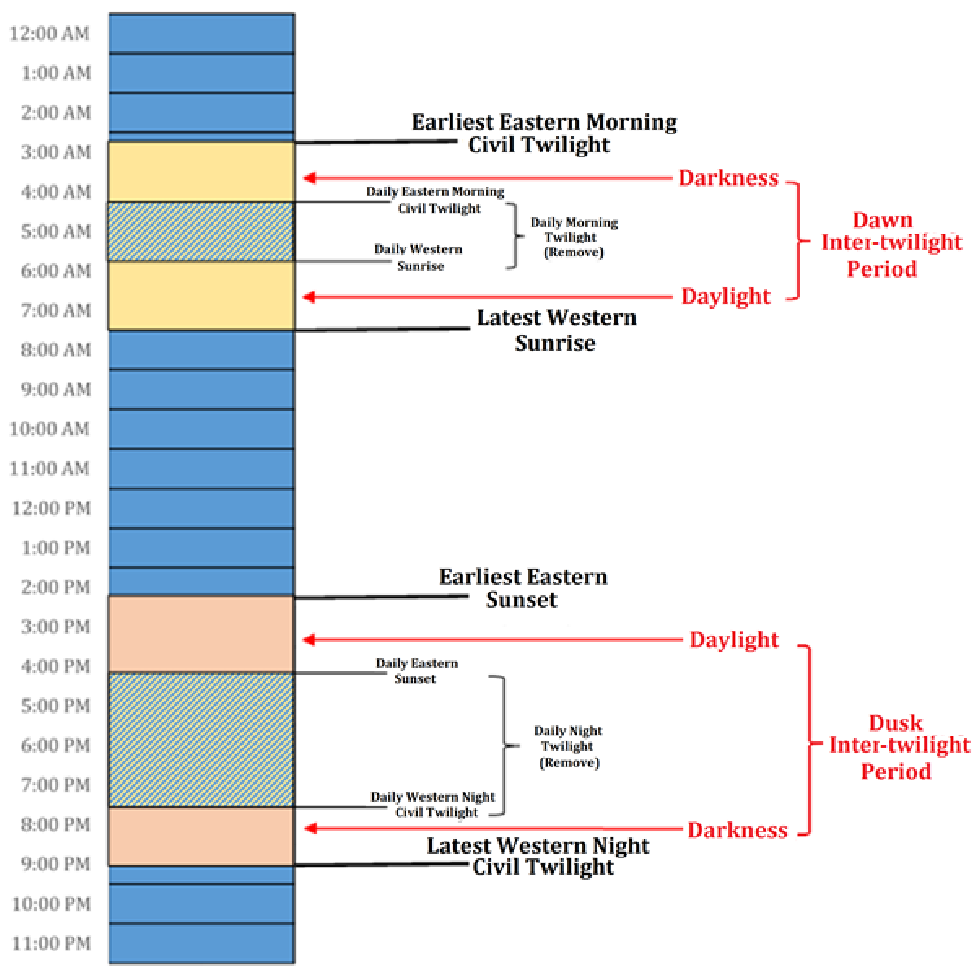
Figure A.2 (1): Diagram of Civil Twilight and Solar Variation



In this analysis, we rely primarily on a combined inter-twilight window that includes traffic stops made at both dawn and dusk. The dawn inter-twilight window is constructed from astronomical data and occurs in the morning hours. The dusk inter-twilight window, on the other hand, is constructed from the same astronomical data but occurs in the evening hours. The combined inter-twilight window relies on a sample that is created by pooling these timeframes and including an additional control variable that identifies the period. The inter-twilight window was identified by attaching astronomical data from the United States Naval Observatory (USNO) to the traffic stop data. As discussed previously, past applications of this method have focused on single large urban geographies and have had no need to consider the possibilities of differential astronomical impacts. The definition for both the dawn and dusk inter-twilight windows was amended to accommodate cross-municipal variation by utilizing data from the easternmost (Newport, RI) and westernmost (Westerly, RI) points available in the USNO data.

The USNO data was merged with the policing data and used to identify the presence of darkness. Again, the presence of darkness was the primary explanatory variable used to identify the presence of racial disparities in the Rhode Island policing data. As a result, any observation in the data that occurred during twilight on any given day were dropped. The twilight period varied on a daily basis throughout the year and was identified using the USNO data. Twilight was defined in the dawn inter-twilight window as the time between the daily eastern start of civil twilight and western sunrise. Similarly, twilight was defined in the dusk inter-twilight window as the time between the daily eastern sunset and western end to civil twilight. The full delineation of the policing data is displayed graphically in Figure A.2 (2).

Figure A.2 (2): Delineation of Inter-twilight windows



A.3: SYNTHETIC CONTROL METHODOLOGY

Rosenbaum and Rubin (1983) characterize the propensity score as the probability of assignment to treatment conditional on pretreatment variables. The key insight is that conditional on this scalar function, assignment to treatment will be independent of the outcome variable. Simply put, given some *observed* pretreatment variables, it is possible to identify the conditional probability of treatment. Correctly adjusting for this conditional probability allows for the bias associated with *observed* covariates to be statistically controlled. If these observed covariates are correlated with unobserved variables, these confounding factors will also be controlled for statistically. This methodology allows for a causal interpretation of the difference between outcomes associated with treatment and control.

Hirano et al. (2003) note that a useful adjustment is to weight observations according to their propensity scores. This adjustment effectively creates a balanced sample among treatment and control observations. Conveniently, when the estimate of interest is the treatment effect on the treated, only potential control observations need to be weighted. In this context, the weight that balances the sample and removes bias associated with pretreatment confounding factors is exactly the inverse of the propensity score. Ridgeway and MacDonald (2009) apply this technique in the context of policing data by matching the joint distribution of a particular officer's stop features to those by other officers. The analysis proceeds by extending this technique for the purposes of developing synthetic controls of municipal police departments using microdata on police stops in combination with U.S. Census Bureau data on demographic and employment characteristics.

We begin using the dataset of *k* demographic and employment characteristics for county subdivision *j* in Rhode Island. This set of variables also contains characteristics including: the racial and ethnic composition of the town, age and gender demographics, population size, land area, population density, housing characteristics, commuter patterns, employment in retail and entertainment sectors, and the aggregate racial and ethnic composition of all contiguous towns. A detailed list of the stop-specific and town-level characteristics can be found in Appendix C, Table 28a. We then applied principal components analysis to reduce dimensionality and assure orthogonality. Components were selected using Guttman-Kaiser's stopping rule, which suggests only keeping those with an Eigen value of 1.2 or larger.

Formally, the *i'th* loading factor is simply:

$$w_{(i)} = \underset{\|w\| = 1}{\arg max} \left\{ \sum_k \left[w \cdot x_j \right]^2 \right\}. \tag{5}$$

Indices were then constructed for each component satisfying Guttman-Kaiser's stopping rule where:

$$y_{j,(i)} = \sum_k w_{(i)} x_j \tag{6}$$

Next, we attach the components capturing residential demographic and economic characteristics to the traffic stop data. We then conduct a second principal components analysis using variables from the traffic stop data itself, again to reduce dimensionality and ensure orthogonality. Traffic stop characteristics include time of the day, day of the week, month, department traffic stop volume, officer traffic stop volume, and type of traffic stop.

We then estimate propensity scores for each *j* department using a logistic regression of the form:

$$ln\left(\frac{F(j)}{1-F(j)}\right) = \beta_0 + \sum_i y_{j,(i)} \qquad (7)$$

Propensity score p_j are used to construct weights $w_i = 1$for the department of interest (i.e. the treatment group) and equal to $w_i = p_j/\left(1-p_j\right)$ for stops made in all other departments. Applying a propensity score weight to stops made by other departments in the state creates a synthetic control group with a comparable distribution of stop-specific and town-level characteristics. The propensity score and resulting weight for those stops with characteristics that are drastically different than stops made by the department of interest will approach zero. As a result, the synthetic control will consist of the stops that are similar, in terms of stop-specific and town-level characteristics, to those made by the department of interest. The construction of a synthetic control group using propensity scores allows the comparison to reflect the average treatment effect on the treated and abstract from potential bias in so far as the observable covariates control for selection into treatment.

Hirano and Imbens (2001) extend the weighting framework to what Robins and Ritov (1997) refer to as doubly robust estimation. That is, including additional covariates to a semi-parametric least-squares regression model enables capture of a more precise estimate of the treatment effect. It is shown in both of these discussions that such an estimator is consistent if either of the models is specified correctly. Ridgeway and MacDonald (2009) further extend the doubly robust propensity score framework to policing data. Specifically, the authors look at whether the department of interest deviates from the synthetic control along the outcome dimension. Here, we provide estimates with and without so called doubly-robust estimation of treatment effects.

Treatment effects are estimated using a logistic regression of the form:

$$ln\left(\frac{F(m)}{1-F(m)}\right) = w_i\left(\beta_0 + t(j) + \sum_i y_{j,(i)}\right) \qquad (8)$$

Where $t(j)$ is an indicator of treatment and $\sum_i y_{j,(i)}$ is a series of covariates included in the propensity score where the dimensionality has been reduced using principle components. If a particular department is designated as a treatment to a group of stops, it follows that the outcome of interest would be motorist race. The question is then simply, does the intervention by a particular department result in a relatively higher stop rate of minority motorists, controlling for all observable factors? Combining inverse propensity score weighting with regression analysis allows for a more precise answer to this question. In the circumstance where the synthetic control and individual department do not perfectly match along all dimensions of stop features, there is potential for bias in any comparison, especially if those features by which they differentiate relate to a motorist's race. Doubly robust estimation helps to remove this source of potential bias by controlling for these features, resulting in a much more accurate department effect.

The share of minority motorists stopped within a department was evaluated through a direct comparison with a unique synthetic control.

Table A.3: Variables Included in Synthetic Control Methodology

Variable	Primary Town		Border Town	
	Percent	Count	Percent	Count
Male 18 to 24	X			
Male 25 to 34	X			
Male 35 to 54	X			
Male 55 to 64	X			
Male > 65	X			
Female 18 to 24	X			
Female 25 to 34	X			
Female 35 to 54	X			
Female 55 to 64	X			
Female 65+	X			
Total Population		X		X
White Population		X		X
Hispanic Population		X		X
Black Population		X		X
Asian + P.I. + N.A. Population		X		X
Other Population		X		X
Labor Force Participation	X			
Employment Rate	X			
Commute Alone	X			
Commute Carpool	X			
Commute Public Transit	X			
Commute Walk	X			
Income < 25k	X			
Income 26k to 50k	X			
Income 51k to 75k	X			
Income 76k to 100k	X			
Income 101k to 150k	X			
Income > 150k	X			
Employment Retail		X		
Employment Entertainment		X		
Vacant Housing		X		
Land Area		X		
Population Density		X		

Note 1: The source of all variables is the Census Bureau's 2016 American Community Survey 5 year estimates.
Note 2: Composite variables for border towns are constructed as weighted means where the weights are the length of each border segment.

A.4: DESCRIPTIVE STATISTICS METHODOLOGY

This section presents the methodology used to compare department-level data and three population based benchmarks commonly used across the country: (1) statewide average, (2) estimated commuter driving population, and (3) resident population. Although any one of these benchmarks cannot provide by itself a rigorous enough analysis to draw conclusions regarding racial profiling, if taken together with the more rigorous statistical methods, they do help to highlight those jurisdictions where disparities are significant and may justify further analysis. Any benchmark approach contains implicit assumptions that must be recognized and understood. The implicit assumptions are outlined in an effort to provide transparency to this research process.

A.4 (1): Problems with Approaches Using Traditional Benchmarks

A traditional approach to evaluating racial and ethnic disparities in policing data has been to apply population-based benchmarks. Although these benchmarks vary in their construction, the general methodology is consistent. Typically, the approach amounts to using residential data from the U.S Census Bureau to compare with the rate of minority traffic stops in a given geographic jurisdiction. In recent years, researchers have refined this approach by adjusting the residential census data to account for things like commuter sheds, access to vehicles, and differences over time. The population-based benchmark is an appealing approach for researchers and policymakers both because of its ease of implementation and intuitive interpretation. There are, however, numerous implicit assumptions that underlie the application of these benchmarks and are seldom presented in a transparent manner.

The goal of this analysis is to evaluate racial and ethnic disparities in the Rhode Island policing data using (1) intuitive measures that compare the data against uniformly applied benchmarks and (2) sophisticated econometric techniques that compare the data against itself without relying on benchmarks. The goal of this section is to clearly outline the assumptions that often accompany traditional benchmarks. We do, however, present two nontraditional benchmarks in this chapter that develop a more convincing approximation and can be used to descriptively assess the data. By presenting these benchmarks alongside our more econometric methods, we provide the context for our findings. In addition, the descriptive data presents jurisdictional information in cases where samples may be too small to provide statistically meaningful results from the more stringent tests.

Although there are a number of examples, the most prominent application of a population-based benchmark is a study by the San Jose Police Department (2002) that received a great deal of criticism. A more recent example is a report by researchers from Northeastern University (McDevitt et al. 2014) using Rhode Island policing data. Although adjusted and unadjusted population-based benchmarks can be intuitively appealing, they have drawn serious criticism from academics and policymakers alike because of the extent to which they are unable to account for all of the possible unobserved variables that may affect the driving population in a geography at any given time (Walker 2001; Fridell 2004; Persico and Todd 2004; Grogger and Ridgeway 2006; Mosher and Pickerill 2012). In an effort to clarify the implicit assumptions that underlie these approaches, an informal discussion of each is presented.

The implicit assumption that must be made when comparing the rate of minority stops in policing data to a population-based (or otherwise constructed) benchmark include the following.

Destination Commuter Traffic

The application of population-based benchmarks does not account for motorists who work but do not live in a given geography. Again, the application of population-based benchmarks implicitly assumes that the demographic distribution of destination commuter traffic, on average, matches the population-based benchmark. This assumption is trivial for geographies with low levels of industrial or commercial development where destination commuter traffic is small. On the other hand, areas with a high level of industrial or commercial development attract workers from neighboring geographies and this assumption becomes more tenuous. This differential impact creates a non-random distribution of error across geographies. While this shortcoming is impossible to avoid using population-based analysis, McDevitt et al. (2004) made a notable effort to adjust static residential population demographics by creating an "estimated driving populations" for jurisdictions in Rhode Island.

Pass-through Commuter Traffic

A small but not insubstantial amount of traffic also comes from pass-through commuters. Although most commuter traffic likely occurs via major highways that form the link between origin and destination geographies, the commuter traffic in some towns likely contains a component of motorists who do not live or work in a given geography but must travel through the area on their way to work. As in the previous case, the application of a population-based benchmark must implicitly assume that the demographic distribution of these motorists matches the population-based benchmark. The distribution of error associated with this assumption is, again, very likely non-random. Specifically, it seems likely that a town's proximity to a major highway may impact the level of pass-through commuter traffic from geographies further away from the major highway and, as a result, affect the magnitude of the potential error. Unfortunately, little useful data exists to quantify the extent to which this affects any particular jurisdiction. Alternatives that survey actual traffic streams are prohibitively expensive and time-consuming to conduct on a statewide basis and, unfortunately, are subject to their own set of implicit assumptions that can affect distribution of error.

Recreational Traffic

Surges in recreational traffic are not accounted for in evaluation methods that utilize population-based benchmarks. In order to apply population-based benchmarks as a test statistic, it must be implicitly assumed that the demographic distribution of recreational traffic, on average, matches the population-based benchmark. Although these assumptions are not disaggregated as with commuter traffic above, this assumption must apply to both destination and pass-through commuter traffic. Although the assumption is troublesome on its face, it becomes more concerning when considering the distribution of the associated error during specific seasons of the year. Specifically, recreational traffic likely has a differential effect across both geographic locations and over time.

Differential Exposure Rates

The exposure rate can be defined as the cumulative driving time of an individual on the road. The application of a population-based benchmark must implicitly assume that exposure rates are, on average, equivalent across demographic groups. Although exposure rates may differ based on cultural factors like driving behavior, there are also many more factors that play an important role. An example might be the differences in age distribution across racial demographics. If a specific minority population is, on average, younger, and younger motorists have a greater exposure rate than older motorists; then one might falsely attribute a racial or ethnic disparity across these groups when there is simply a different exposure to law enforcement. Although census-based estimation methods exist to apply these demographically based exposure differences to a given population, they are best suited to situations where a single or very limited number of jurisdictions must be analyzed.

Temporal Controls

The lack of temporal controls in population-based benchmarks does not account for differences in the rate of stops across different times and days in the week. Assuming, that the above four assumptions hold and the population-based benchmark is representative of the demographic distribution of the driving population, then temporal controls are not an issue. However, if any of these assumptions do not hold, the lack of temporal controls may further magnify potential bias. Imagine that we believe the only assumption pertaining to exposure rates is invalid. It seems plausible that younger motorists are more likely to drive on weekend evenings than older motorists. If more stops were being made on weekend evenings than during the week and, as described above, minority groups were more prevalent in younger segments of the population, we might observe a racial or ethnic disparity simply because population-based benchmarks do not control for these temporal differences in policing patterns.

When one or more of the implicit assumptions associated with a population-based benchmark is violated, it can become a biased test statistic of racial disparities in policing data. Furthermore, since the source and direction of any such bias are unknown, it is impossible to determine if the bias is positive or negative, thus creating the potential for both type one (false positive) and two error (false negative). Further, the bias also is likely to be non-random across different geographies within the state. It might be that the bias disproportionately impacts urban areas compared to rural areas, tourist destinations compared to non-tourist destinations, geographies closer to highways, or based on similar policing patterns.

The question then becomes: If the assumptions inherent in population-based benchmarks make them less than ideal as indicators of possible bias, why include them in a statewide analysis of policing data? One answer is that excluding them as part of a multi-level analysis guarantees only that when others inevitably use these measures as a way to interpret the data, it is highly likely to be done inappropriately. Comparing a town's stop percentages to its residential population may not be a good way to draw conclusions about its performance but, in the absence of better alternatives, it inevitably becomes the default method for making comparisons. Providing an enhanced way to estimate the impact commuters have on the driving population and primarily analyzing the stops made during the periods of the day when those commuters are the most likely to be a significant component of the driving population improves that comparison.

Another answer to the question is that the population-based and other benchmarks are not used as indicators of bias, but rather as descriptive indicators for understanding each town's data. Since the purpose of this study is to uniformly apply a set of descriptive measures and statistical tests to all towns in order to identify possible candidates for more targeted analysis, having a broad array of possible applicable measures enhances the robustness of the screening process. Relying solely on benchmarking to accomplish this would not be effective, but using these non-statistical methods to complement and enhance the more technical evaluation results in a report that examines the data from many possible angles.

The third answer to the question is that the benchmarks and intuitive measures developed for this study can be useful in cases where an insufficient sample size make it difficult to draw meaningful conclusions from the formal statistical tests. The descriptive measures can serve a supportive role in this regard.

A.4 (2): Statewide Average Comparison

Although it is relatively easy to compare individual town stop data to the statewide average, this can be misleading if done without regard to differences in town characteristics. If, for example, the statewide average for a particular racial category of motorists stopped was 10 percent and the individual data for two towns was 18 percent and 38 percent respectively, a superficial comparison of both towns to the statewide average might suggest that the latter town, at 38 percent, could be performing less satisfactorily. However, that might not actually be the case if the town with the higher stop percentage also had a significantly higher resident population of driving age people than the statewide average. It is important to establish a context within which to make the comparisons when using the statewide average as a descriptive benchmark.

Comparing town data to statewide average data is frequently the first thing the public does when trying to understand and assess how a police department may be conducting traffic stops. Although these comparisons are inevitable and have a significant intuitive appeal, the reader is cautioned against basing any conclusions about the data exclusively upon this measure.

The method chosen to make the statewide average comparison is as follows:

- The towns that exceeded the statewide average for the three racial categories being compared to the state average were selected.
- The amount that each town's stop percentage exceeded the state average stop percentage was determined.
- The amount that each town's resident driving age population exceeded the state average for the racial group being measured was determined.
- The net differences in these two measures were determined and used to assess orders of magnitude differences in these factors.

While it is clear that a town's relative proportion of driving age residents in a racial group is not, in and of itself, capable of explaining differences in stop percentages between towns, it does provide a simple and effective way to establish a baseline for all towns from which the relative differences between town stop numbers become more apparent. To provide additional context, two additional factors were identified: (1) if the town shares a border with one or more towns whose age 16 and over resident population for that racial group exceeds the state average and (2) the percentage of nonresident motorists stopped for that racial group, in that town.

A.4 (3): Estimated Commuter Driving Population Comparison

Adjusting "static" residential census data to approximate the estimated driving demographics in a particular jurisdiction provides a more accurate benchmark method than previous census-based approaches. At any given time, nonresidents may use any road to commute to work or travel to and from entertainment venues, retail centers, tourist destinations, etc. in a particular town. It is impossible to account for all driving in a community at any given time, particularly for the random, itinerant driving trips sometimes made for entertainment or recreational purposes. However, residential census data can be modified to create a reasonable estimate of the possible presence of many nonresidents likely to be driving in a given community because they work there and live elsewhere. This methodology is an estimate of the composition of the driving population during typical commuting hours.

Previously, the most significant effort to modify census data was conducted by Northeastern University's Institute on Race and Justice. The institute created the estimated driving population (EDP) model for traffic stop analyses in Rhode Island and Massachusetts. A summary of the steps used in the analysis is shown below in Table A.3 (1).

Table A.4 (1): Northeastern University Institute on Race and Justice Methodology for EDP Models in Rhode Island and Massachusetts

Step 1	Identify all the communities falling within a 30 mile distance of a given target community. Determine the racial and ethnic breakdown of the resident population of each of the communities in the contributing pool.
Step 2	Modify the potentially eligible contributing population of each contributing community by factoring in (a) vehicle ownership within the demographic, (b) numbers of persons within the demographic commuting more than 10 miles to work, and (c) commuting time in minutes. The modified number becomes the working estimate of those in each contributing community who may possibly be traveling to the target community for employment.
Step 3	Using four factors, (a) percentage of state employment, (b) percentage of state retail trade, (c) percentage of state food and accommodation sales, and (d) percentage of average daily road volume, rank order all communities in the state. Based on the average of all four ranking factors, place all communities in one of four groups thus approximating their ability to draw persons from the eligible nonresident pool of contributing communities.
Step 4	Determine driving population estimate for each community by combining resident and nonresident populations in proportions determined by which group the community falls into as determined in Step 3. (Range: 60% resident/40% nonresident for highest category communities to 90% resident/10% nonresident for lowest ranking communities)

Although the EDP model created by Northeastern University is a significant improvement in creating an effective benchmark, limitations of the census data at the time required certain assumptions to be made about the estimated driving population. They used information culled from certain transportation planning studies to set a limit to the towns they would include in their potential pool of nonresident commuters. Only those towns located within a 30 minute driving time of a target town were included in the nonresident portion of the EDP model. This approach assumed only those who potentially could be drawn to a community for employment, and did not account for how many people actually commute. Retail, entertainment, and other economic indicators were used to rank order communities into groups to determine the percentage of nonresident motorists to be included in the EDP. A higher rank would lead to a higher percentage of nonresidents being included in the EDP.

Since development of the Northeastern University model, significant enhancements were made to the U.S. Census Bureau data. It is now possible to get more nuanced estimates of those who identify their employment location as somewhere other than where they live. Since the 2004 effort by Northeastern University to benchmark Rhode Island and Massachusetts' data, the Census Bureau has developed new tools that can provide more targeted information that can be used to create a more useful estimated driving population for analyzing weekday daytime traffic stops.

The source of this improved data is a database known as the LEHD Origin-Destination Employer Statistics (LODES). LEHD is an acronym for "Local Employer Household Dynamics" and is a partnership between the U.S. Census Bureau and its partner states. LODES data is available through an online application called *OnTheMap* operated by the Census Bureau. The data estimates where people work and where workers live. The partnership's main purpose is to merge data from workers with data from employers to produce a collection of synthetic and partially synthetic labor market statistics including LODES and the Quarterly Workforce Indicators.

Under the LEHD Partnership, states agree to share Unemployment Insurance earnings data and the Quarterly Census of Employment and Wages data with the Census Bureau. The LEHD program combines the administrative data, additional administrative data, and data from censuses and surveys. From these data, the program creates statistics on employment, earnings, and job flows at detailed levels of geography and industry. In addition, the LEHD program uses this data to create workers' residential patterns. The LEHD program is part of the Center for Economic Studies at the U.S. Census Bureau.

It was determined that the data available through LODES, used in conjunction with data available in the 2010 census, could provide the tools necessary to create an advanced EDP model. The result was the creation of an individualized EDP for each of the 39 towns in Rhode Island that reflects, to a certain extent, the estimated racial and ethnic demographic makeup of all persons identified in the data as working in the community but residing elsewhere. Table A.3 (2) shows the steps in this procedure.

Table A.4 (2): Central Connecticut State University Institute for Municipal and Regional Policy Methodology for EDP Model in Rhode Island

Step 1	For each town, LODES data was used to identify all those employed in the town but residing in some other location regardless of how far away they lived from the target community.
Step 2	ACS* five-year average estimated data was used to adjust for individuals commuting by some means other than driving, such as those using public transportation.
Step 3	For all Rhode Island towns contributing commuters, racial and ethnic characteristics of the commuting population were determined by using the jurisdictions' 2010 census demographics.
Step 4	For communities contributing more than 10 commuters who live outside of Rhode Island, racial and ethnic characteristics of the commuting population were determined using the jurisdictions' 2010 census demographics.
Step 5	For communities contributing fewer than 10 commuters who live outside of Rhode Island, racial and ethnic characteristics of the commuting population were determined using the demographic data for the county in which they live.
Step 6	The numbers for all commuters from the contributing towns were totaled and represent the nonresident portion of the given town's EDP. This was combined with the town's resident driving age population. The combined nonresident and resident numbers form the town's complete EDP.
Step 7	To avoid double counting, those both living and working in the target town were counted as part of the town's resident population and not its commuting population.

*American Community Survey, U.S. Census Bureau

Structured in this way, each town's EDP should reflect an improved estimate of the racial and ethnic makeup of the driving population who might be on a municipality's streets at some time during a typical weekday/daytime period. The more sophisticated methodology central to the LODES data should make this EDP, even with its inherent limitations, superior to previous uses of an EDP model. To an extent, it mirrors the process used by the Census Bureau to develop from ACS estimates the commuter-adjusted daytime populations (estimates of changes to daytime populations based on travel for employment) for minor civil divisions in several states, including Rhode Island. This type of data is subject to a margin of error based on differing sample sizes and other factors.

It is important to understand that the EDPs used in this report are a first attempt to use this tool in assessing traffic stop data. Much of the data used to create the EDPs comes from the same sources the Census Bureau used to create its commuter-adjusted daytime population estimates so it is reasonable to expect a similar range in the margins of error in the EDP. While the limitations of the model must be recognized, its value as a new tool to help understand some of the traffic stop data should not be dismissed. It represents a significant improvement over the use of resident census demographics as an elementary analytical tool and can hopefully be improved as the process of analyzing stop data progresses.

It was determined that a limited application of the EDP can be used to assess stops that occur during typical morning and evening commuting periods, when the nonresident workers have the highest probability of actually being on the road. Traffic volume and populations can change significantly during peak commuting hours. For example, Providence has a predominately Minority resident population (57 percent). According to *OnTheMap*, 88,949 people work in Providence, but live somewhere else and we are estimating that about 86 percent of those people are likely to be white. Based on the total working population it is reasonable to assume that the daytime driver population would change significantly due to workers in Providence. According to the ACS Journey to Work survey, over 70 percent of Rhode Island residents travel to work between 6:00am and 10:00am. The census currently does not have complete state level data on residents' travel from work to home. In the areas where evening commute information is available, it is consistently between the hours of 3:00pm and 7:00pm. In addition to looking at census information to understand peak commuting hours, the volume of nonresident traffic stops in several Rhode Island communities was also reviewed, based on our theory that the proportion of nonresidents stopped should increase during peak commuting hours.

The only traffic stops included in this analysis were stops conducted Monday through Friday from 6:00am to 10:00am and 3:00pm to 7:00pm (peak commuting hours). Due to the margins of error inherent in the EDP estimates, we established a reasonable set of thresholds for determining if a department shows a disparity in its stops when compared to its EDP percentages. Departments that exceed their EDP percentages by greater than 10 percentage points in any of the three categories: (1) Minority (all race/ethnicity), (2) Black non-Hispanic, and (3) Hispanic, were identified in our tier one group. In addition, departments that exceeded their EDP percentage by more than five but less than 10 percentage points were identified in our tier two group for this benchmark if the ratio of the percentage of stops for the target group compared to the baseline measure for that group also was 1.75 or above (percentage of stops divided by benchmark percentage equals 1.75 or more) in any of the three categories: (1) Minority (all race/ethnicity), (2) Black non-Hispanic, or (3) Hispanic.

A.4 (4): Resident Only Stop Comparison

Some questioned the accuracy of the estimated driving population. As a result, we have limited the next part of the analysis to stops involving only residents of the community and compared them to the community demographics based on the 2010 decennial census for residents age 16 and over.

While comparing resident-only stops to resident driving age population eliminates the influence out-of-town motorists on the roads at any given time may be having on a town's stop data, the mere existence of a disparity is not in and of itself significant unless it does so by a significant amount. Such disparities may exist for several reasons including high police presence on high crime areas.

Therefore, we established a reasonable set of thresholds for determining if a department shows a significant enough disparity in its resident stops compared to its resident population to be identified. Departments with a difference of 10 percentage points or more between the resident stops and the 16+

resident population in any of the three categories: (1) Minority (all race/ethnicity), (2) Black non-Hispanic, and (3) Hispanic, were identified in our tier one group. In addition, departments that exceeded their resident population percentage by more than five but less than 10 percentage points were identified in our tier two group for this benchmark if the ratio of the percentage of resident stops for the target group compared to the baseline measure for that group also was 1.75 or above(percentage of stopped residents divided by resident benchmark percentage equals 1.75 or more) in any of three categories: (1) Minority (all race/ethnicity), (2) Black non-Hispanic, and (3) Hispanic.

A.5: KPT-HIT RATE METHODOLOGY

The logic of the hit-rate test follows from a simplified game theoretic exposition. In the absence of disparate treatment, the costs of searching different groups of motorists are equal. Police officers make decisions to search in an effort to maximize their expectations of finding contraband. The implication being that police will be more likely to search a group that has a higher probability of carrying contraband, i.e. participate in statistical discrimination. In turn, motorists from the targeted demography understand this aspect of police behavior and respond by lowering their rate of carrying contraband. This iterative process continues within demographic groups until, in equilibrium, it is expected that an equalization of hit-rates across groups is found.

Knowles et al. introduce disparate treatment via search costs incurred by officers that differ across demographic groups. An officer with a lower search cost for a specific demographic group will be more likely to search motorists from that group. The result of this action will be an observable increase in the number of targeted searches for that group. As above, the targeted group will respond rationally and reduce their exposure by carrying less contraband. Eventually, the added benefit associated with a higher probability of finding contraband in the non-targeted group will offset the lower cost of search for that group. As a result, one would expect the hit-rates to differ across demographic groups in the presence of disparate treatment.

Knowles et al. (2001) developed a theoretical model with testable implications that can be used to evaluate statistical disparities in the rate of searches across demographic groups. Following Knowles et al. an empirical test of the null hypothesis (that no racial or ethnic disparity exists) in Equation 9 is presented.

$$P(H = 1 \mid m, S) = P(H = 1 | S\ ) \ \forall\ r, c \tag{9}$$

Equation 9 computes the probability of a search resulting in a hit across different demographic groups. If the null hypothesis was true and there was no racial or ethnic disparity across these groups, one would expect the hit-rates across minority and non-minority groups to reach equilibrium. As discussed previously, this expectation stems from a game-theoretic model where officers and motorists optimize their behaviors based on knowledge of the other party's actions. In more concrete terms, one would expect motorists to lower their propensity to carry contraband as searches increase while officers would raise their propensity to search vehicles that are more likely to have contraband. Essentially, the model allows for statistical discrimination but finds if there is bias-based discrimination.

An important cautionary note about hit-rate tests related to an implicit infra-marginality assumption. Specifically, several papers have explored generalizations and extensions of the framework and found that, in certain circumstances, empirical testing using hit-rate tests can suffer from the infra-marginality problem as well as differences in the direction of bias across officers (see Antonovics and Knight 2004; Anwar and Fang 2006; Dharmapala and Ross 2003). Knowles and his colleagues responded to these critiques with further refinements of their model that provide additional evidence of its validity (Persico and Todd 2004). Although the results from a hit-rate analysis help contextualize post-stop activity within departments, the results should only be considered as supplementary evidence.

APPENDIX B

Table B.1: Rate of Traffic Stops per 1,000 Residents (Sorted Alphabetically)

Town Name	2010 16 and Over Census Pop.	2016 Traffic Stops	Stops per Resident	Stops per 1,000 Residents
State of Rhode Island	854,478	237,591	0.28	278
Barrington	12,292	4,895	0.40	398
Bristol	19,740	5,801	0.29	294
Burrillville	12,749	3,314	0.26	260
Central Falls	14,248	3,350	0.24	235
Charlestown	6,456	1,955	0.30	303
Coventry	28,241	5,603	0.20	198
Cranston	66,122	19,529	0.30	295
Cumberland	26,912	5,467	0.20	203
East Greenwich	10,174	2,847	0.28	280
East Providence	39,044	12,450	0.32	319
Foster	3,662	3,715	1.01	1,014
Glocester	7,839	2,853	0.36	364
Hopkinton	6,443	2,688	0.42	417
Jamestown	4,355	2,062	0.47	473
Johnston	23,899	3,784	0.16	158
Lincoln	16,911	2,240	0.13	132
Little Compton	2,865	1,510	0.53	527
Middletown	12,812	5,277	0.41	412
Narragansett	13,911	6,461	0.46	464
Newport	21,066	5,519	0.26	262
North Kingstown	20,989	5,097	0.24	243
North Providence	27,231	4,222	0.16	155
North Smithfield	9,793	2,600	0.27	265
Pawtucket	56,546	9,833	0.17	174
Portsmouth	13,901	8,919	0.64	642
Providence	141,375	9,787	0.07	69
Richmond	5,992	1,480	0.25	247
Scituate	8,282	1,119	0.14	135
Smithfield	18,280	4,216	0.23	231
South Kingstown	25,918	5,731	0.22	221
Tiverton	13,138	3,339	0.25	254
Warren	8,834	2,603	0.29	295
Warwick	68,876	14,104	0.20	205
West Greenwich	4,703	1,067	0.23	227
West Warwick	23,958	5,525	0.23	231
Westerly	18,560	4,859	0.26	262
Woonsocket	32,338	4,035	0.12	125

Table B.2: Basis for Stop (Sorted by % Speeding)

Department Name	Total	Speeding	APB	Call for Service	Equipment/ Inspection Violation	Motorist Assist	Other Traffic Violation	Registration Violation	Seatbelt	Suspicious Person	Violation of ordinance	Warrant
Glocester	2,853	83.0%	0.0%	2.0%	2.1%	0.0%	9.5%	0.0%	3.1%	0.2%	0.0%	0.0%
Foster	3,715	76.8%	0.0%	0.6%	11.5%	0.1%	8.3%	0.4%	1.9%	0.2%	0.1%	0.1%
Charlestown	1,955	70.4%	1.0%	3.8%	8.6%	1.2%	10.9%	2.5%	0.4%	0.8%	0.3%	0.1%
West Greenwich	1,067	64.9%	0.0%	1.5%	9.7%	0.6%	13.5%	7.1%	0.7%	1.9%	0.0%	0.1%
Burrillville	3,314	64.9%	0.1%	2.2%	14.8%	0.1%	10.3%	5.0%	2.2%	0.2%	0.1%	0.1%
Scituate	1,119	58.4%	0.1%	3.8%	13.4%	0.5%	16.0%	5.4%	1.6%	0.4%	0.2%	0.2%
East Greenwich	2,847	57.8%	0.0%	1.4%	11.1%	1.8%	21.6%	0.2%	4.6%	1.1%	0.3%	0.0%
Richmond	1,480	57.1%	0.0%	2.6%	9.8%	0.1%	10.4%	16.5%	2.3%	1.3%	0.0%	0.0%
Hopkinton	2,688	54.8%	0.1%	1.2%	19.9%	1.4%	12.2%	3.7%	5.2%	1.3%	0.1%	0.1%
North Kingstown	5,097	51.7%	0.5%	1.9%	14.9%	1.2%	26.6%	1.5%	0.4%	1.3%	0.0%	0.0%
Little Compton	1,510	51.7%	0.0%	0.9%	25.0%	0.0%	9.7%	6.3%	6.2%	0.1%	0.0%	0.1%
South Kingstown	5,731	49.8%	0.5%	1.7%	8.4%	0.4%	29.8%	5.7%	1.9%	1.4%	0.2%	0.2%
Barrington	4,895	48.5%	0.1%	0.9%	22.4%	0.5%	14.4%	5.5%	5.9%	1.5%	0.3%	0.1%
RISP- Wickford	12,539	47.0%	0.1%	3.0%	14.5%	0.2%	16.0%	7.8%	11.0%	0.1%	0.3%	0.0%
Narragansett	6,461	46.4%	0.1%	1.7%	19.2%	0.5%	28.4%	2.0%	0.8%	0.6%	0.2%	0.1%
Portsmouth	8,919	44.5%	0.1%	0.9%	28.5%	1.2%	20.4%	0.1%	4.0%	0.2%	0.1%	0.0%
Lincoln	2,240	43.6%	0.0%	6.4%	7.5%	1.3%	27.7%	3.3%	6.7%	3.3%	0.2%	0.0%
Jamestown	2,062	42.8%	0.1%	1.4%	25.7%	0.2%	21.5%	1.1%	6.5%	0.4%	0.1%	0.2%
Westerly	4,859	42.3%	0.2%	3.1%	20.2%	0.1%	25.4%	4.5%	3.9%	0.3%	0.1%	0.1%
RISP- HQ	2,763	42.2%	0.1%	2.1%	13.7%	0.5%	37.0%	1.6%	2.4%	0.1%	0.1%	0.1%
Johnston	3,784	42.1%	0.2%	13.0%	17.3%	0.2%	20.9%	2.0%	3.6%	0.5%	0.1%	0.2%
RISP- Hope Valley	9,973	41.7%	0.3%	2.2%	15.3%	0.2%	18.6%	7.9%	13.6%	0.1%	0.1%	0.0%
RISP- Chepachet	8,463	38.6%	0.0%	1.7%	15.3%	0.3%	22.5%	8.6%	12.6%	0.0%	0.2%	0.1%
Coventry	5,603	38.6%	0.2%	3.4%	27.2%	0.2%	25.4%	2.8%	1.3%	0.6%	0.1%	0.1%
Cumberland	5,467	36.6%	0.2%	7.7%	17.6%	0.9%	28.0%	3.9%	4.0%	0.6%	0.3%	0.3%
West Warwick	5,525	36.4%	0.2%	3.2%	27.3%	0.2%	23.9%	5.6%	1.2%	1.3%	0.5%	0.1%
Middletown	5,277	35.5%	0.2%	1.3%	15.3%	0.1%	27.7%	12.2%	7.5%	0.1%	0.1%	0.0%

Department Name	Total	Speeding	APB	Call for Service	Equipment/ Inspection Violation	Motorist Assist	Other Traffic Violation	Registration Violation	Seatbelt	Suspicious Person	Violation of ordinance	Warrant
East Providence	12,450	33.3%	0.1%	2.4%	29.4%	0.2%	22.5%	6.2%	3.7%	1.5%	0.4%	0.3%
Smithfield	4,216	32.2%	0.1%	8.0%	19.0%	0.7%	26.3%	8.8%	3.7%	1.1%	0.1%	0.1%
Tiverton	3,339	32.0%	0.1%	2.4%	18.2%	0.4%	24.7%	2.6%	17.9%	1.1%	0.4%	0.2%
RISP- Lincoln	12,619	31.3%	0.1%	5.9%	16.5%	1.1%	20.7%	10.6%	13.4%	0.1%	0.2%	0.1%
Central Falls	3,350	30.7%	0.1%	3.9%	13.4%	0.2%	25.0%	5.5%	19.9%	0.4%	0.9%	0.1%
North Smithfield	2,600	28.6%	0.1%	1.7%	37.0%	0.0%	20.5%	6.8%	3.7%	0.5%	0.5%	0.7%
Warwick	14,104	27.8%	0.1%	5.1%	15.9%	0.7%	37.4%	5.3%	5.1%	1.1%	1.5%	0.0%
Warren	2,603	25.5%	0.7%	5.0%	17.5%	0.3%	22.2%	17.9%	9.0%	1.0%	0.5%	0.2%
Pawtucket	9,833	23.9%	0.1%	5.9%	13.1%	0.1%	46.0%	1.3%	7.8%	1.0%	0.5%	0.2%
Bristol	5,801	23.3%	0.0%	2.2%	15.9%	0.0%	38.9%	5.8%	13.4%	0.3%	0.2%	0.1%
Cranston	19,529	21.5%	0.1%	1.4%	23.8%	0.4%	39.1%	5.8%	4.4%	1.7%	1.7%	0.1%
Woonsocket	4,035	20.9%	0.3%	9.0%	19.9%	0.4%	33.4%	4.0%	6.0%	2.7%	2.7%	0.7%
North Providence	4,222	19.7%	0.0%	3.4%	28.3%	0.0%	33.4%	1.6%	13.3%	0.2%	0.1%	0.0%
DEM	382	19.6%	0.0%	35.9%	3.1%	0.0%	23.0%	1.8%	2.9%	3.9%	9.7%	0.0%
Newport	5,519	18.3%	0.1%	2.1%	28.8%	0.1%	48.6%	0.3%	1.3%	0.1%	0.3%	0.0%
Providence	9,787	17.4%	0.5%	7.6%	8.5%	3.6%	43.5%	6.3%	3.7%	6.7%	2.1%	0.0%
URI	996	17.4%	0.0%	0.1%	25.3%	0.2%	49.9%	0.5%	4.6%	1.9%	0.0%	0.1%

Table B.3: Basis for Stop (Sorted by % Other Traffic Violation)

Department Name	Total	Other Traffic Violation	Speeding	APB	Call for Service	Equipment/ Inspection Violation	Motorist Assist	Registration Violation	Seatbelt	Suspicious Person	Violation of ordinance	Warrant
URI	996	49.9%	17.4%	0.0%	0.1%	25.3%	0.2%	0.5%	4.6%	1.9%	0.0%	0.1%
Newport	5,519	48.6%	18.3%	0.1%	2.1%	28.8%	0.1%	0.3%	1.3%	0.1%	0.3%	0.0%
Pawtucket	9,833	46.0%	23.9%	0.1%	5.9%	13.1%	0.1%	1.3%	7.8%	1.0%	0.5%	0.2%
Providence	9,787	43.5%	17.4%	0.5%	7.6%	8.5%	3.6%	6.3%	3.7%	6.7%	2.1%	0.0%
Cranston	19,529	39.1%	21.5%	0.1%	1.4%	23.8%	0.4%	5.8%	4.4%	1.7%	1.7%	0.1%
Bristol	5,801	38.9%	23.3%	0.0%	2.2%	15.9%	0.0%	5.8%	13.4%	0.3%	0.2%	0.1%
Warwick	14,104	37.4%	27.8%	0.1%	5.1%	15.9%	0.7%	5.3%	5.1%	1.1%	1.5%	0.0%
RISP- HQ	2,763	37.0%	42.2%	0.1%	2.1%	13.7%	0.5%	1.6%	2.4%	0.1%	0.1%	0.1%
North Providence	4,222	33.4%	19.7%	0.0%	3.4%	28.3%	0.0%	1.6%	13.3%	0.2%	0.1%	0.0%
Woonsocket	4,035	33.4%	20.9%	0.3%	9.0%	19.9%	0.4%	4.0%	6.0%	2.7%	2.7%	0.7%
South Kingstown	5,731	29.8%	49.8%	0.5%	1.7%	8.4%	0.4%	5.7%	1.9%	1.4%	0.2%	0.2%
Narragansett	6,461	28.4%	46.4%	0.1%	1.7%	19.2%	0.5%	2.0%	0.8%	0.6%	0.2%	0.1%
Cumberland	5,467	28.0%	36.6%	0.2%	7.7%	17.6%	0.9%	3.9%	4.0%	0.6%	0.3%	0.3%
Middletown	5,277	27.7%	35.5%	0.2%	1.3%	15.3%	0.1%	12.2%	7.5%	0.1%	0.1%	0.0%
Lincoln	2,240	27.7%	43.6%	0.0%	6.4%	7.5%	1.3%	3.3%	6.7%	3.3%	0.2%	0.0%
North Kingstown	5,097	26.6%	51.7%	0.5%	1.9%	14.9%	1.2%	1.5%	0.4%	1.3%	0.0%	0.0%
Smithfield	4,216	26.3%	32.2%	0.1%	8.0%	19.0%	0.7%	8.8%	3.7%	1.1%	0.1%	0.1%
Coventry	5,603	25.4%	38.6%	0.2%	3.4%	27.2%	0.2%	2.8%	1.3%	0.6%	0.1%	0.1%
Westerly	4,859	25.4%	42.3%	0.2%	3.1%	20.2%	0.1%	4.5%	3.9%	0.3%	0.1%	0.1%
Central Falls	3,350	25.0%	30.7%	0.1%	3.9%	13.4%	0.2%	5.5%	19.9%	0.4%	0.9%	0.1%
Tiverton	3,339	24.7%	32.0%	0.1%	2.4%	18.2%	0.4%	2.6%	17.9%	1.1%	0.4%	0.2%
West Warwick	5,525	23.9%	36.4%	0.2%	3.2%	27.3%	0.2%	5.6%	1.2%	1.3%	0.5%	0.1%
DEM	382	23.0%	19.6%	0.0%	35.9%	3.1%	0.0%	1.8%	2.9%	3.9%	9.7%	0.0%
East Providence	12,450	22.5%	33.3%	0.1%	2.4%	29.4%	0.2%	6.2%	3.7%	1.5%	0.4%	0.3%
RISP- Chepachet	8,463	22.5%	38.6%	0.0%	1.7%	15.3%	0.3%	8.6%	12.6%	0.0%	0.2%	0.1%
Warren	2,603	22.2%	25.5%	0.7%	5.0%	17.5%	0.3%	17.9%	9.0%	1.0%	0.5%	0.2%
East Greenwich	2,847	21.6%	57.8%	0.0%	1.4%	11.1%	1.8%	0.2%	4.6%	1.1%	0.3%	0.0%

Department Name	Total	Other Traffic Violation	Speeding	APB	Call for Service	Equipment/ Inspection Violation	Motorist Assist	Registration Violation	Seatbelt	Suspicious Person	Violation of ordinance	Warrant
Jamestown	2,062	21.5%	42.8%	0.1%	1.4%	25.7%	0.2%	1.1%	6.5%	0.4%	0.1%	0.2%
Johnston	3,784	20.9%	42.1%	0.2%	13.0%	17.3%	0.2%	2.0%	3.6%	0.5%	0.1%	0.2%
RISP- Lincoln	12,619	20.7%	31.3%	0.1%	5.9%	16.5%	1.1%	10.6%	13.4%	0.1%	0.2%	0.1%
North Smithfield	2,600	20.5%	28.6%	0.1%	1.7%	37.0%	0.0%	6.8%	3.7%	0.5%	0.5%	0.7%
Portsmouth	8,919	20.4%	44.5%	0.1%	0.9%	28.5%	1.2%	0.1%	4.0%	0.2%	0.1%	0.0%
RISP- Hope Valley	9,973	18.6%	41.7%	0.3%	2.2%	15.3%	0.2%	7.9%	13.6%	0.1%	0.1%	0.0%
Scituate	1,119	16.0%	58.4%	0.1%	3.8%	13.4%	0.5%	5.4%	1.6%	0.4%	0.2%	0.2%
RISP- Wickford	12,539	16.0%	47.0%	0.1%	3.0%	14.5%	0.2%	7.8%	11.0%	0.1%	0.3%	0.0%
Barrington	4,895	14.4%	48.5%	0.1%	0.9%	22.4%	0.5%	5.5%	5.9%	1.5%	0.3%	0.1%
West Greenwich	1,067	13.5%	64.9%	0.0%	1.5%	9.7%	0.6%	7.1%	0.7%	1.9%	0.0%	0.1%
Hopkinton	2,688	12.2%	54.8%	0.1%	1.2%	19.9%	1.4%	3.7%	5.2%	1.3%	0.1%	0.1%
Charlestown	1,955	10.9%	70.4%	1.0%	3.8%	8.6%	1.2%	2.5%	0.4%	0.8%	0.3%	0.1%
Richmond	1,480	10.4%	57.1%	0.0%	2.6%	9.8%	0.1%	16.5%	2.3%	1.3%	0.0%	0.0%
Burrillville	3,314	10.3%	64.9%	0.1%	2.2%	14.8%	0.1%	5.0%	2.2%	0.2%	0.1%	0.1%
Little Compton	1,510	9.7%	51.7%	0.0%	0.9%	25.0%	0.0%	6.3%	6.2%	0.1%	0.0%	0.1%
Glocester	2,853	9.5%	83.0%	0.0%	2.0%	2.1%	0.0%	0.0%	3.1%	0.2%	0.0%	0.0%
Foster	3,715	8.3%	76.8%	0.0%	0.6%	11.5%	0.1%	0.4%	1.9%	0.2%	0.1%	0.1%

Table B.4: Basis for Stop (Sorted by % Equipment/Inspection Violation)

Department Name	Total	Equipment/ Inspection Violation	Speeding	APB	Call for Service	Motorist Assist	Other Traffic Viability	Registration Violation	Seatbelt Violation	Suspicious Person	Violation of ordinance	Warrant
North Smithfield	2,600	37.0%	28.6%	0.1%	1.7%	0.0%	20.5%	6.8%	3.7%	0.5%	0.5%	0.7%
East Providence	12,450	29.4%	33.3%	0.1%	2.4%	0.2%	22.5%	6.2%	3.7%	1.5%	0.4%	0.3%
Newport	5,519	28.8%	18.3%	0.1%	2.1%	0.1%	48.6%	0.3%	1.3%	0.1%	0.3%	0.0%
Portsmouth	8,919	28.5%	44.5%	0.1%	0.9%	1.2%	20.4%	0.1%	4.0%	0.2%	0.1%	0.0%
North Providence	4,222	28.3%	19.7%	0.0%	3.4%	0.0%	33.4%	1.6%	13.3%	0.2%	0.1%	0.0%
West Warwick	5,525	27.3%	36.4%	0.2%	3.2%	0.2%	23.9%	5.6%	1.2%	1.3%	0.5%	0.1%
Coventry	5,603	27.2%	38.6%	0.2%	3.4%	0.2%	25.4%	2.8%	1.3%	0.6%	0.1%	0.1%
Jamestown	2,062	25.7%	42.8%	0.1%	1.4%	0.2%	21.5%	1.1%	6.5%	0.4%	0.1%	0.2%
URI	996	25.3%	17.4%	0.0%	0.1%	0.2%	49.9%	0.5%	4.6%	1.9%	0.0%	0.1%
Little Compton	1,510	25.0%	51.7%	0.0%	0.9%	0.0%	9.7%	6.3%	6.2%	0.1%	0.0%	0.1%
Cranston	19,529	23.8%	21.5%	0.1%	1.4%	0.4%	39.1%	5.8%	4.4%	1.7%	1.7%	0.1%
Barrington	4,895	22.4%	48.5%	0.1%	0.9%	0.5%	14.4%	5.5%	5.9%	1.5%	0.3%	0.1%
Westerly	4,859	20.2%	42.3%	0.2%	3.1%	0.1%	25.4%	4.5%	3.9%	0.3%	0.1%	0.1%
Hopkinton	2,688	19.9%	54.8%	0.1%	1.2%	1.4%	12.2%	3.7%	5.2%	1.3%	0.1%	0.1%
Woonsocket	4,035	19.9%	20.9%	0.3%	9.0%	0.4%	33.4%	4.0%	6.0%	2.7%	2.7%	0.7%
Narragansett	6,461	19.2%	46.4%	0.1%	1.7%	0.5%	28.4%	2.0%	0.8%	0.6%	0.2%	0.1%
Smithfield	4,216	19.0%	32.2%	0.1%	8.0%	0.7%	26.3%	8.8%	3.7%	1.1%	0.1%	0.1%
Tiverton	3,339	18.2%	32.0%	0.1%	2.4%	0.4%	24.7%	2.6%	17.9%	1.1%	0.4%	0.2%
Cumberland	5,467	17.6%	36.6%	0.2%	7.7%	0.9%	28.0%	3.9%	4.0%	0.6%	0.3%	0.3%
Warren	2,603	17.5%	25.5%	0.7%	5.0%	0.3%	22.2%	17.9%	9.0%	1.0%	0.5%	0.2%
Johnston	3,784	17.3%	42.1%	0.2%	13.0%	0.2%	20.9%	2.0%	3.6%	0.5%	0.1%	0.2%
RISP- Lincoln	12,619	16.5%	31.3%	0.1%	5.9%	1.1%	20.7%	10.6%	13.4%	0.1%	0.2%	0.1%
Warwick	14,104	15.9%	27.8%	0.1%	5.1%	0.7%	37.4%	5.3%	5.1%	1.1%	1.5%	0.0%
Bristol	5,801	15.9%	23.3%	0.0%	2.2%	0.0%	38.9%	5.8%	13.4%	0.3%	0.2%	0.1%
RISP- Chepachet	8,463	15.3%	38.6%	0.0%	1.7%	0.3%	22.5%	8.6%	12.6%	0.0%	0.2%	0.1%
RISP- Hope Valley	9,973	15.3%	41.7%	0.3%	2.2%	0.2%	18.6%	7.9%	13.6%	0.1%	0.1%	0.0%
Middletown	5,277	15.3%	35.5%	0.2%	1.3%	0.1%	27.7%	12.2%	7.5%	0.1%	0.1%	0.0%

Department Name	Total	Equipment/ Inspection Violation	Speeding	APB	Call for Service	Motorist Assist	Other Traffic Viability	Registration Violation	Seatbelt Violation	Suspicious Person	Violation of ordinance	Warrant
North Kingstown	5,097	14.9%	51.7%	0.5%	1.9%	1.2%	26.6%	1.5%	0.4%	1.3%	0.0%	0.0%
Burrillville	3,314	14.8%	64.9%	0.1%	2.2%	0.1%	10.3%	5.0%	2.2%	0.2%	0.1%	0.1%
RISP- Wickford	12,539	14.5%	47.0%	0.1%	3.0%	0.2%	16.0%	7.8%	11.0%	0.1%	0.3%	0.0%
RISP- HQ	2,763	13.7%	42.2%	0.1%	2.1%	0.5%	37.0%	1.6%	2.4%	0.1%	0.1%	0.1%
Scituate	1,119	13.4%	58.4%	0.1%	3.8%	0.5%	16.0%	5.4%	1.6%	0.4%	0.2%	0.2%
Central Falls	3,350	13.4%	30.7%	0.1%	3.9%	0.2%	25.0%	5.5%	19.9%	0.4%	0.9%	0.1%
Pawtucket	9,833	13.1%	23.9%	0.1%	5.9%	0.1%	46.0%	1.3%	7.8%	1.0%	0.5%	0.2%
Foster	3,715	11.5%	76.8%	0.0%	0.6%	0.1%	8.3%	0.4%	1.9%	0.2%	0.1%	0.1%
East Greenwich	2,847	11.1%	57.8%	0.0%	1.4%	1.8%	21.6%	0.2%	4.6%	1.1%	0.3%	0.0%
Richmond	1,480	9.8%	57.1%	0.0%	2.6%	0.1%	10.4%	16.5%	2.3%	1.3%	0.0%	0.0%
West Greenwich	1,067	9.7%	64.9%	0.0%	1.5%	0.6%	13.5%	7.1%	0.7%	1.9%	0.0%	0.1%
Charlestown	1,955	8.6%	70.4%	1.0%	3.8%	1.2%	10.9%	2.5%	0.4%	0.8%	0.3%	0.1%
Providence	9,787	8.5%	17.4%	0.5%	7.6%	3.6%	43.5%	6.3%	3.7%	6.7%	2.1%	0.0%
South Kingstown	5,731	8.4%	49.8%	0.5%	1.7%	0.4%	29.8%	5.7%	1.9%	1.4%	0.2%	0.2%
Lincoln	2,240	7.5%	43.6%	0.0%	6.4%	1.3%	27.7%	3.3%	6.7%	3.3%	0.2%	0.0%
DEM	382	3.1%	19.6%	0.0%	35.9%	0.0%	23.0%	1.8%	2.9%	3.9%	9.7%	0.0%
Glocester	2,853	2.1%	83.0%	0.0%	2.0%	0.0%	9.5%	0.0%	3.1%	0.2%	0.0%	0.0%

Table B.5: Outcome of Stop (Sorted by % Citation)

Department Name	N	Citation	Warning	Notice of Demand	Arrest Driver	Arrest Passenger	No Action
Johnston	3,784	81.3%	12.3%	0.1%	1.6%	0.4%	4.3%
Pawtucket	9,833	74.6%	20.2%	1.3%	2.4%	0.1%	1.3%
RISP- Wickford	12,539	71.2%	24.9%	0.6%	1.4%	0.3%	1.6%
RISP- Chepachet	8,463	70.8%	25.6%	0.0%	1.5%	0.4%	1.6%
Richmond	1,480	69.2%	28.6%	0.9%	0.9%	0.0%	0.4%
RISP- Hope Valley	9,973	69.2%	27.6%	0.4%	1.3%	0.4%	1.1%
RISP- Lincoln	12,619	66.8%	23.1%	0.6%	4.4%	0.4%	4.6%
Central Falls	3,350	63.7%	25.3%	1.5%	8.2%	0.2%	1.0%
Warren	2,603	60.6%	25.4%	4.7%	3.9%	0.2%	5.3%
Smithfield	4,216	60.1%	31.4%	1.1%	2.5%	0.1%	4.8%
Glocester	2,853	57.7%	41.7%	0.0%	0.5%	0.0%	0.2%
North Providence	4,222	55.9%	43.0%	0.0%	0.9%	0.0%	0.2%
RISP- HQ	2,763	55.5%	14.8%	6.8%	1.4%	0.2%	21.2%
Scituate	1,119	53.3%	37.7%	0.2%	8.0%	0.0%	0.8%
East Providence	12,450	48.4%	41.2%	5.3%	2.9%	0.5%	1.7%
West Warwick	5,525	46.2%	44.6%	0.6%	5.4%	0.3%	2.9%
North Kingstown	5,097	44.7%	48.0%	0.4%	3.0%	0.1%	3.8%
West Greenwich	1,067	44.0%	48.9%	1.3%	3.0%	0.2%	2.5%
Lincoln	2,240	43.9%	41.6%	0.3%	4.7%	0.2%	9.4%
Cumberland	5,467	43.7%	40.0%	4.7%	5.0%	0.3%	6.2%
Warwick	14,104	41.2%	48.4%	1.3%	4.9%	0.1%	4.1%
Middletown	5,277	38.9%	60.4%	0.0%	0.6%	0.1%	0.0%
Woonsocket	4,035	38.8%	51.5%	1.3%	4.7%	0.5%	3.2%
Bristol	5,801	37.7%	61.4%	0.3%	0.5%	0.0%	0.1%
DEM (Environmental Mang.)	382	37.7%	53.1%	0.0%	2.4%	0.0%	6.8%
North Smithfield	2,600	37.3%	39.7%	10.5%	10.5%	0.6%	1.3%
Westerly	4,859	36.7%	61.4%	0.2%	1.6%	0.1%	0.1%
Tiverton	3,339	35.5%	51.4%	2.2%	5.5%	0.4%	5.1%
East Greenwich	2,847	34.5%	59.3%	0.8%	1.8%	0.1%	3.5%
Burrillville	3,314	34.0%	62.5%	0.1%	2.6%	0.0%	0.8%
Providence	9,787	33.6%	51.6%	0.8%	5.6%	0.4%	8.0%
Foster	3,715	32.4%	64.3%	0.0%	2.8%	0.1%	0.4%
Cranston	19,529	32.3%	59.0%	0.7%	2.3%	0.2%	5.5%
Hopkinton	2,688	30.6%	56.5%	5.9%	2.1%	0.4%	4.4%
Unv. of Rhode Island	996	29.1%	68.3%	0.1%	1.5%	0.2%	0.8%
Portsmouth	8,919	26.3%	62.2%	6.3%	2.8%	0.2%	2.2%
Coventry	5,603	25.8%	69.8%	1.5%	1.7%	0.0%	1.2%
Narragansett	6,461	25.6%	67.4%	0.2%	4.2%	0.5%	2.1%
Charlestown	1,955	25.4%	64.1%	0.9%	2.0%	0.1%	7.5%
South Kingstown	5,731	22.5%	70.6%	1.3%	2.9%	0.3%	2.2%

Department Name	N	Citation	Warning	Notice of Demand	Arrest Driver	Arrest Passenger	No Action
Barrington	4,895	19.7%	76.0%	0.8%	1.3%	0.1%	2.0%
Jamestown	2,062	19.7%	68.7%	7.7%	2.8%	0.0%	1.1%
Little Compton	1,510	12.8%	86.6%	0.0%	0.1%	0.0%	0.5%
Newport	5,519	7.2%	92.4%	0.0%	0.3%	0.0%	0.0%

Table B.6: Outcome of Stop (Sorted by % Warning)

Department Name	N	Warning	Citation	Notice of Demand	Arrest Driver	Arrest Passenger	No Action
Newport	5,519	92.4%	7.2%	0.0%	0.3%	0.0%	0.0%
Little Compton	1,510	86.6%	12.8%	0.0%	0.1%	0.0%	0.5%
Barrington	4,895	76.0%	19.7%	0.8%	1.3%	0.1%	2.0%
South Kingstown	5,731	70.6%	22.5%	1.3%	2.9%	0.3%	2.2%
Coventry	5,603	69.8%	25.8%	1.5%	1.7%	0.0%	1.2%
Jamestown	2,062	68.7%	19.7%	7.7%	2.8%	0.0%	1.1%
Unv. of Rhode Island	996	68.3%	29.1%	0.1%	1.5%	0.2%	0.8%
Narragansett	6,461	67.4%	25.6%	0.2%	4.2%	0.5%	2.1%
Foster	3,715	64.3%	32.4%	0.0%	2.8%	0.1%	0.4%
Charlestown	1,955	64.1%	25.4%	0.9%	2.0%	0.1%	7.5%
Burrillville	3,314	62.5%	34.0%	0.1%	2.6%	0.0%	0.8%
Portsmouth	8,919	62.2%	26.3%	6.3%	2.8%	0.2%	2.2%
Westerly	4,859	61.4%	36.7%	0.2%	1.6%	0.1%	0.1%
Bristol	5,801	61.4%	37.7%	0.3%	0.5%	0.0%	0.1%
Middletown	5,277	60.4%	38.9%	0.0%	0.6%	0.1%	0.0%
East Greenwich	2,847	59.3%	34.5%	0.8%	1.8%	0.1%	3.5%
Cranston	19,529	59.0%	32.3%	0.7%	2.3%	0.2%	5.5%
Hopkinton	2,688	56.5%	30.6%	5.9%	2.1%	0.4%	4.4%
DEM (Environmental Mang.)	382	53.1%	37.7%	0.0%	2.4%	0.0%	6.8%
Providence	9,787	51.6%	33.6%	0.8%	5.6%	0.4%	8.0%
Woonsocket	4,035	51.5%	38.8%	1.3%	4.7%	0.5%	3.2%
Tiverton	3,339	51.4%	35.5%	2.2%	5.5%	0.4%	5.1%
West Greenwich	1,067	48.9%	44.0%	1.3%	3.0%	0.2%	2.5%
Warwick	14,104	48.4%	41.2%	1.3%	4.9%	0.1%	4.1%
North Kingstown	5,097	48.0%	44.7%	0.4%	3.0%	0.1%	3.8%
West Warwick	5,525	44.6%	46.2%	0.6%	5.4%	0.3%	2.9%
North Providence	4,222	43.0%	55.9%	0.0%	0.9%	0.0%	0.2%
Glocester	2,853	41.7%	57.7%	0.0%	0.5%	0.0%	0.2%
Lincoln	2,240	41.6%	43.9%	0.3%	4.7%	0.2%	9.4%
East Providence	12,450	41.2%	48.4%	5.3%	2.9%	0.5%	1.7%
Cumberland	5,467	40.0%	43.7%	4.7%	5.0%	0.3%	6.2%
North Smithfield	2,600	39.7%	37.3%	10.5%	10.5%	0.6%	1.3%
Scituate	1,119	37.7%	53.3%	0.2%	8.0%	0.0%	0.8%
Smithfield	4,216	31.4%	60.1%	1.1%	2.5%	0.1%	4.8%
Richmond	1,480	28.6%	69.2%	0.9%	0.9%	0.0%	0.4%
RISP- Hope Valley	9,973	27.6%	69.2%	0.4%	1.3%	0.4%	1.1%
RISP- Chepachet	8,463	25.6%	70.8%	0.0%	1.5%	0.4%	1.6%
Warren	2,603	25.4%	60.6%	4.7%	3.9%	0.2%	5.3%
Central Falls	3,350	25.3%	63.7%	1.5%	8.2%	0.2%	1.0%
RISP- Wickford	12,539	24.9%	71.2%	0.6%	1.4%	0.3%	1.6%

Department Name	N	Warning	Citation	Notice of Demand	Arrest Driver	Arrest Passenger	No Action
RISP- Lincoln	12,619	23.1%	66.8%	0.6%	4.4%	0.4%	4.6%
Pawtucket	9,833	20.2%	74.6%	1.3%	2.4%	0.1%	1.3%
RISP- HQ	2,763	14.8%	55.5%	6.8%	1.4%	0.2%	21.2%
Johnston	3,784	12.3%	81.3%	0.1%	1.6%	0.4%	4.3%

Table B.7: Outcome of Stop (Sorted by % Arrest)

Department Name	N	Arrest	Citation	Warning	Notice of Demand	No Action
North Smithfield	2,600	11.1%	37.3%	39.7%	10.5%	1.3%
Central Falls	3,350	8.4%	63.7%	25.3%	1.5%	1.0%
Scituate	1,119	8.0%	53.3%	37.7%	0.2%	0.8%
Providence	9,787	6.0%	33.6%	51.6%	0.8%	8.0%
Tiverton	3,339	5.8%	35.5%	51.4%	2.2%	5.1%
West Warwick	5,525	5.6%	46.2%	44.6%	0.6%	2.9%
Cumberland	5,467	5.3%	43.7%	40.0%	4.7%	6.2%
Woonsocket	4,035	5.2%	38.8%	51.5%	1.3%	3.2%
Warwick	14,104	5.1%	41.2%	48.4%	1.3%	4.1%
RISP- Lincoln	12,619	4.9%	66.8%	23.1%	0.6%	4.6%
Lincoln	2,240	4.9%	43.9%	41.6%	0.3%	9.4%
Narragansett	6,461	4.7%	25.6%	67.4%	0.2%	2.1%
Warren	2,603	4.0%	60.6%	25.4%	4.7%	5.3%
East Providence	12,450	3.4%	48.4%	41.2%	5.3%	1.7%
South Kingstown	5,731	3.3%	22.5%	70.6%	1.3%	2.2%
West Greenwich	1,067	3.2%	44.0%	48.9%	1.3%	2.5%
North Kingstown	5,097	3.1%	44.7%	48.0%	0.4%	3.8%
Portsmouth	8,919	3.0%	26.3%	62.2%	6.3%	2.2%
Foster	3,715	2.9%	32.4%	64.3%	0.0%	0.4%
Jamestown	2,062	2.8%	19.7%	68.7%	7.7%	1.1%
Burrillville	3,314	2.7%	34.0%	62.5%	0.1%	0.8%
Smithfield	4,216	2.6%	60.1%	31.4%	1.1%	4.8%
Hopkinton	2,688	2.5%	30.6%	56.5%	5.9%	4.4%
Cranston	19,529	2.5%	32.3%	59.0%	0.7%	5.5%
Pawtucket	9,833	2.5%	74.6%	20.2%	1.3%	1.3%
DEM (Environmental Mang.)	382	2.4%	37.7%	53.1%	0.0%	6.8%
Charlestown	1,955	2.1%	25.4%	64.1%	0.9%	7.5%
Johnston	3,784	2.0%	81.3%	12.3%	0.1%	4.3%
RISP- Chepachet	8,463	1.9%	70.8%	25.6%	0.0%	1.6%
East Greenwich	2,847	1.9%	34.5%	59.3%	0.8%	3.5%
RISP- Wickford	12,539	1.7%	71.2%	24.9%	0.6%	1.6%
Unv. of Rhode Island	996	1.7%	29.1%	68.3%	0.1%	0.8%
Coventry	5,603	1.7%	25.8%	69.8%	1.5%	1.2%
RISP- Hope Valley	9,973	1.7%	69.2%	27.6%	0.4%	1.1%
Westerly	4,859	1.7%	36.7%	61.4%	0.2%	0.1%
RISP- HQ	2,763	1.6%	55.5%	14.8%	6.8%	21.2%
Barrington	4,895	1.5%	19.7%	76.0%	0.8%	2.0%
North Providence	4,222	0.9%	55.9%	43.0%	0.0%	0.2%
Richmond	1,480	0.9%	69.2%	28.6%	0.9%	0.4%
Middletown	5,277	0.6%	38.9%	60.4%	0.0%	0.0%

Department Name	N	Arrest	Citation	Warning	Notice of Demand	No Action
Bristol	5,801	0.6%	37.7%	61.4%	0.3%	0.1%
Glocester	2,853	0.5%	57.7%	41.7%	0.0%	0.2%
Newport	5,519	0.3%	7.2%	92.4%	0.0%	0.0%
Little Compton	1,510	0.1%	12.8%	86.6%	0.0%	0.5%

Table B.8: Number of Searches (Sorted by % Search)

Department Name	Stops	Searches	
		N	%
Cumberland	5,467	664	12.1%
Warren	2,603	219	8.4%
Providence	9,787	790	8.1%
Woonsocket	4,035	293	7.3%
North Smithfield	2,600	188	7.2%
Hopkinton	2,688	150	5.6%
East Providence	12,450	676	5.4%
Pawtucket	9,833	492	5.0%
Tiverton	3,339	156	4.7%
Richmond	1,480	69	4.7%
Central Falls	3,350	155	4.6%
Westerly	4,859	207	4.3%
Middletown	5,277	203	3.8%
Jamestown	2,062	76	3.7%
North Kingstown	5,097	186	3.6%
Little Compton	1,510	55	3.6%
RISP- Lincoln	12,619	449	3.6%
Coventry	5,603	181	3.2%
Newport	5,519	176	3.2%
RISP- Hope Valley	9,973	294	2.9%
Narragansett	6,461	184	2.8%
Unv. of Rhode Island	996	28	2.8%
South Kingstown	5,731	154	2.7%
DEM (Environmental Mang.)	382	10	2.6%
Burrillville	3,314	84	2.5%
Portsmouth	8,919	221	2.5%
Warwick	14,104	328	2.3%
Cranston	19,529	452	2.3%
West Greenwich	1,067	24	2.2%
Johnston	3,784	84	2.2%
Smithfield	4,216	91	2.2%
West Warwick	5,525	112	2.0%
Foster	3,715	67	1.8%
RISP- Chepachet	8,463	140	1.7%
Lincoln	2,240	34	1.5%
Scituate	1,119	16	1.4%
Bristol	5,801	69	1.2%
RISP- HQ	2,763	32	1.2%
RISP- Wickford	12,539	139	1.1%
Barrington	4,895	49	1.0%

Department Name	Stops	Searches	
		N	%
North Providence	4,222	38	0.9%
Charlestown	1,955	16	0.8%
East Greenwich	2,847	20	0.7%
Glocester	2,853	20	0.7%

APPENDIX C

Table C.1: Logistic Regression of Minority Status on Daylight with Officer Fixed Effects, All Traffic Stops 2016

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
Daylight	Coefficient	0.153***	0.176***	0.241***	0.196***
	Standard Error	(0.052)	(0.047)	(0.034)	(0.033)
Sample Size		46,096	45,018	45,037	50,070
Pseudo R^2		0.088	0.096	0.100	0.094

Note 1: The coefficients are presented along with standard errors clustered at the officer level. A coefficient concatenated with * represents a p-value of .1, ** represents a p-value of .05, and *** represents a p-value of .01 significance.
Note 2: All specifications include controls for time of the day, day of the week, analysis year, inter-twilight window (e.g. morning and night), volume, and officer fixed-effects.
Note 3: Sample includes all traffic stops made during the inter-twilight window in 2016.

Table C.2: Logistic Regression of Minority Status on Daylight with Officer Fixed Effects, All Municipal Traffic Stops 2016

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
Daylight	Coefficient	0.158***	0.160***	0.222***	0.180***
	Standard Error	(0.048)	(0.049)	(0.035)	(0.034)
Sample Size		41,443	40,566	40,711	44,936
Pseudo R^2		0.089	0.098	0.103	0.097

Note 1: The coefficients are presented along with standard errors clustered at the officer level. A coefficient concatenated with * represents a p-value of .1, ** represents a p-value of .05, and *** represents a p-value of .01 significance.
Note 2: All specifications include controls for time of the day, day of the week, analysis year, inter-twilight window (e.g. morning and night), volume, and officer fixed-effects.
Note 3: Sample includes all traffic stops made during the inter-twilight window in 2016.

Table C.3: Logistic Regression of Minority Status on Daylight with Officer Fixed Effects, All State Police Traffic Stops 2016

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
Daylight	Coefficient	0.189*	0.239**	0.370***	0.287***
	Standard Error	(0.103)	(0.108)	(0.094)	(0.085)
Sample Size		4,327	4,171	4,040	4,828
Pseudo R^2		0.051	0.060	0.086	0.060

Note 1: The coefficients are presented along with standard errors clustered at the officer level. A coefficient concatenated with * represents a p-value of .1, ** represents a p-value of .05, and *** represents a p-value of .01 significance.
Note 2: All specifications include controls for time of the day, day of the week, analysis year, inter-twilight window (e.g. morning and night), volume, and officer fixed-effects.
Note 3: Sample includes all traffic stops made during the inter-twilight window in 2016.

Table C.4: Logistic Regression of Minority Status on Daylight with Officer Fixed Effects, All Moving Violations 2016

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
Daylight	Coefficient	0.126**	0.141***	0.188***	0.157***
	Standard Error	(0.053)	(0.048)	(0.038)	(0.035)
Sample Size		33,097	32,263	32,129	35,417
Pseudo R^2		0.098	0.108	0.116	0.107

Note 1: The coefficients are presented along with standard errors clustered at the officer level. A coefficient concatenated with * represents a p-value of .1, ** represents a p-value of .05, and *** represents a p-value of .01 significance.
Note 2: All specifications include controls for time of the day, day of the week, analysis year, inter-twilight window (e.g. morning and night), volume, and officer fixed-effects.
Note 3: Sample includes all traffic stops made during the inter-twilight window in 2016.

Table C.5: Logistic Regression of Minority Status on Daylight with Officer Fixed Effects, All Municipal Moving Violations 2016

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
Daylight	Coefficient	0.135***	0.131**	0.190***	0.152***
	Standard Error	(0.051)	(0.053)	(0.045)	(0.039)
Sample Size		29,784	29,113	29,100	31,828
Pseudo R^2		0.098	0.111	0.119	0.111

Note 1: The coefficients are presented along with standard errors clustered at the officer level. A coefficient concatenated with * represents a p-value of .1, ** represents a p-value of .05, and *** represents a p-value of .01 significance.
Note 2: All specifications include controls for time of the day, day of the week, analysis year, inter-twilight window (e.g. morning and night), volume, and officer fixed-effects.
Note 3: Sample includes all traffic stops made during the inter-twilight window in 2016.

Table C.6: Logistic Regression of Minority Status on Daylight with Officer Fixed Effects, All State Police Moving Violations 2016

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
Daylight	Coefficient	0.194*	0.186	0.227**	0.202**
	Standard Error	(0.103)	(0.117)	(0.094)	(0.094)
Sample Size		3,061	2,940	2,818	3,361
Pseudo R^2		0.059	0.069	0.096	0.066

Note 1: The coefficients are presented along with standard errors clustered at the officer level. A coefficient concatenated with * represents a p-value of .1, ** represents a p-value of .05, and *** represents a p-value of .01 significance.
Note 2: All specifications include controls for time of the day, day of the week, analysis year, inter-twilight window (e.g. morning and night), volume, and officer fixed-effects.
Note 3: Sample includes all traffic stops made during the inter-twilight window in 2016.

Table C.7: Logistic Regression of Minority Status on Daylight by Department, All Traffic Stops 2016

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
Barrington	Coefficient	0.233	0.705	0.52	0.566
	Standard Error	-0.408	-0.584	-0.444	-0.357
	Pseudo R^2	0.072	0.095	0.122	0.08
	Sample Size	891	873	872	902
Bristol	Coefficient	0.326	0.204	0.449	0.247
	Standard Error	-0.307	-0.348	-0.342	-0.264
	Pseudo R^2	0.021	0.025	0.062	0.023
	Sample Size	1605	1594	1576	1624
Burrillville	Coefficient	-0.31	-0.639	0.617	0.087
	Standard Error	-0.539	-0.577	-0.452	-0.367
	Pseudo R^2	0.151	0.182	0.055	0.052
	Sample Size	885	882	884	902
Central Falls	Coefficient	-0.116	-0.125	0.26	0.208
	Standard Error	-0.213	-0.214	-0.168	-0.159
	Pseudo R^2	0.02	0.019	0.02	0.015
	Sample Size	602	599	958	1124
Charlestown	Coefficient	0.676	1.106	-0.048	0.754
	Standard Error	-0.565	-1.06	-1.301	-0.924
	Pseudo R^2	0.116	0.222	0.429	0.189
	Sample Size	443	420	408	426
Coventry	Coefficient	0.518	0.741*	0.587	0.671**
	Standard Error	-0.42	-0.441	-0.439	-0.32
	Pseudo R^2	0.076	0.094	0.094	0.075
	Sample Size	1343	1337	1345	1372
Cranston	Coefficient	0.154*	0.219**	0.268***	0.213***
	Standard Error	-0.091	-0.099	-0.093	-0.078
	Pseudo R^2	0.005	0.007	0.01	0.007
	Sample Size	4002	3790	3964	4676
Cumberland	Coefficient	0.419	0.431	-0.129	0.025
	Standard Error	-0.267	-0.309	-0.234	-0.203
	Pseudo R^2	0.053	0.064	0.019	0.017
	Sample Size	1038	1018	1077	1123

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
DEM	Coefficient	-0.224	30.428***	2.709	3.018**
	Standard Error	-1.073	-1.954	-1.709	-1.47
	Pseudo R^2	0.406	0.471	0.306	0.264
	Sample Size	107	102	108	115
East Greenwich	Coefficient	0.149	-0.157	-0.288	-0.089
	Standard Error	-0.504	-0.566	-0.569	-0.443
	Pseudo R^2	0.077	0.107	0.081	0.071
	Sample Size	655	641	631	655
East Providence	Coefficient	0.187*	0.164	0.315**	0.194*
	Standard Error	-0.109	-0.113	-0.151	-0.101
	Pseudo R^2	0.018	0.019	0.024	0.019
	Sample Size	3674	3597	3270	3914
Foster	Coefficient	0.222	0.345	0.426	0.399
	Standard Error	-0.287	-0.335	-0.335	-0.244
	Pseudo R^2	0.049	0.086	0.068	0.059
	Sample Size	942	908	903	969
Glocester	Coefficient	0.11	0.093	-0.41	-0.19
	Standard Error	-0.446	-0.473	-0.464	-0.348
	Pseudo R^2	0.076	0.077	0.102	0.048
	Sample Size	949	946	941	966
Hopkinton	Coefficient	-0.216	-0.253	-0.452	-0.551
	Standard Error	-0.409	-0.471	-0.505	-0.375
	Pseudo R^2	0.162	0.196	0.285	0.189
	Sample Size	427	417	415	432
Jamestown	Coefficient	-1.288	-1.805	-2.065*	-1.838**
	Standard Error	-0.92	-1.348	-1.068	-0.889
	Pseudo R^2	0.299	0.354	0.291	0.255
	Sample Size	367	362	362	372
Johnston	Coefficient	-0.398	-0.364	-0.047	-0.155
	Standard Error	-0.357	-0.385	-0.301	-0.262
	Pseudo R^2	0.076	0.11	0.073	0.07
	Sample Size	873	858	929	989
Lincoln	Coefficient	-0.315	-0.5	0.532	0.225
	Standard Error	-0.361	-0.422	-0.346	-0.29
	Pseudo R^2	0.061	0.084	0.073	0.048
	Sample Size	388	376	399	432

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
Little Compton	Coefficient	0.646	0.041	0.927	-0.078
	Standard Error	-0.804	-0.779	-1.38	-0.742
	Pseudo R^2	0.336	0.372	0.432	0.286
	Sample Size	260	257	258	263
Middletown	Coefficient	0.125	0.291	0.863*	0.607**
	Standard Error	-0.359	-0.385	-0.44	-0.303
	Pseudo R^2	0.034	0.05	0.078	0.045
	Sample Size	576	563	560	613
Narragansett	Coefficient	0.347	0.442	0.946***	0.628**
	Standard Error	-0.292	-0.324	-0.345	-0.246
	Pseudo R^2	0.033	0.042	0.054	0.022
	Sample Size	1723	1705	1684	1755
Newport	Coefficient	0.426**	0.201	0.218	0.211
	Standard Error	-0.189	-0.2	-0.24	-0.169
	Pseudo R^2	0.036	0.037	0.039	0.031
	Sample Size	1453	1427	1363	1530
North Kingstown	Coefficient	0.277	0.201	0.21	0.22
	Standard Error	-0.528	-0.554	-0.538	-0.431
	Pseudo R^2	0.055	0.06	0.102	0.046
	Sample Size	705	693	686	717
North Providence	Coefficient	0.099	0.12	-0.211	-0.001
	Standard Error	-0.2	-0.206	-0.231	-0.173
	Pseudo R^2	0.04	0.044	0.037	0.034
	Sample Size	882	869	806	985
North Smithfield	Coefficient	0.061	0.048	0.304	0.178
	Standard Error	-0.311	-0.323	-0.257	-0.216
	Pseudo R^2	0.057	0.053	0.047	0.038
	Sample Size	565	554	602	676
Pawtucket	Coefficient	-0.193	-0.212	-0.085	-0.188
	Standard Error	-0.153	-0.154	-0.156	-0.132
	Pseudo R^2	0.046	0.049	0.029	0.039
	Sample Size	1370	1356	1359	1692
Portsmouth	Coefficient	0.442*	0.291	0.304	0.285
	Standard Error	-0.24	-0.255	-0.346	-0.214
	Pseudo R^2	0.025	0.031	0.037	0.021
	Sample Size	1589	1568	1503	1630

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
Providence	Coefficient	0.298**	0.259**	0.214*	0.234**
	Standard Error	-0.123	-0.125	-0.127	-0.111
	Pseudo R^2	0.014	0.014	0.012	0.01
	Sample Size	1623	1542	1526	2100
Richmond	Coefficient	0.243	0.139	1.613	0.271
	Standard Error	-0.512	-0.595	-1.097	-0.501
	Pseudo R^2	0.148	0.201	0.428	0.164
	Sample Size	479	464	452	469
RISP - Chepachet (Scituate Barracks) (002)	Coefficient	-0.006	0.123	0.664**	0.383
	Standard Error	-0.299	-0.324	-0.3	-0.246
	Pseudo R^2	0.034	0.04	0.034	0.026
	Sample Size	680	654	678	777
RISP - Hope Valley (006)	Coefficient	0.400**	0.402**	0.464**	0.436**
	Standard Error	-0.189	-0.205	-0.22	-0.174
	Pseudo R^2	0.028	0.029	0.036	0.027
	Sample Size	1082	1035	987	1171
RISP - HQ	Coefficient	0.324	0.418	0.366	0.422
	Standard Error	-0.466	-0.496	-0.589	-0.466
	Pseudo R^2	0.099	0.118	0.162	0.108
	Sample Size	220	213	191	224
RISP - Lincoln (001)	Coefficient	-0.446***	-0.168	-0.023	-0.088
	Standard Error	-0.148	-0.158	-0.167	-0.134
	Pseudo R^2	0.024	0.022	0.031	0.02
	Sample Size	1356	1278	1238	1533
RISP - Wickford (004)	Coefficient	0.327	0.511**	0.178	0.388**
	Standard Error	-0.211	-0.229	-0.244	-0.188
	Pseudo R^2	0.023	0.025	0.024	0.021
	Sample Size	1027	991	946	1123
Scituate	Coefficient	-0.676	1.242	0.672	0.936
	Standard Error	-2.013	-1.882	-0.959	-0.965
	Pseudo R^2	0.383	0.455	0.423	0.32
	Sample Size	211	210	213	217
Smithfield	Coefficient	-0.499*	-0.535*	-0.099	-0.307
	Standard Error	-0.277	-0.323	-0.287	-0.231
	Pseudo R^2	0.041	0.047	0.048	0.033
	Sample Size	954	935	949	998

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
South Kingstown	Coefficient	0.095	0.173	0.181	0.074
	Standard Error	-0.225	-0.238	-0.302	-0.206
	Pseudo R^2	0.019	0.021	0.031	0.018
	Sample Size	1454	1427	1376	1470
Tiverton	Coefficient	0.591	0.413	1.488*	0.662*
	Standard Error	-0.429	-0.441	-0.78	-0.381
	Pseudo R^2	0.119	0.117	0.11	0.072
	Sample Size	914	906	889	926
Univ Of Rhode Island	Coefficient	0.492	0.397	-0.364	0.001
	Standard Error	-0.934	-0.945	-0.829	-0.66
	Pseudo R^2	0.26	0.256	0.288	0.201
	Sample Size	181	179	178	191
Warren	Coefficient	0.411	0.499	16.030***	1.135*
	Standard Error	-0.643	-0.752	-0.178	-0.582
	Pseudo R^2	0.126	0.119	0.152	0.096
	Sample Size	724	716	705	745
Warwick	Coefficient	0.027	0.106	0.064	0.077
	Standard Error	-0.154	-0.169	-0.173	-0.13
	Pseudo R^2	0.016	0.013	0.019	0.013
	Sample Size	2896	2842	2853	3064
West Greenwich	Coefficient	0.526	-0.564	0.143	0.05
	Standard Error	-0.999	-1.628	-1.673	-1.216
	Pseudo R^2	0.301	0.35	0.402	0.289
	Sample Size	297	294	294	298
West Warwick	Coefficient	0.007	0.086	-0.291	-0.108
	Standard Error	-0.257	-0.284	-0.259	-0.206
	Pseudo R^2	0.036	0.035	0.026	0.02
	Sample Size	2037	2017	2010	2102
Westerly	Coefficient	-0.151	-0.411	0.337	-0.081
	Standard Error	-0.367	-0.437	-0.427	-0.328
	Pseudo R^2	0.052	0.096	0.128	0.079
	Sample Size	880	858	860	891
Woonsocket	Coefficient	-0.059	-0.011	0.022	0.013
	Standard Error	-0.249	-0.267	-0.204	-0.183
	Pseudo R^2	0.039	0.053	0.022	0.025
	Sample Size	767	745	829	917

Note 1: The coefficients are presented along with standard errors clustered at the officer level. A coefficient concatenated with * represents a p-value of .1, ** represents a p-value of .05, and *** represents a p-value of .01 significance.
Note 2: All specifications include controls for time of the day, day of the week, analysis year, inter-twilight window (e.g. morning and night), volume, and officer fixed-effects.
Note 3: Sample includes all traffic stops made during the inter-twilight window in 2016.

Table C.8: Logistic Regression of Minority Status on Daylight by Department with Officer Fixed-Effects, All Traffic Stops 2016

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
Barrington	Coefficient	0.161	0.450	0.753	0.571
	Standard Error	(0.593)	(0.807)	(0.478)	(0.472)
	Pseudo R^2	0.087	0.137	0.201	0.103
	Sample Size	891	873	872	902
Bristol	Coefficient	0.363	0.201	0.317	0.161
	Standard Error	(0.355)	(0.272)	(0.297)	(0.224)
	Pseudo R^2	0.068	0.080	0.123	0.071
	Sample Size	1605	1594	1576	1624
Burrillville	Coefficient	-0.237	-0.614*	0.616	0.125
	Standard Error	(0.403)	(0.318)	(0.396)	(0.357)
	Pseudo R^2	0.221	0.279	0.080	0.089
	Sample Size	885	882	884	902
Central Falls	Coefficient	-0.134	-0.150	0.258	0.197
	Standard Error	(0.122)	(0.130)	(0.169)	(0.134)
	Pseudo R^2	0.046	0.050	0.041	0.034
	Sample Size	602	599	958	1124
Charlestown	Coefficient	0.763***	1.099	-1.333	0.634
	Standard Error	(0.082)	(1.246)	(1.098)	(0.527)
	Pseudo R^2	0.134	0.257	0.543	0.232
	Sample Size	443	420	408	426
Coventry	Coefficient	0.502*	0.774**	0.570	0.661***
	Standard Error	(0.302)	(0.388)	(0.419)	(0.256)
	Pseudo R^2	0.104	0.124	0.125	0.088
	Sample Size	1343	1337	1345	1372
Cranston	Coefficient	0.212***	0.301***	0.268***	0.235***
	Standard Error	(0.070)	(0.088)	(0.092)	(0.073)
	Pseudo R^2	0.035	0.043	0.053	0.037
	Sample Size	4002	3790	3964	4676
Cumberland	Coefficient	0.353	0.341	-0.083	0.030
	Standard Error	(0.299)	(0.371)	(0.158)	(0.153)
	Pseudo R^2	0.102	0.120	0.047	0.048
	Sample Size	1038	1018	1077	1123
DEM	Coefficient	-0.224	30.428	2.708	3.018
	Standard Error	(.)	(.)	(.)	(.)
	Pseudo R^2	0.406	0.471	0.306	0.264
	Sample Size	107	102	108	115

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
East Greenwich	Coefficient	0.073	-0.206	-0.342	-0.111
	Standard Error	(0.459)	(0.565)	(0.424)	(0.393)
	Pseudo R^2	0.105	0.141	0.175	0.110
	Sample Size	655	641	631	655
East Providence	Coefficient	0.318**	0.294**	0.435***	0.323**
	Standard Error	(0.129)	(0.128)	(0.161)	(0.134)
	Pseudo R^2	0.056	0.063	0.071	0.063
	Sample Size	3674	3597	3270	3914
Foster	Coefficient	0.257	0.371	0.498	0.439*
	Standard Error	(0.393)	(0.376)	(0.330)	(0.254)
	Pseudo R^2	0.070	0.106	0.104	0.087
	Sample Size	942	908	903	969
Glocester	Coefficient	-0.021	-0.048	-0.541	-0.299
	Standard Error	(0.339)	(0.353)	(0.423)	(0.314)
	Pseudo R^2	0.119	0.116	0.177	0.085
	Sample Size	949	946	941	966
Hopkinton	Coefficient	-0.436*	-0.528	-0.528	-0.727***
	Standard Error	(0.234)	(0.403)	(0.647)	(0.271)
	Pseudo R^2	0.203	0.257	0.339	0.220
	Sample Size	427	417	415	432
Jamestown	Coefficient	-0.983***	-1.832	-2.818	-2.203
	Standard Error	(0.276)	(1.250)	(1.840)	(1.431)
	Pseudo R^2	0.338	0.400	0.341	0.294
	Sample Size	367	362	362	372
Johnston	Coefficient	-0.468***	-0.447***	-0.158*	-0.280***
	Standard Error	(0.061)	(0.069)	(0.086)	(0.090)
	Pseudo R^2	0.139	0.184	0.092	0.102
	Sample Size	873	858	929	989
Lincoln	Coefficient	-0.475***	-0.671**	0.485*	0.156
	Standard Error	(0.116)	(0.303)	(0.249)	(0.215)
	Pseudo R^2	0.093	0.128	0.087	0.068
	Sample Size	388	376	399	432
Little Compton	Coefficient	1.559*	1.201***	3.878	0.480
	Standard Error	(0.812)	(0.369)	(3.710)	(0.544)
	Pseudo R^2	0.442	0.508	0.554	0.333
	Sample Size	260	257	258	263

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
Middletown	Coefficient	0.035	0.235	0.906***	0.625**
	Standard Error	(0.465)	(0.454)	(0.298)	(0.300)
	Pseudo R^2	0.103	0.151	0.122	0.094
	Sample Size	576	563	560	613
Narragansett	Coefficient	0.343	0.403	0.921***	0.565***
	Standard Error	(0.230)	(0.317)	(0.311)	(0.191)
	Pseudo R^2	0.052	0.068	0.030	0.051
	Sample Size	1723	1705	1684	1755
Newport	Coefficient	0.402**	0.169	0.219	0.196
	Standard Error	(0.192)	(0.194)	(0.389)	(0.273)
	Pseudo R^2	0.065	0.071	0.086	0.066
	Sample Size	1453	1427	1363	1530
North Kingstown	Coefficient	0.332	0.159	0.308	0.244
	Standard Error	(0.576)	(0.675)	(0.554)	(0.558)
	Pseudo R^2	0.133	0.142	0.197	0.110
	Sample Size	705	693	686	717
North Providence	Coefficient	0.108	0.139	-0.306*	-0.019
	Standard Error	(0.133)	(0.148)	(0.182)	(0.132)
	Pseudo R^2	0.053	0.060	0.074	0.049
	Sample Size	882	869	806	985
North Smithfield	Coefficient	-0.006	-0.031	0.264	0.145
	Standard Error	(0.166)	(0.183)	(0.175)	(0.103)
	Pseudo R^2	0.080	0.079	0.068	0.060
	Sample Size	565	554	602	676
Pawtucket	Coefficient	-0.044	-0.065	0.004	-0.074
	Standard Error	(0.175)	(0.189)	(0.146)	(0.161)
	Pseudo R^2	0.083	0.086	0.038	0.056
	Sample Size	1370	1356	1359	1692
Portsmouth	Coefficient	0.480*	0.355	0.285	0.328
	Standard Error	(0.246)	(0.281)	(0.293)	(0.221)
	Pseudo R^2	0.048	0.051	0.087	0.044
	Sample Size	1589	1568	1503	1630
Providence	Coefficient	0.298***	0.259***	0.212***	0.234***
	Standard Error	(0.034)	(0.034)	(0.039)	(0.034)
	Pseudo R^2	0.014	0.014	0.013	0.010
	Sample Size	1623	1542	1526	2100

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
Richmond	Coefficient	-0.024	0.007	2.361**	0.222
	Standard Error	(0.744)	(0.979)	(1.135)	(0.902)
	Pseudo R^2	0.189	0.232	0.475	0.186
	Sample Size	479	464	452	469
RISP - Chepachet (Scituate Barracks) (002)	Coefficient	-0.081	0.043	0.646**	0.322
	Standard Error	(0.338)	(0.330)	(0.285)	(0.269)
	Pseudo R^2	0.081	0.099	0.095	0.077
	Sample Size	680	654	678	777
RISP - Hope Valley (006)	Coefficient	0.388***	0.407***	0.629***	0.511***
	Standard Error	(0.150)	(0.156)	(0.213)	(0.131)
	Pseudo R^2	0.057	0.069	0.101	0.064
	Sample Size	1082	1035	987	1171
RISP - HQ	Coefficient	0.185	0.248	0.360	0.360
	Standard Error	(0.345)	(0.370)	(0.339)	(0.287)
	Pseudo R^2	0.109	0.135	0.185	0.112
	Sample Size	220	213	191	224
RISP - Lincoln (001)	Coefficient	-0.217	-0.010	0.154	0.063
	Standard Error	(0.188)	(0.154)	(0.152)	(0.138)
	Pseudo R^2	0.095	0.086	0.103	0.076
	Sample Size	1356	1278	1238	1533
RISP - Wickford (004)	Coefficient	0.389	0.553*	0.344	0.478**
	Standard Error	(0.256)	(0.320)	(0.217)	(0.210)
	Pseudo R^2	0.059	0.071	0.105	0.076
	Sample Size	1027	991	946	1123
Scituate	Coefficient	2.487	2.487	0.769	2.679***
	Standard Error	(2.032)	(2.032)	(0.718)	(0.804)
	Pseudo R^2	0.608	0.532	0.583	0.388
	Sample Size	211	210	213	217
Smithfield	Coefficient	-0.493**	-0.561***	-0.092	-0.313
	Standard Error	(0.233)	(0.218)	(0.254)	(0.193)
	Pseudo R^2	0.075	0.093	0.099	0.067
	Sample Size	954	935	949	998
South Kingstown	Coefficient	0.107	0.231	0.296**	0.141
	Standard Error	(0.305)	(0.292)	(0.143)	(0.254)
	Pseudo R^2	0.056	0.070	0.116	0.067
	Sample Size	1454	1427	1376	1470

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
Tiverton	Coefficient	0.638	0.513	1.474***	0.706*
	Standard Error	(0.408)	(0.445)	(0.279)	(0.390)
	Pseudo R^2	0.142	0.144	0.155	0.096
	Sample Size	914	906	889	926
Univ Of Rhode Island	Coefficient	0.834	0.702	-0.601***	-0.055
	Standard Error	(0.848)	(0.803)	(0.186)	(0.403)
	Pseudo R^2	0.393	0.346	0.367	0.224
	Sample Size	181	179	178	191
Warren	Coefficient	0.302	0.815	15.298***	1.180**
	Standard Error	(0.547)	(0.603)	(0.559)	(0.472)
	Pseudo R^2	0.213	0.139	0.223	0.170
	Sample Size	724	716	705	745
Warwick	Coefficient	-0.023	0.045	-0.048	-0.010
	Standard Error	(0.136)	(0.127)	(0.149)	(0.100)
	Pseudo R^2	0.051	0.056	0.056	0.043
	Sample Size	2896	2842	2853	3064
West Greenwich	Coefficient	0.475	-0.632	0.105	0.516
	Standard Error	(0.598)	(1.686)	(1.339)	(1.096)
	Pseudo R^2	0.380	0.381	0.442	0.339
	Sample Size	297	294	294	298
West Warwick	Coefficient	0.058	0.149	-0.269	-0.052
	Standard Error	(0.238)	(0.267)	(0.259)	(0.187)
	Pseudo R^2	0.056	0.061	0.046	0.044
	Sample Size	2037	2017	2010	2102
Westerly	Coefficient	-0.104	-0.409*	0.565**	0.037
	Standard Error	(0.231)	(0.232)	(0.256)	(0.217)
	Pseudo R^2	0.089	0.148	0.179	0.108
	Sample Size	880	858	860	891
Woonsocket	Coefficient	-0.049	-0.020	-0.020	-0.036
	Standard Error	(0.107)	(0.146)	(0.084)	(0.079)
	Pseudo R^2	0.067	0.084	0.038	0.036
	Sample Size	767	745	829	917

Note 1: The coefficients are presented along with standard errors clustered at the officer level. A coefficient concatenated with * represents a p-value of .1, ** represents a p-value of .05, and *** represents a p-value of .01 significance.
Note 2: All specifications include controls for time of the day, day of the week, analysis year, inter-twilight window (e.g. morning and night), volume, and officer fixed-effects.
Note 3: Sample includes all traffic stops made during the inter-twilight window in 2016.

Table C.9: Logistic Regression of Minority Status on Daylight by Department, All Moving Violations 2016

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
Barrington	Coefficient	-0.149	0.198	0.397	0.252
	Standard Error	(0.439)	(0.655)	(0.538)	(0.407)
	Pseudo R^2	0.105	0.109	0.174	0.093
	Sample Size	732	718	715	738
Bristol	Coefficient	0.470	0.454	0.770*	0.518*
	Standard Error	(0.344)	(0.387)	(0.456)	(0.312)
	Pseudo R^2	0.031	0.041	0.122	0.032
	Sample Size	1026	1019	1000	1036
Burrillville	Coefficient	-0.528	-0.819	0.465	-0.033
	Standard Error	(0.597)	(0.665)	(0.498)	(0.413)
	Pseudo R^2	0.259	0.267	0.090	0.101
	Sample Size	653	652	654	667
Central Falls	Coefficient	-0.078	-0.089	0.367*	0.286
	Standard Error	(0.275)	(0.275)	(0.221)	(0.207)
	Pseudo R^2	0.049	0.048	0.036	0.030
	Sample Size	390	387	566	670
Charlestown	Coefficient	1.558*	1.071	-1.052	0.494
	Standard Error	(0.885)	(1.429)	(1.587)	(1.251)
	Pseudo R^2	0.164	0.301	0.453	0.248
	Sample Size	379	361	351	367
Coventry	Coefficient	0.217	0.699	0.199	0.402
	Standard Error	(0.488)	(0.517)	(0.511)	(0.374)
	Pseudo R^2	0.100	0.128	0.117	0.083
	Sample Size	961	956	961	979
Cranston	Coefficient	0.166	0.242**	0.268**	0.214**
	Standard Error	(0.113)	(0.123)	(0.117)	(0.096)
	Pseudo R^2	0.008	0.007	0.010	0.006
	Sample Size	2745	2599	2688	3157
Cumberland	Coefficient	0.282	0.375	-0.403	-0.134
	Standard Error	(0.318)	(0.383)	(0.307)	(0.255)
	Pseudo R^2	0.039	0.084	0.041	0.027
	Sample Size	815	802	841	875
DEM	Coefficient	0.801	17.429***	0.319	1.151
	Standard Error	(1.250)	(1.939)	(1.784)	(1.735)
	Pseudo R^2	0.365	0.393	0.368	0.291
	Sample Size	65	62	66	71

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
East Greenwich	Coefficient	0.233	-0.192	-0.487	-0.190
	Standard Error	(0.637)	(0.714)	(0.614)	(0.515)
	Pseudo R^2	0.101	0.158	0.177	0.110
	Sample Size	571	561	555	572
East Providence	Coefficient	0.113	0.078	0.079	0.079
	Standard Error	(0.150)	(0.156)	(0.209)	(0.139)
	Pseudo R^2	0.024	0.027	0.032	0.026
	Sample Size	2472	2422	2247	2592
Foster	Coefficient	-0.022	0.008	0.357	0.228
	Standard Error	(0.301)	(0.364)	(0.353)	(0.259)
	Pseudo R^2	0.073	0.098	0.084	0.061
	Sample Size	790	760	756	809
Glocester	Coefficient	0.105	0.081	-0.315	-0.152
	Standard Error	(0.438)	(0.463)	(0.479)	(0.348)
	Pseudo R^2	0.078	0.080	0.112	0.046
	Sample Size	885	882	876	901
Hopkinton	Coefficient	-0.348	-0.243	-0.570	-0.709
	Standard Error	(0.468)	(0.572)	(0.630)	(0.437)
	Pseudo R^2	0.221	0.270	0.340	0.240
	Sample Size	327	318	315	329
Jamestown	Coefficient	-1.545	-18.239	-17.433***	-17.978
	Standard Error	(1.163)	(.)	(1.531)	(.)
	Pseudo R^2	0.420	0.589	0.508	0.464
	Sample Size	222	217	213	221
Johnston	Coefficient	-0.226	-0.217	-0.025	-0.079
	Standard Error	(0.488)	(0.559)	(0.474)	(0.395)
	Pseudo R^2	0.098	0.149	0.092	0.078
	Sample Size	608	596	632	668
Lincoln	Coefficient	-0.090	-0.322	0.652	0.336
	Standard Error	(0.448)	(0.524)	(0.408)	(0.355)
	Pseudo R^2	0.142	0.164	0.093	0.073
	Sample Size	280	272	289	313
Little Compton	Coefficient	1.700	-14.167***	32.207***	0.948
	Standard Error	(2.187)	(2.061)	(1.349)	(1.818)
	Pseudo R^2	0.539	0.546	0.766	0.475
	Sample Size	169	167	168	170

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
Middletown	Coefficient	-0.045	0.189	0.350	0.343
	Standard Error	(0.416)	(0.452)	(0.564)	(0.371)
	Pseudo R^2	0.043	0.043	0.120	0.053
	Sample Size	447	435	435	472
Narragansett	Coefficient	0.515	0.635*	1.594***	0.981***
	Standard Error	(0.336)	(0.372)	(0.475)	(0.296)
	Pseudo R^2	0.048	0.053	0.138	0.055
	Sample Size	1342	1328	1312	1360
Newport	Coefficient	0.699***	0.419	-0.067	0.272
	Standard Error	(0.253)	(0.275)	(0.334)	(0.230)
	Pseudo R^2	0.064	0.068	0.075	0.053
	Sample Size	972	949	910	1004
North Kingstown	Coefficient	0.384	0.332	0.480	0.377
	Standard Error	(0.596)	(0.621)	(0.620)	(0.492)
	Pseudo R^2	0.096	0.092	0.176	0.072
	Sample Size	581	570	561	586
North Providence	Coefficient	0.014	0.179	-0.089	0.049
	Standard Error	(0.292)	(0.306)	(0.332)	(0.251)
	Pseudo R^2	0.033	0.044	0.115	0.050
	Sample Size	509	499	477	554
North Smithfield	Coefficient	0.513	0.383	0.286	0.238
	Standard Error	(0.465)	(0.495)	(0.406)	(0.329)
	Pseudo R^2	0.116	0.120	0.086	0.067
	Sample Size	316	307	316	354
Pawtucket	Coefficient	-0.347*	-0.408**	-0.286	-0.387**
	Standard Error	(0.197)	(0.199)	(0.210)	(0.173)
	Pseudo R^2	0.041	0.047	0.036	0.036
	Sample Size	875	863	839	1036
Portsmouth	Coefficient	0.019	-0.252	0.371	-0.011
	Standard Error	(0.301)	(0.332)	(0.398)	(0.273)
	Pseudo R^2	0.028	0.042	0.058	0.033
	Sample Size	1001	983	946	1018
Providence	Coefficient	0.287**	0.232*	0.202	0.224*
	Standard Error	(0.134)	(0.137)	(0.139)	(0.121)
	Pseudo R^2	0.016	0.016	0.014	0.012
	Sample Size	1374	1308	1279	1758

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
Richmond	Coefficient	0.010	-0.385	1.046	-0.084
	Standard Error	(0.563)	(0.704)	(1.249)	(0.548)
	Pseudo R^2	0.158	0.219	0.462	0.153
	Sample Size	400	386	375	391
RISP - Chepachet (Scituate Barracks) (002)	Coefficient	-0.168	-0.179	0.655	0.175
	Standard Error	(0.355)	(0.386)	(0.400)	(0.313)
	Pseudo R^2	0.038	0.052	0.060	0.035
	Sample Size	505	486	494	565
RISP - Hope Valley (006)	Coefficient	0.568**	0.523**	0.091	0.365*
	Standard Error	(0.230)	(0.252)	(0.277)	(0.216)
	Pseudo R^2	0.036	0.040	0.055	0.036
	Sample Size	770	731	692	827
RISP - HQ	Coefficient	0.217	0.282	0.176	0.262
	Standard Error	(0.495)	(0.528)	(0.610)	(0.502)
	Pseudo R^2	0.111	0.136	0.168	0.113
	Sample Size	193	187	167	196
RISP - Lincoln (001)	Coefficient	-0.479**	-0.046	0.045	0.027
	Standard Error	(0.188)	(0.204)	(0.220)	(0.174)
	Pseudo R^2	0.032	0.029	0.030	0.023
	Sample Size	918	852	821	1006
RISP - Wickford (004)	Coefficient	0.112	0.267	-0.107	0.176
	Standard Error	(0.252)	(0.272)	(0.290)	(0.227)
	Pseudo R^2	0.025	0.027	0.047	0.028
	Sample Size	713	684	644	767
Scituate	Coefficient	-0.900	0.909	-0.956	0.314
	Standard Error	(1.862)	(1.699)	(2.083)	(1.274)
	Pseudo R^2	0.392	0.468	0.620	0.434
	Sample Size	180	179	178	182
Smithfield	Coefficient	-0.176	-0.058	-0.177	-0.154
	Standard Error	(0.305)	(0.354)	(0.305)	(0.251)
	Pseudo R^2	0.055	0.060	0.046	0.029
	Sample Size	726	709	725	764
South Kingstown	Coefficient	0.280	0.454	-0.140	0.144
	Standard Error	(0.258)	(0.277)	(0.335)	(0.235)
	Pseudo R^2	0.033	0.048	0.030	0.025
	Sample Size	1229	1204	1171	1237

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
Tiverton	Coefficient	0.221	-0.034	1.178	0.085
	Standard Error	(0.574)	(0.628)	(1.210)	(0.554)
	Pseudo R^2	0.162	0.181	0.277	0.137
	Sample Size	495	489	482	497
Univ Of Rhode Island	Coefficient	0.648	0.485	-1.541	-0.202
	Standard Error	(1.041)	(1.026)	(1.031)	(0.758)
	Pseudo R^2	0.284	0.291	0.410	0.258
	Sample Size	149	148	145	157
Warren	Coefficient	0.619	0.929	15.398***	1.535**
	Standard Error	(0.680)	(0.784)	(0.419)	(0.622)
	Pseudo R^2	0.165	0.168	0.243	0.151
	Sample Size	500	497	482	517
Warwick	Coefficient	0.074	0.196	0.131	0.110
	Standard Error	(0.193)	(0.223)	(0.226)	(0.171)
	Pseudo R^2	0.019	0.015	0.027	0.018
	Sample Size	2051	2006	2018	2143
West Greenwich	Coefficient	0.027	-1.239	0.113	-0.373
	Standard Error	(1.044)	(1.259)	(1.858)	(1.096)
	Pseudo R^2	0.348	0.442	0.435	0.331
	Sample Size	257	254	254	258
West Warwick	Coefficient	-0.586*	-0.580	-0.303	-0.389
	Standard Error	(0.314)	(0.354)	(0.328)	(0.259)
	Pseudo R^2	0.087	0.087	0.035	0.032
	Sample Size	1337	1325	1324	1374
Westerly	Coefficient	0.110	-0.131	1.172**	0.423
	Standard Error	(0.400)	(0.480)	(0.568)	(0.389)
	Pseudo R^2	0.070	0.110	0.145	0.100
	Sample Size	704	684	685	708
Woonsocket	Coefficient	-0.221	-0.243	0.164	0.047
	Standard Error	(0.348)	(0.391)	(0.278)	(0.247)
	Pseudo R^2	0.072	0.117	0.051	0.043
	Sample Size	463	449	504	551

Note 1: The coefficients are presented along with standard errors clustered at the officer level. A coefficient concatenated with * represents a p-value of .1, ** represents a p-value of .05, and *** represents a p-value of .01 significance.
Note 2: All specifications include controls for time of the day, day of the week, analysis year, inter-twilight window (e.g. morning and night), volume, and officer fixed-effects.
Note 3: Sample includes all traffic stops made during the inter-twilight window in 2016.

Table C.10: Logistic Regression of Minority Status on Daylight by Department with Officer Fixed-Effects, All Moving Violations 2016

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
Barrington	Coefficient	-0.224	-0.009	0.650	0.265
	Standard Error	(0.617)	(0.828)	(0.483)	(0.467)
	Pseudo R^2	0.117	0.173	0.240	0.110
	Sample Size	732	718	715	738
Bristol	Coefficient	0.382	0.405	0.571	0.405
	Standard Error	(0.422)	(0.315)	(0.512)	(0.320)
	Pseudo R^2	0.116	0.131	0.216	0.112
	Sample Size	1026	1019	1000	1036
Burrillville	Coefficient	-0.754	-1.142***	0.341	-0.136
	Standard Error	(0.579)	(0.404)	(0.630)	(0.453)
	Pseudo R^2	0.394	0.408	0.131	0.156
	Sample Size	653	652	654	667
Central Falls	Coefficient	-0.131	-0.144	0.434**	0.328***
	Standard Error	(0.144)	(0.152)	(0.203)	(0.124)
	Pseudo R^2	0.093	0.097	0.074	0.064
	Sample Size	390	387	566	670
Charlestown	Coefficient	1.602***	1.157	-2.078	0.537
	Standard Error	(0.347)	(1.306)	(1.675)	(0.389)
	Pseudo R^2	0.189	0.356	0.544	0.300
	Sample Size	379	361	351	367
Coventry	Coefficient	0.224	0.735**	0.118	0.428
	Standard Error	(0.207)	(0.308)	(0.538)	(0.287)
	Pseudo R^2	0.151	0.177	0.178	0.119
	Sample Size	961	956	961	979
Cranston	Coefficient	0.228**	0.335***	0.294**	0.257***
	Standard Error	(0.096)	(0.108)	(0.120)	(0.084)
	Pseudo R^2	0.046	0.058	0.076	0.053
	Sample Size	2745	2599	2688	3157
Cumberland	Coefficient	0.139	0.263	-0.364	-0.146
	Standard Error	(0.304)	(0.384)	(0.236)	(0.205)
	Pseudo R^2	0.105	0.146	0.079	0.072
	Sample Size	815	802	841	875
DEM	Coefficient	0.801	17.429	0.319	1.151
	Standard Error	(.)	(.)	(.)	(.)
	Pseudo R^2	0.365	0.393	0.368	0.291
	Sample Size	65	62	66	71

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
East Greenwich	Coefficient	0.226	-0.180	-0.756	-0.231
	Standard Error	(0.578)	(0.810)	(0.510)	(0.523)
	Pseudo R^2	0.133	0.212	0.323	0.163
	Sample Size	571	561	555	572
East Providence	Coefficient	0.209	0.175	0.223	0.184
	Standard Error	(0.164)	(0.171)	(0.233)	(0.178)
	Pseudo R^2	0.056	0.064	0.082	0.064
	Sample Size	2472	2422	2247	2592
Foster	Coefficient	-0.039	-0.058	0.422	0.222*
	Standard Error	(0.414)	(0.298)	(0.332)	(0.117)
	Pseudo R^2	0.102	0.126	0.126	0.094
	Sample Size	790	760	756	809
Glocester	Coefficient	-0.018	-0.048	-0.510	-0.261
	Standard Error	(0.372)	(0.382)	(0.536)	(0.344)
	Pseudo R^2	0.123	0.120	0.208	0.084
	Sample Size	885	882	876	901
Hopkinton	Coefficient	-0.501	-0.518	-0.393	-0.807***
	Standard Error	(0.371)	(0.498)	(0.981)	(0.277)
	Pseudo R^2	0.260	0.330	0.426	0.283
	Sample Size	327	318	315	329
Jamestown	Coefficient	-1.655*	-18.826	-18.470	-19.018
	Standard Error	(0.934)	(.)	(.)	(.)
	Pseudo R^2	0.446	0.639	0.658	0.548
	Sample Size	222	217	213	221
Johnston	Coefficient	-0.297*	-0.293	-0.084	-0.184
	Standard Error	(0.178)	(0.218)	(0.082)	(0.134)
	Pseudo R^2	0.165	0.218	0.107	0.102
	Sample Size	608	596	632	668
Lincoln	Coefficient	-0.366	-0.571	0.709***	0.293
	Standard Error	(0.318)	(0.656)	(0.260)	(0.366)
	Pseudo R^2	0.198	0.227	0.132	0.113
	Sample Size	280	272	289	313
Little Compton	Coefficient	-3.654**	-47.400	55.371	0.274
	Standard Error	(1.643)	(.)	(.)	(1.069)
	Pseudo R^2	0.927	0.872	1.000	0.527
	Sample Size	169	167	168	170

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
Middletown	Coefficient	-0.010	0.342	0.493	0.519
	Standard Error	(0.465)	(0.451)	(0.579)	(0.434)
	Pseudo R^2	0.095	0.139	0.210	0.116
	Sample Size	447	435	435	472
Narragansett	Coefficient	0.501**	0.579*	1.541***	0.911***
	Standard Error	(0.219)	(0.315)	(0.432)	(0.224)
	Pseudo R^2	0.085	0.095	0.199	0.094
	Sample Size	1342	1328	1312	1360
Newport	Coefficient	0.685**	0.394	-0.068	0.271
	Standard Error	(0.272)	(0.321)	(0.541)	(0.402)
	Pseudo R^2	0.099	0.104	0.128	0.091
	Sample Size	972	949	910	1004
North Kingstown	Coefficient	0.410	0.307	0.911	0.482
	Standard Error	(0.505)	(0.564)	(0.582)	(0.480)
	Pseudo R^2	0.187	0.189	0.344	0.173
	Sample Size	581	570	561	586
North Providence	Coefficient	0.119	0.326*	-0.364	0.092
	Standard Error	(0.148)	(0.179)	(0.295)	(0.153)
	Pseudo R^2	0.069	0.087	0.178	0.083
	Sample Size	509	499	477	554
North Smithfield	Coefficient	0.515	0.340	0.403***	0.284
	Standard Error	(0.557)	(0.652)	(0.074)	(0.208)
	Pseudo R^2	0.156	0.164	0.106	0.089
	Sample Size	316	307	316	354
Pawtucket	Coefficient	-0.136	-0.206	-0.188	-0.254**
	Standard Error	(0.132)	(0.141)	(0.127)	(0.115)
	Pseudo R^2	0.087	0.093	0.050	0.061
	Sample Size	875	863	839	1036
Portsmouth	Coefficient	0.067	-0.141	0.531	0.132
	Standard Error	(0.209)	(0.283)	(0.526)	(0.209)
	Pseudo R^2	0.072	0.079	0.147	0.082
	Sample Size	1001	983	946	1018
Providence	Coefficient	0.286***	0.232***	0.199***	0.224***
	Standard Error	(0.040)	(0.041)	(0.044)	(0.039)
	Pseudo R^2	0.016	0.016	0.015	0.013
	Sample Size	1374	1308	1279	1758

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
Richmond	Coefficient	-0.353	-0.513	1.684	-0.077
	Standard Error	(1.029)	(1.400)	(1.421)	(1.151)
	Pseudo R^2	0.213	0.257	0.499	0.184
	Sample Size	400	386	375	391
RISP - Chepachet (Scituate Barracks) (002)	Coefficient	-0.278	-0.315	0.520	-0.018
	Standard Error	(0.309)	(0.390)	(0.608)	(0.436)
	Pseudo R^2	0.103	0.140	0.124	0.089
	Sample Size	505	486	494	565
RISP - Hope Valley (006)	Coefficient	0.586***	0.563***	0.232	0.442***
	Standard Error	(0.163)	(0.200)	(0.250)	(0.159)
	Pseudo R^2	0.061	0.074	0.134	0.073
	Sample Size	770	731	692	827
RISP - HQ	Coefficient	0.083	0.124	0.150	0.188
	Standard Error	(0.499)	(0.567)	(0.467)	(0.483)
	Pseudo R^2	0.121	0.158	0.212	0.120
	Sample Size	193	187	167	196
RISP - Lincoln (001)	Coefficient	-0.228	0.026	0.223	0.133
	Standard Error	(0.211)	(0.193)	(0.153)	(0.157)
	Pseudo R^2	0.114	0.094	0.120	0.088
	Sample Size	918	852	821	1006
RISP - Wickford (004)	Coefficient	0.154	0.273	-0.061	0.209
	Standard Error	(0.328)	(0.407)	(0.202)	(0.265)
	Pseudo R^2	0.075	0.091	0.140	0.095
	Sample Size	713	684	644	767
Scituate	Coefficient	1.980	1.980	-154.593	3.188**
	Standard Error	(2.072)	(2.072)	(.)	(1.400)
	Pseudo R^2	0.623	0.550	1.000	0.527
	Sample Size	180	179	178	182
Smithfield	Coefficient	-0.123	-0.096	-0.254	-0.206
	Standard Error	(0.255)	(0.234)	(0.294)	(0.212)
	Pseudo R^2	0.092	0.119	0.124	0.073
	Sample Size	726	709	725	764
South Kingstown	Coefficient	0.312	0.589*	-0.063	0.250
	Standard Error	(0.281)	(0.303)	(0.131)	(0.273)
	Pseudo R^2	0.067	0.094	0.111	0.072
	Sample Size	1229	1204	1171	1237

LHS: Minority Status		Non-Caucasian	Black	Hispanic	Black or Hispanic
Tiverton	Coefficient	0.274	-0.027	1.589	0.168
	Standard Error	(0.622)	(0.812)	(1.108)	(0.746)
	Pseudo R^2	0.207	0.249	0.369	0.192
	Sample Size	495	489	482	497
Univ Of Rhode Island	Coefficient	0.847	0.818	-1.766***	-0.053
	Standard Error	(0.784)	(0.772)	(0.590)	(0.662)
	Pseudo R^2	0.420	0.393	0.486	0.287
	Sample Size	149	148	145	157
Warren	Coefficient	0.846	1.289**	17.541***	1.837***
	Standard Error	(0.638)	(0.654)	(1.015)	(0.487)
	Pseudo R^2	0.306	0.311	0.303	0.228
	Sample Size	500	497	482	517
Warwick	Coefficient	-0.025	0.069	-0.005	-0.012
	Standard Error	(0.179)	(0.213)	(0.134)	(0.147)
	Pseudo R^2	0.066	0.073	0.079	0.052
	Sample Size	2051	2006	2018	2143
West Greenwich	Coefficient	-0.096	-0.913	0.012	0.084
	Standard Error	(0.793)	(1.283)	(1.013)	(0.760)
	Pseudo R^2	0.440	0.475	0.472	0.432
	Sample Size	257	254	254	258
West Warwick	Coefficient	-0.638***	-0.663***	-0.259	-0.395*
	Standard Error	(0.184)	(0.188)	(0.321)	(0.209)
	Pseudo R^2	0.110	0.118	0.066	0.059
	Sample Size	1337	1325	1324	1374
Westerly	Coefficient	0.250	0.003	1.332***	0.578**
	Standard Error	(0.234)	(0.214)	(0.372)	(0.250)
	Pseudo R^2	0.122	0.172	0.222	0.153
	Sample Size	704	684	685	708
Woonsocket	Coefficient	-0.296*	-0.352*	0.153	-0.009
	Standard Error	(0.173)	(0.213)	(0.115)	(0.100)
	Pseudo R^2	0.090	0.136	0.082	0.060
	Sample Size	463	449	504	551

Note 1: The coefficients are presented along with standard errors clustered at the officer level. A coefficient concatenated with * represents a p-value of .1, ** represents a p-value of .05, and *** represents a p-value of .01 significance.
Note 2: All specifications include controls for time of the day, day of the week, analysis year, inter-twilight window (e.g. morning and night), volume, and officer fixed-effects.
Note 3: Sample includes all traffic stops made during the inter-twilight window in 2016.

APPENDIX D

Table D.1: Inverse Propensity Score Weighted Logistic Regression of Minority Status on Department, All Traffic Stops 2016

Department	Estimate	Non-Caucasian	Black	Hispanic	Black or Hispanic
Barrington	Coefficient	0.873***	4.181***	6.105***	-0.895***
	Standard Error	(0.054)	(0.064)	(0.065)	(0.050)
	Sample Size	163,493	163,493	163,493	163,493
Bristol	Coefficient	-0.457***	-0.467***	-0.677***	-0.606***
	Standard Error	(0.066)	(0.072)	(0.084)	(0.058)
	Sample Size	174,338	174,338	174,338	174,338
Burrillville	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	40,158	40,158	40,158	40,158
Central Falls	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	104,094	104,094	104,094	104,094
Charlestown	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	40,589	40,589	40,589	40,589
Coventry	Coefficient	-1.837***	-1.970***	-1.900***	-2.001***
	Standard Error	(0.074)	(0.081)	(0.089)	(0.063)
	Sample Size	169,536	169,536	169,536	169,536
Cranston	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	65,376	65,376	65,376	65,376
Cumberland	Coefficient	-0.061	10.547***	0.499***	0.293***
	Standard Error	(0.048)	(0.051)	(0.044)	(0.037)
	Sample Size	189,856	189,856	189,856	189,856
East Greenwich	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	38,820	38,820	38,820	38,820
East Providence	Coefficient	0.151***	0.170***	-0.641***	-0.156***
	Standard Error	(0.022)	(0.023)	(0.031)	(0.020)
	Sample Size	161,886	161,886	161,886	161,886
Foster	Coefficient	0.773***	0.587***	0.686***	0.723***
	Standard Error	(0.074)	(0.089)	(0.094)	(0.068)
	Sample Size	92,854	92,854	92,854	92,854
Glocester	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	57,870	57,870	57,870	57,870

Department	Estimate	Non-Caucasian	Black	Hispanic	Black or Hispanic
Hopkinton	Coefficient	0.111	-0.184**	-0.740***	-0.501***
	Standard Error	(0.073)	(0.086)	(0.089)	(0.066)
	Sample Size	118,892	118,892	118,892	118,892
Jamestown	Coefficient	17.753***	-0.834***	-2.262***	-17.307***
	Standard Error	(0.088)	(0.106)	(0.117)	(0.081)
	Sample Size	73,344	73,344	73,344	73,344
Johnston	Coefficient	2.387***	16.522***	1.039***	0.491***
	Standard Error	(0.054)	(0.058)	(0.060)	(0.047)
	Sample Size	174,338	174,338	174,338	174,338
Lincoln	Coefficient	0.326***	0.288***	1.136***	0.783***
	Standard Error	(0.065)	(0.071)	(0.060)	(0.051)
	Sample Size	189,856	189,856	189,856	189,856
Little Compton	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	62,000	62,000	62,000	62,000
Middletown	Coefficient	0.362***	0.425***	22.016***	0.148***
	Standard Error	(0.066)	(0.071)	(0.051)	(0.057)
	Sample Size	180,069	180,069	180,069	180,069
Narragansett	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	78,743	78,743	78,743	78,743
Newport	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	55,519	55,519	55,519	55,519
North Kingstown	Coefficient	7.522***	-0.294***	-0.438***	-0.351***
	Standard Error	(0.050)	(0.058)	(0.065)	(0.046)
	Sample Size	189,856	189,856	189,856	189,856
North Providence	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	12,028	12,028	12,028	12,028
North Smithfield	Coefficient	1.111***	1.248***	1.383***	1.428***
	Standard Error	(0.167)	(0.208)	(0.206)	(0.157)
	Sample Size	170,229	170,229	170,229	170,229
Pawtucket	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	103,842	103,842	103,842	103,842
Portsmouth	Coefficient	0.987***	1.089***	0.477*	0.882***
	Standard Error	(0.333)	(0.402)	(0.288)	(0.286)
	Sample Size	174,308	174,308	174,308	174,308

Department	Estimate	Non-Caucasian	Black	Hispanic	Black or Hispanic
Providence	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	183,395	183,395	183,395	183,395
Richmond	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	59,931	59,931	59,931	59,931
Scituate	Coefficient	5.210***	9.259***	0.625***	-10.473***
	Standard Error	(0.152)	(0.172)	(0.182)	(0.128)
	Sample Size	101,262	101,262	101,262	101,262
Smithfield	Coefficient	19.556***	-0.161**	-0.201***	-0.164***
	Standard Error	(0.057)	(0.069)	(0.069)	(0.052)
	Sample Size	114,192	114,192	114,192	114,192
South Kingstown	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	31,143	31,143	31,143	31,143
Tiverton	Coefficient	-0.626***	-0.597***	-1.014***	-0.768***
	Standard Error	(0.075)	(0.082)	(0.107)	(0.067)
	Sample Size	170,991	170,991	170,991	170,991
Warren	Coefficient	0.945***	-0.102	-0.951***	-0.503***
	Standard Error	(0.074)	(0.084)	(0.105)	(0.069)
	Sample Size	130,872	130,872	130,872	130,872
Warwick	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	90,321	90,321	90,321	90,321
West Greenwich	Coefficient	-0.784***	-0.846***	-1.080***	-0.972***
	Standard Error	(0.167)	(0.187)	(0.200)	(0.142)
	Sample Size	165,314	165,314	165,314	165,314
West Warwick	Coefficient	-0.332***	-0.346***	2.424***	-0.379***
	Standard Error	(0.076)	(0.076)	(0.061)	(0.063)
	Sample Size	122,562	122,562	122,562	122,562
Westerly	Coefficient	2.006***	-1.090***	1.378***	0.707***
	Standard Error	(0.056)	(0.066)	(0.079)	(0.053)
	Sample Size	72,286	72,286	72,286	72,286
Woonsocket	Coefficient	-0.199***	3.819***	2.311***	-0.528***
	Standard Error	(0.048)	(0.044)	(0.039)	(0.041)
	Sample Size	70,030	70,030	70,030	70,030

Note 1: The coefficients are presented along with robust standard errors. A coefficient concatenated with * represents a p-value of .1, ** represents a p-value of .05, and *** represents a p-value of .01 significance.

Note 2: Propensity scores were estimated using principal components analysis of traffic stop characteristics as well as Census data selected using the Kaiser-Guttman stopping rule. Traffic stop characteristics include time of the day, day of the week, month, department traffic stop volume, and officer traffic stop volume. Census demographics for both the primary and border towns include retail employment, entertainment employment, commuting population, vacant housing, rental housing, earnings, population density, gender, age, race, and ethnicity.

Table D.2: Doubly-Robust Inverse Propensity Score Weighted Logistic Regression of Minority Status on Department, All Traffic Stops 2016

Department	Estimate	Non-Caucasian	Black	Hispanic	Black or Hispanic
Barrington	Coefficient	-0.164	-0.439	-0.185	0.218
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	163,489	163,489	163,489	163,489
Bristol	Coefficient	-0.590***	15.201	39.187	7.491
	Standard Error	(0.127)	(~0.000)	(995.373)	(~0.000)
	Sample Size	174,338	174,338	174,338	174,338
Burrillville	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	40,158	40,158	40,158	40,158
Central Falls	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	104,094	104,094	104,094	104,094
Charlestown	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	40,589	40,589	40,589	40,589
Coventry	Coefficient	-1.135***	-1.177***	5.543	1.186***
	Standard Error	(0.426)	(0.434)	(~0.000)	(0.265)
	Sample Size	169,536	169,536	169,536	169,536
Cranston	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	65,363	65,363	65,363	65,363
Cumberland	Coefficient	0.103*	0.224***	0.894***	0.593***
	Standard Error	(0.053)	(0.059)	(0.049)	(0.040)
	Sample Size	189,856	189,856	189,856	189,856
East Greenwich	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	38,820	38,820	38,820	38,820
East Providence	Coefficient	-0.599***	-1.957	-1.108	0.539
	Standard Error	(0.158)	(~0.000)	(1.066)	(~0.000)
	Sample Size	161,886	161,886	161,886	161,886
Foster	Coefficient	2.433***	2.312***	10.017***	2.386***
	Standard Error	(0.198)	(0.262)	(0.258)	(0.200)
	Sample Size	92,854	92,854	92,854	92,854
Glocester	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	57,870	57,870	57,870	57,870

Department	Estimate	Non-Caucasian	Black	Hispanic	Black or Hispanic
Hopkinton	Coefficient	1.444***	9.856***	-0.017	0.159
	Standard Error	(0.440)	(0.153)	(0.304)	(0.378)
	Sample Size	118,892	118,892	118,892	118,892
Jamestown	Coefficient	-0.537	-0.770	-0.685	-0.349
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	73,344	73,344	73,344	73,344
Johnston	Coefficient	0.184	2.544***	22.187	1.322***
	Standard Error	(0.215)	(0.185)	(23.359)	(0.160)
	Sample Size	174,338	174,338	174,338	174,338
Lincoln	Coefficient	0.546***	3.145***	1.400***	1.044***
	Standard Error	(0.070)	(0.143)	(0.068)	(0.055)
	Sample Size	189,856	189,856	189,856	189,856
Little Compton	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	62,000	62,000	62,000	62,000
Middletown	Coefficient	0.496***	0.597***	0.293***	0.464***
	Standard Error	(0.070)	(0.079)	(0.099)	(0.065)
	Sample Size	180,069	180,069	180,069	180,069
Narragansett	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	78,743	78,743	78,743	78,743
Newport	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	55,519	55,519	55,519	55,519
North Kingstown	Coefficient	-0.065	0.014	-0.036	-0.026
	Standard Error	(0.054)	(0.063)	(0.069)	(0.049)
	Sample Size	189,856	189,856	189,856	189,856
North Providence	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	12,028	12,028	12,028	12,028
North Smithfield	Coefficient	1.239***	1.275***	1.477***	1.448***
	Standard Error	(0.198)	(0.226)	(0.165)	(0.139)
	Sample Size	170,229	170,229	170,229	170,229
Pawtucket	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	103,842	103,842	103,842	103,842
Portsmouth	Coefficient	-2.721	24.274	68.808	0.867
	Standard Error	(3.556)	(875.882)	(~0.000)	(1.095)
	Sample Size	174,308	174,308	174,308	174,308

Department	Estimate	Non-Caucasian	Black	Hispanic	Black or Hispanic
Providence	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	183,395	183,395	183,395	183,395
Richmond	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	59,931	59,931	59,931	59,931
Scituate	Coefficient	-1.455*	-1.501	-2.135	-1.188
	Standard Error	(0.805)	(3.026)	(1.340)	(1.087)
	Sample Size	101,262	101,262	101,262	101,262
Smithfield	Coefficient	1.849***	1.450***	14.508	0.753***
	Standard Error	(0.071)	(0.082)	(~0.000)	(0.195)
	Sample Size	114,192	114,192	114,192	114,192
South Kingstown	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	31,143	31,143	31,143	31,143
Tiverton	Coefficient	-34.426***	-23.245***	0.909	3.281
	Standard Error	(0.225)	(0.235)	(2.215)	(29.915)
	Sample Size	170,988	170,988	170,988	170,988
Warren	Coefficient	0.075	4.904	-0.841	-0.001
	Standard Error	(0.985)	(~0.000)	(~0.000)	(0.990)
	Sample Size	130,872	130,872	130,872	130,872
Warwick	Coefficient	0.000	0.000	0.000	0.000
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	90,321	90,321	90,321	90,321
West Greenwich	Coefficient	169.433***	-77.002	0.502	8.882
	Standard Error	(30.801)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	165,314	165,314	165,314	165,314
West Warwick	Coefficient	-1.478	-1.253	0.625	0.005
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	122,562	122,562	122,562	122,562
Westerly	Coefficient	-0.143	-0.252	-0.732	-0.411
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(~0.000)
	Sample Size	72,286	72,286	72,286	72,286
Woonsocket	Coefficient	1.097	1.187	0.290	0.769***
	Standard Error	(~0.000)	(~0.000)	(~0.000)	(0.113)
	Sample Size	70,030	70,030	70,030	70,030

Note 1: The coefficients are presented along with robust standard errors. A coefficient concatenated with * represents a p-value of .1, ** represents a p-value of .05, and *** represents a p-value of .01 significance.
Note 2: Estimates include principal components used to generate propensity scores as a control for balancing between treatment and control.
Note 3: Sample includes all traffic stops made by the primary department and an inverse propensity score weighted sample of all other departments in 2016.

APPENDIX E

Table E.1: Statewide Average Comparisons for Black Motorists, All Departments

Department Name	Black Stops	Difference Between Town and State Average	Black Residents Age 16+	Difference Between Town and State Average	Difference Between Net Differences
Barrington	5.1%	-6.3%	0.00%	-4.5%	-1.8%
Bristol	3.7%	-7.7%	0.70%	-3.8%	-3.9%
Burrillville	2.6%	-8.8%	0.00%	-4.5%	-4.3%
Central Falls	15.0%	3.6%	6.80%	2.3%	1.3%
Charlestown	4.7%	-6.7%	0.00%	-4.5%	-2.2%
Coventry	2.6%	-8.8%	0.50%	-4.0%	-4.8%
Cranston	13.7%	2.3%	4.60%	0.1%	2.2%
Cumberland	6.4%	-5.0%	1.10%	-3.4%	-1.6%
East Greenwich	4.7%	-6.7%	0.80%	-3.7%	-3.0%
East Providence	16.8%	5.4%	5.20%	0.7%	4.7%
Foster	7.0%	-4.4%	0.00%	-4.5%	0.1%
Glocester	3.9%	-7.5%	0.00%	-4.5%	-3.0%
Hopkinton	5.3%	-6.1%	0.00%	-4.5%	-1.6%
Jamestown	4.4%	-7.0%	0.00%	-4.5%	-2.5%
Johnston	7.2%	-4.2%	1.60%	-2.9%	-1.3%
Lincoln	8.3%	-3.1%	1.30%	-3.2%	0.1%
Little Compton	1.9%	-9.5%	0.00%	-4.5%	-5.0%
Middletown	10.7%	-0.7%	4.20%	-0.3%	-0.4%
Narragansett	4.8%	-6.6%	0.70%	-3.8%	-2.8%
Newport	12.3%	0.9%	6.10%	1.6%	-0.7%
North Kingstown	6.1%	-5.3%	0.80%	-3.7%	-1.6%
North Providence	16.4%	5.0%	3.90%	-0.6%	5.6%
North Smithfield	12.2%	0.8%	0.00%	-4.5%	5.3%
Pawtucket	20.8%	9.4%	11.10%	6.6%	2.8%
Portsmouth	8.3%	-3.1%	1.30%	-3.2%	0.1%
Providence	27.0%	15.6%	12.40%	7.9%	7.7%
Richmond	4.0%	-7.4%	0.00%	-4.5%	-2.9%
Scituate	3.0%	-8.4%	0.00%	-4.5%	-3.9%
Smithfield	5.7%	-5.7%	1.20%	-3.3%	-2.4%
South Kingstown	7.6%	-3.8%	2.10%	-2.4%	-1.4%
Tiverton	4.8%	-6.6%	0.80%	-3.7%	-2.9%
Warren	6.0%	-5.4%	0.90%	-3.6%	-1.8%
Warwick	7.0%	-4.4%	1.40%	-3.1%	-1.3%
West Greenwich	2.5%	-8.9%	0.00%	-4.5%	-4.4%
West Warwick	5.1%	-6.3%	1.90%	-2.6%	-3.7%
Westerly	4.7%	-6.7%	0.80%	-3.7%	-3.0%
Woonsocket	12.9%	1.5%	4.90%	0.4%	1.1%

Table E.2: Statewide Average Comparisons for Hispanic Motorists, All Departments

Department Name	Hispanic Stops	Difference Between Town and State Average	Hispanic Residents Age 16+	Difference Between Town and State Average	Difference Between Net Differences
Barrington	5.0%	-8.0%	1.60%	-8.9%	0.9%
Bristol	3.0%	-10.0%	1.70%	-8.8%	-1.2%
Burrillville	3.5%	-9.5%	1.30%	-9.2%	-0.3%
Central Falls	49.9%	36.9%	57.60%	47.1%	-10.2%
Charlestown	1.9%	-11.1%	1.30%	-9.2%	-1.9%
Coventry	2.4%	-10.6%	1.40%	-9.1%	-1.5%
Cranston	21.1%	8.1%	9.20%	-1.3%	9.4%
Cumberland	11.5%	-1.5%	3.80%	-6.7%	5.2%
East Greenwich	4.1%	-8.9%	1.30%	-9.2%	0.3%
East Providence	9.5%	-3.5%	3.10%	-7.4%	3.9%
Foster	6.5%	-6.5%	0.00%	-10.5%	4.0%
Glocester	3.5%	-9.5%	1.00%	-9.5%	0.0%
Hopkinton	5.4%	-7.6%	1.60%	-8.9%	1.3%
Jamestown	3.7%	-9.3%	0.00%	-10.5%	1.2%
Johnston	13.2%	0.2%	4.60%	-5.9%	6.1%
Lincoln	15.9%	2.9%	3.30%	-7.2%	10.1%
Little Compton	3.2%	-9.8%	0.00%	-10.5%	0.7%
Middletown	8.1%	-4.9%	3.90%	-6.6%	1.7%
Narragansett	4.3%	-8.7%	1.40%	-9.1%	0.4%
Newport	7.1%	-5.9%	6.80%	-3.7%	-2.2%
North Kingstown	5.2%	-7.8%	1.80%	-8.7%	0.9%
North Providence	13.0%	0.0%	6.50%	-4.0%	4.0%
North Smithfield	16.8%	3.8%	1.80%	-8.7%	12.5%
Pawtucket	25.7%	12.7%	17.40%	6.9%	5.8%
Portsmouth	3.9%	-9.1%	1.70%	-8.8%	-0.3%
Providence	36.0%	23.0%	33.50%	23.0%	0.0%
Richmond	2.4%	-10.6%	1.50%	-9.0%	-1.6%
Scituate	2.8%	-10.2%	0.90%	-9.6%	-0.6%
Smithfield	6.2%	-6.8%	2.00%	-8.5%	1.7%
South Kingstown	3.8%	-9.2%	2.70%	-7.8%	-1.4%
Tiverton	2.8%	-10.2%	0.80%	-9.7%	-0.5%
Warren	3.8%	-9.2%	1.40%	-9.1%	-0.1%
Warwick	8.1%	-4.9%	2.80%	-7.7%	2.8%
West Greenwich	2.4%	-10.6%	1.80%	-8.7%	-1.9%
West Warwick	5.2%	-7.8%	3.80%	-6.7%	-1.1%
Westerly	3.4%	-9.6%	2.20%	-8.3%	-1.3%
Woonsocket	20.0%	7.0%	10.70%	0.2%	6.8%

Table E.3: Statewide Average Comparisons for Minority Motorists, All Departments

Department Name	Minority Stops	Difference Between Town and State Average	Minority Residents Age 16+	Difference Between Town and State Average	Difference Between Net Differences
Barrington	12.3%	-14.3%	4.8%	-15.6%	1.3%
Bristol	7.7%	-18.9%	4.2%	-16.2%	-2.7%
Burrillville	6.8%	-19.8%	2.0%	-18.4%	-1.4%
Central Falls	65.4%	38.8%	69.8%	49.4%	-10.6%
Charlestown	8.8%	-17.8%	4.0%	-16.4%	-1.4%
Coventry	5.7%	-20.9%	3.4%	-17.0%	-3.9%
Cranston	38.9%	12.3%	20.3%	-0.1%	12.4%
Cumberland	19.3%	-7.3%	8.3%	-12.1%	4.8%
East Greenwich	10.7%	-15.9%	6.5%	-13.9%	-2.0%
East Providence	28.0%	1.4%	15.6%	-4.8%	6.2%
Foster	18.2%	-8.4%	0.0%	-20.4%	12.0%
Glocester	8.1%	-18.5%	1.0%	-19.4%	0.9%
Hopkinton	13.8%	-12.8%	2.5%	-17.9%	5.1%
Jamestown	10.3%	-16.3%	0.0%	-20.4%	4.1%
Johnston	21.9%	-4.7%	8.9%	-11.5%	6.8%
Lincoln	26.6%	0.0%	8.2%	-12.2%	12.2%
Little Compton	6.0%	-20.6%	0.0%	-20.4%	-0.2%
Middletown	20.5%	-6.1%	12.5%	-7.9%	1.8%
Narragansett	10.3%	-16.3%	4.3%	-16.1%	-0.2%
Newport	20.9%	-5.7%	18.1%	-2.3%	-3.4%
North Kingstown	13.0%	-13.6%	5.5%	-14.9%	1.3%
North Providence	30.5%	3.9%	14.4%	-6.0%	9.9%
North Smithfield	31.4%	4.8%	3.5%	-16.9%	21.7%
Pawtucket	47.6%	21.0%	38.7%	18.3%	2.7%
Portsmouth	13.6%	-13.0%	5.5%	-14.9%	1.9%
Providence	66.5%	39.9%	56.9%	36.5%	3.4%
Richmond	8.7%	-17.9%	2.7%	-17.7%	-0.2%
Scituate	6.7%	-19.9%	0.9%	-19.5%	-0.4%
Smithfield	13.5%	-13.1%	5.1%	-15.3%	2.2%
South Kingstown	13.6%	-13.0%	10.1%	-10.3%	-2.7%
Tiverton	8.6%	-18.0%	3.2%	-17.2%	-0.8%
Warren	11.0%	-15.6%	3.2%	-17.2%	1.6%
Warwick	17.1%	-9.5%	7.8%	-12.6%	3.1%
West Greenwich	5.7%	-20.9%	1.8%	-18.6%	-2.3%
West Warwick	11.7%	-14.9%	9.2%	-11.2%	-3.7%
Westerly	10.2%	-16.4%	7.0%	-13.4%	-3.0%
Woonsocket	36.4%	9.8%	23.3%	2.9%	6.9%

Table E.4: Ratio of Minority EDP to Minority Stops, All Departments

Department Name	Number of Stops	% Minority Stops	% Minority EDP	Absolute Difference	Ratio
Barrington	1,409	10.4%	6.5%	3.9%	1.59
Bristol	1,749	5.4%	6.6%	-1.2%	0.82
Burrillville	946	5.7%	3.9%	1.8%	1.46
Central Falls	1,101	65.1%	62.5%	2.6%	1.04
Charlestown	552	5.6%	4.7%	0.9%	1.19
Coventry	1,506	5.1%	5.0%	0.1%	1.02
Cranston	5,687	38.1%	19.9%	18.2%	1.92
Cumberland	1,607	18.1%	11.6%	6.5%	1.56
East Greenwich	705	9.6%	9.3%	0.3%	1.04
East Providence	4,062	22.4%	16.7%	5.7%	1.34
Foster	731	11.4%	1.0%	10.4%	11.35
Glocester	1,141	9.2%	2.3%	6.9%	4.00
Hopkinton	669	9.9%	3.4%	6.5%	2.90
Jamestown	473	5.9%	1.9%	4.0%	3.12
Johnston	2,012	20.2%	12.4%	7.8%	1.63
Lincoln	581	24.8%	13.1%	11.7%	1.89
Little Compton	305	5.2%	1.1%	4.1%	4.77
Middletown	1,106	18.4%	12.3%	6.1%	1.50
Narragansett	1,502	8.3%	5.7%	2.6%	1.45
Newport	1,219	16.7%	16.4%	0.3%	1.02
North Kingstown	738	10.7%	9.0%	1.7%	1.19
North Providence	1,367	27.1%	15.8%	11.3%	1.72
North Smithfield	774	25.8%	7.4%	18.4%	3.49
Pawtucket	3,219	44.1%	34.6%	9.5%	1.27
Portsmouth	2,369	11.4%	6.9%	4.5%	1.65
Providence	2,334	62.8%	40.3%	22.5%	1.56
Richmond	404	6.7%	4.7%	2.0%	1.42
Scituate	352	6.5%	2.9%	3.6%	2.25
Smithfield	1,722	13.0%	9.9%	3.1%	1.31
South Kingstown	1,547	10.1%	10.4%	-0.3%	0.98
Tiverton	940	7.1%	4.1%	3.0%	1.74
Warren	1,048	11.7%	5.6%	6.1%	2.10
Warwick	3,839	13.7%	11.4%	2.3%	1.20
West Greenwich	341	3.5%	5.7%	-2.2%	0.62
West Warwick	2,031	9.4%	10.2%	-0.8%	0.92
Westerly	1,107	7.7%	7.9%	-0.2%	0.97
Woonsocket	1,140	31.0%	21.4%	9.6%	1.45

Table E.5: Ratio of Black EDP to Black Stops, All Departments

Department Name	Number of Stops	% Black Stops	% Black EDP	Absolute Difference	Ratio
Barrington	1,409	3.4%	0.6%	2.8%	5.78
Bristol	1,749	2.5%	1.4%	1.1%	1.79
Burrillville	946	1.8%	0.5%	1.3%	3.85
Central Falls	1,101	14.9%	6.7%	8.2%	2.23
Charlestown	552	2.5%	0.2%	2.3%	10.47
Coventry	1,506	2.3%	0.9%	1.3%	2.45
Cranston	5,687	13.6%	4.5%	9.0%	2.99
Cumberland	1,607	5.0%	2.0%	2.9%	2.43
East Greenwich	705	3.1%	1.7%	1.4%	1.84
East Providence	4,062	13.0%	4.9%	8.1%	2.65
Foster	731	4.1%	0.2%	3.9%	19.35
Glocester	1,141	4.2%	0.3%	3.9%	13.17
Hopkinton	669	4.2%	0.3%	3.9%	15.72
Jamestown	473	2.5%	0.5%	2.0%	5.18
Johnston	2,012	6.6%	2.5%	4.1%	2.59
Lincoln	581	8.1%	2.7%	5.4%	3.01
Little Compton	305	2.0%	0.3%	1.7%	7.50
Middletown	1,106	9.1%	3.8%	5.4%	2.42
Narragansett	1,502	3.6%	1.1%	2.5%	3.35
Newport	1,219	8.6%	5.3%	3.3%	1.63
North Kingstown	738	4.7%	1.8%	3.0%	2.69
North Providence	1,367	14.5%	4.1%	10.4%	3.53
North Smithfield	774	9.9%	1.1%	8.9%	9.25
Pawtucket	3,219	17.3%	9.5%	7.7%	1.81
Portsmouth	2,369	6.4%	1.7%	4.7%	3.82
Providence	2,334	25.1%	8.9%	16.1%	2.80
Richmond	404	2.0%	0.6%	1.4%	3.56
Scituate	352	2.0%	0.4%	1.6%	5.01
Smithfield	1,722	5.2%	2.3%	2.9%	2.28
South Kingstown	1,547	5.3%	2.2%	3.1%	2.37
Tiverton	940	3.7%	1.0%	2.7%	3.81
Warren	1,048	6.6%	1.4%	5.2%	4.82
Warwick	3,839	5.5%	2.4%	3.1%	2.31
West Greenwich	341	0.9%	1.0%	-0.1%	0.88
West Warwick	2,031	4.3%	2.1%	2.2%	2.01
Westerly	1,107	3.5%	1.1%	2.4%	3.07
Woonsocket	1,140	10.0%	4.5%	5.5%	2.20

Table E.6: Ratio of Hispanic EDP to Hispanic Stops, All Departments

Department Name	Number of Stops	% Hispanic Stops	% Hispanic EDP	Absolute Difference	Ratio
Barrington	1,409	4.9%	2.5%	2.4%	1.99
Bristol	1,749	2.2%	2.8%	-0.6%	0.78
Burrillville	946	3.3%	2.2%	1.1%	1.49
Central Falls	1,101	49.8%	50.3%	-0.5%	0.99
Charlestown	552	1.4%	1.7%	-0.2%	0.88
Coventry	1,506	2.1%	2.2%	-0.2%	0.93
Cranston	5,687	20.9%	9.4%	11.5%	2.23
Cumberland	1,607	11.1%	5.6%	5.6%	2.00
East Greenwich	705	4.0%	3.4%	0.6%	1.18
East Providence	4,062	7.7%	5.1%	2.5%	1.49
Foster	731	4.9%	0.5%	4.4%	9.77
Glocester	1,141	4.0%	1.6%	2.5%	2.58
Hopkinton	669	3.3%	1.9%	1.4%	1.70
Jamestown	473	2.1%	0.8%	1.3%	2.77
Johnston	2,012	11.8%	6.3%	5.5%	1.88
Lincoln	581	14.6%	6.0%	8.6%	2.43
Little Compton	305	2.3%	0.5%	1.8%	4.83
Middletown	1,106	8.1%	4.3%	3.9%	1.90
Narragansett	1,502	3.9%	2.0%	1.9%	1.96
Newport	1,219	6.4%	6.3%	0.1%	1.02
North Kingstown	738	4.5%	3.8%	0.7%	1.19
North Providence	1,367	11.9%	7.3%	4.6%	1.63
North Smithfield	774	14.0%	3.7%	10.3%	3.80
Pawtucket	3,219	25.8%	16.0%	9.7%	1.61
Portsmouth	2,369	4.1%	2.4%	1.7%	1.69
Providence	2,334	33.8%	22.9%	10.9%	1.47
Richmond	404	2.7%	2.3%	0.5%	1.20
Scituate	352	3.4%	1.7%	1.7%	2.03
Smithfield	1,722	6.0%	4.4%	1.6%	1.37
South Kingstown	1,547	3.2%	3.4%	-0.2%	0.94
Tiverton	940	2.4%	1.3%	1.2%	1.90
Warren	1,048	4.1%	2.5%	1.6%	1.67
Warwick	3,839	6.5%	4.9%	1.6%	1.32
West Greenwich	341	2.1%	3.2%	-1.2%	0.63
West Warwick	2,031	4.0%	4.5%	-0.5%	0.90
Westerly	1,107	2.3%	2.7%	-0.4%	0.86
Woonsocket	1,140	18.2%	9.9%	8.3%	1.84

Table E.7: Ratio of Minority Residents to Minority Resident Stops, All Departments

Department Name	Number of Residents	% Minority Residents	Resident Stops	% Minority Resident Stops	Difference	Ratio
Barrington	12,292	4.8%	1,504	5.8%	1.0%	1.22
Bristol	19,740	4.2%	2,554	2.9%	-1.3%	0.69
Burrillville	12,749	2.0%	806	1.9%	-0.1%	0.93
Central Falls	14,248	69.8%	1,169	79.2%	9.4%	1.14
Charlestown	6,456	4.0%	379	5.0%	1.0%	1.24
Coventry	28,241	3.4%	3,022	3.7%	0.3%	1.08
Cranston	66,122	20.3%	5,320	26.7%	6.4%	1.32
Cumberland	26,912	8.3%	2,010	9.0%	0.7%	1.08
East Greenwich	10,174	6.5%	360	9.2%	2.7%	1.41
East Providence	39,044	15.6%	2,198	24.5%	8.9%	1.57
Foster	3,662	0.0%	270	2.2%	2.2%	N/A
Glocester	7,839	1.0%	374	1.3%	0.4%	1.36
Hopkinton	6,443	2.5%	94	5.3%	2.9%	2.17
Jamestown	4,355	0.0%	495	1.8%	1.8%	N/A
Johnston	23,899	8.9%	832	13.6%	4.7%	1.52
Lincoln	16,911	8.2%	465	10.3%	2.1%	1.25
Little Compton	2,865	0.0%	368	1.9%	1.9%	N/A
Middletown	12,812	12.5%	1,043	21.9%	9.3%	1.75
Narragansett	13,911	4.3%	1,460	5.9%	1.6%	1.36
Newport	21,066	18.1%	2,147	27.9%	9.7%	1.54
North Kingstown	20,989	5.5%	609	6.2%	0.8%	1.14
North Providence	27,231	14.4%	1,353	21.3%	6.9%	1.48
North Smithfield	9,793	3.5%	214	7.0%	3.5%	2.02
Pawtucket	56,546	38.7%	4,082	57.5%	18.7%	1.48
Portsmouth	13,901	5.5%	1,789	5.4%	-0.1%	0.99
Providence	141,375	56.9%	6,102	80.6%	23.8%	1.42
Richmond	5,992	2.7%	152	4.6%	1.9%	1.72
Scituate	8,282	0.9%	136	5.9%	4.9%	6.25
Smithfield	18,280	5.1%	500	5.4%	0.3%	1.05
South Kingstown	25,918	10.1%	678	15.2%	5.1%	1.51
Tiverton	13,138	3.2%	1,033	3.0%	-0.2%	0.95
Warren	8,834	3.2%	590	4.4%	1.2%	1.36
Warwick	68,876	7.8%	5,297	9.1%	1.2%	1.16
West Greenwich	4,703	1.8%	104	1.0%	-0.8%	0.54
West Warwick	23,958	9.2%	1,539	11.8%	2.6%	1.28
Westerly	18,560	7.0%	2,247	10.0%	3.0%	1.43
Woonsocket	32,338	23.3%	1,935	42.2%	18.9%	1.81

Table E.8: Ratio of Black Residents to Black Resident Stops, All Departments

Department Name	Number of Residents	% Black Residents	Resident Stops	% Black Resident Stops	Difference	Ratio
Barrington	12,292	0.0%	1,504	1.5%	1.5%	N/A
Bristol	19,740	0.7%	2,554	1.0%	0.2%	1.34
Burrillville	12,749	0.0%	806	0.6%	0.6%	N/A
Central Falls	14,248	6.8%	1,169	10.9%	4.1%	1.60
Charlestown	6,456	0.0%	379	2.4%	2.4%	N/A
Coventry	28,241	0.5%	3,022	1.9%	1.4%	3.61
Cranston	66,122	4.6%	5,320	8.1%	3.4%	1.74
Cumberland	26,912	1.1%	2,010	2.7%	1.5%	2.36
East Greenwich	10,174	0.8%	360	1.9%	1.1%	2.38
East Providence	39,044	5.2%	2,198	18.1%	12.9%	3.48
Foster	3,662	0.0%	270	1.5%	1.5%	N/A
Glocester	7,839	0.0%	374	0.8%	0.8%	N/A
Hopkinton	6,443	0.0%	94	0.0%	0.0%	N/A
Jamestown	4,355	0.0%	495	0.6%	0.6%	N/A
Johnston	23,899	1.6%	832	3.0%	1.4%	1.82
Lincoln	16,911	1.3%	465	2.8%	1.5%	2.12
Little Compton	2,865	0.0%	368	1.4%	1.4%	N/A
Middletown	12,812	4.2%	1,043	13.7%	9.5%	3.23
Narragansett	13,911	0.7%	1,460	3.6%	2.8%	4.91
Newport	21,066	6.1%	2,147	18.1%	12.0%	2.96
North Kingstown	20,989	0.8%	609	3.0%	2.1%	3.65
North Providence	27,231	3.9%	1,353	11.8%	7.9%	3.03
North Smithfield	9,793	0.0%	214	3.3%	3.3%	N/A
Pawtucket	56,546	11.1%	4,082	26.1%	15.0%	2.35
Portsmouth	13,901	1.3%	1,789	3.2%	2.0%	2.59
Providence	141,375	12.4%	6,102	33.0%	20.5%	2.65
Richmond	5,992	0.0%	152	3.9%	3.9%	N/A
Scituate	8,282	0.0%	136	2.9%	2.9%	N/A
Smithfield	18,280	1.2%	500	1.4%	0.2%	1.17
South Kingstown	25,918	2.1%	678	10.5%	8.4%	4.94
Tiverton	13,138	0.8%	1,033	1.5%	0.8%	2.03
Warren	8,834	0.9%	590	3.2%	2.4%	3.74
Warwick	68,876	1.4%	5,297	3.7%	2.3%	2.58
West Greenwich	4,703	0.0%	104	0.0%	0.0%	N/A
West Warwick	23,958	1.9%	1,539	4.7%	2.8%	2.50
Westerly	18,560	0.8%	2,247	4.0%	3.2%	5.02
Woonsocket	32,338	4.9%	1,935	13.6%	8.8%	2.80

Table E.9: Ratio of Hispanic Residents to Hispanic Resident Stops, All Departments

Department Name	Number of Residents	% Hispanic Residents	Resident Stops	% Hispanic Resident Stops	Difference	Ratio
Barrington	12,292	1.6%	1,504	1.3%	-0.3%	0.84
Bristol	19,740	1.7%	2,554	1.3%	-0.5%	0.72
Burrillville	12,749	1.3%	806	0.9%	-0.5%	0.66
Central Falls	14,248	57.6%	1,169	68.0%	10.4%	1.18
Charlestown	6,456	1.3%	379	1.3%	0.0%	0.97
Coventry	28,241	1.4%	3,022	1.3%	-0.1%	0.94
Cranston	66,122	9.2%	5,320	14.2%	5.0%	1.54
Cumberland	26,912	3.8%	2,010	5.2%	1.4%	1.37
East Greenwich	10,174	1.3%	360	3.1%	1.7%	2.32
East Providence	39,044	3.1%	2,198	5.1%	2.0%	1.67
Foster	3,662	0.0%	270	0.4%	0.4%	N/A
Glocester	7,839	1.0%	374	0.5%	-0.4%	0.54
Hopkinton	6,443	1.6%	94	4.3%	2.6%	2.61
Jamestown	4,355	0.0%	495	0.4%	0.4%	N/A
Johnston	23,899	4.6%	832	9.1%	4.6%	2.00
Lincoln	16,911	3.3%	465	6.2%	3.0%	1.92
Little Compton	2,865	0.0%	368	0.5%	0.5%	N/A
Middletown	12,812	3.9%	1,043	6.9%	3.0%	1.78
Narragansett	13,911	1.4%	1,460	1.7%	0.3%	1.22
Newport	21,066	6.8%	2,147	9.0%	2.2%	1.32
North Kingstown	20,989	1.8%	609	2.5%	0.6%	1.34
North Providence	27,231	6.5%	1,353	8.8%	2.3%	1.36
North Smithfield	9,793	1.8%	214	2.3%	0.5%	1.28
Pawtucket	56,546	17.4%	4,082	30.7%	13.3%	1.77
Portsmouth	13,901	1.7%	1,789	1.0%	-0.7%	0.56
Providence	141,375	33.5%	6,102	44.3%	10.7%	1.32
Richmond	5,992	1.5%	152	0.0%	-1.5%	0.00
Scituate	8,282	0.9%	136	2.2%	1.3%	2.34
Smithfield	18,280	2.0%	500	2.0%	0.0%	1.01
South Kingstown	25,918	2.7%	678	2.4%	-0.4%	0.87
Tiverton	13,138	0.8%	1,033	0.9%	0.0%	1.03
Warren	8,834	1.4%	590	0.8%	-0.6%	0.60
Warwick	68,876	2.8%	5,297	4.0%	1.3%	1.45
West Greenwich	4,703	1.8%	104	1.0%	-0.8%	0.54
West Warwick	23,958	3.8%	1,539	5.9%	2.1%	1.54
Westerly	18,560	2.2%	2,247	3.9%	1.7%	1.76
Woonsocket	32,338	10.7%	1,935	24.7%	14.0%	2.32

Table E.10: Departments with Disparities Relative to Descriptive Benchmarks

	State Average			EDP			Resident Population			
Department Name	M	B	H	M	B	H	M	B	H	Total
Providence				22.5	16.1	10.9	23.8	20.5	10.7	6
North Smithfield	21.7		12.5	18.4	8.9	10.3				4.5
Lincoln	12.2		10.1	11.7	5.4	8.6				4
Cranston	12.4			18.2	9	11.5				3.5
Pawtucket					7.7		18.7	15	13.3	3.5
Woonsocket					5.5	8.3	18.9	8.8	14	3.5
North Providence				11.3	10.4			7.9		2.5
Foster	12			10.4						2
Central Falls					8.2				10.4	1.5
East Providence					8.1			12.9		1.5
Middletown					5.4		9.3	9.5		1.5
Newport								12		1
Warren				6.1	5.2					1
Cumberland						5.6				0.5
Glocester				6.9						0.5
Hopkinton				6.5						0.5
Johnston						5.5				0.5
South Kingstown								8.4		0.5

Note 1: M=Minority, B=Black, H=Hispanic

APPENDIX F

Table F.1: Chi-Square Test of Hit-Rate by Department, All Discretionary Searches

KPT Hit-Rate		White	Non-White	Black	Hispanic	Black or Hispanic
Barrington	Hit-Rate	10.53%	0%	0%	0%	0%
	Chi^2	N/A	0.46	0.46	0.57	1.02
	Sample Size	19	4	4	5	9
Bristol	Hit-Rate	48.28%	50%	0%	N/A	0%
	Chi^2	N/A	0	0.91	N/A	0.91
	Sample Size	29	2	1	0	1
Burrillville	Hit-Rate	12%	0%	0%	0%	0%
	Chi^2	N/A	0.27	0.27	0.27	0.4
	Sample Size	25	2	2	2	3
Central Falls	Hit-Rate	0%	0%	0%	2.38%	1.61%
	Chi^2	N/A	N/A	N/A	0.32	0.21
	Sample Size	13	32	32	42	62
Charlestown	Hit-Rate	0%	0%	0%	N/A	0%
	Chi^2	N/A	N/A	N/A	N/A	N/A
	Sample Size	3	1	1	0	1
Coventry	Hit-Rate	25%	100%	100%	0%	50%
	Chi^2	N/A	2.75	2.75	0.33	0.6
	Sample Size	32	1	1	1	2
Cranston	Hit-Rate	1.72%	3.28%	1.75%	3.33%	2.25%
	Chi^2	N/A	0.29	0	0.31	0.05
	Sample Size	58	61	57	60	89
Cumberland	Hit-Rate	11.43%	0%	0%	7.69%	5.88%
	Chi^2	N/A	1.01	1.01	0.14	0.4
	Sample Size	35	8	8	13	17
DEM	Hit-Rate	0%	0%	0%	0%	0%
	Chi^2	N/A	N/A	N/A	N/A	N/A
	Sample Size	3	2	1	1	1
East Greenwich	Hit-Rate	0%	0%	0%	0%	0%
	Chi^2	N/A	N/A	N/A	N/A	N/A
	Sample Size	6	5	5	3	5
East Providence	Hit-Rate	2.36%	1.27%	1.29%	1.54%	1.5%
	Chi^2	N/A	0.58	0.55	0.16	0.4
	Sample Size	212	158	155	65	200
Foster	Hit-Rate	0%	0%	0%	0%	0%
	Chi^2	N/A	N/A	N/A	N/A	N/A
	Sample Size	13	8	6	7	9

KPT Hit-Rate		White	Non-White	Black	Hispanic	Black or Hispanic
Glocester	Hit-Rate	0%	N/A	N/A	0%	0%
	Chi^2	N/A	N/A	N/A	N/A	N/A
	Sample Size	6	0	0	1	1
Hopkinton	Hit-Rate	1.19%	18.18%	11.11%	0%	5.56%
	Chi^2	N/A	9.18	3.8	0.11	1.47
	Sample Size	84	11	9	9	18
Jamestown	Hit-Rate	0%	0%	0%	0%	0%
	Chi^2	N/A	N/A	N/A	N/A	N/A
	Sample Size	17	9	9	3	10
Johnston	Hit-Rate	0%	0%	0%	0%	0%
	Chi^2	N/A	N/A	N/A	N/A	N/A
	Sample Size	7	5	5	4	6
Lincoln	Hit-Rate	0%	0%	0%	0%	0%
	Chi^2	N/A	N/A	N/A	N/A	N/A
	Sample Size	2	1	1	2	3
Little Compton	Hit-Rate	0%	0%	0%	0%	0%
	Chi^2	N/A	N/A	N/A	N/A	N/A
	Sample Size	15	1	1	1	2
Middletown	Hit-Rate	2.78%	11.11%	0%	0%	0%
	Chi^2	N/A	1.18	0.2	0.09	0.26
	Sample Size	36	9	7	3	9
Narragansett	Hit-Rate	12.5%	25%	33.33%	0%	25%
	Chi^2	N/A	0.39	0.82	0.14	0.39
	Sample Size	16	4	3	1	4
Newport	Hit-Rate	10%	0%	0%	0%	0%
	Chi^2	N/A	1.29	1.29	0.55	1.61
	Sample Size	30	12	12	5	15
North Kingstown	Hit-Rate	0%	12.5%	12.5%	10%	13.33%
	Chi^2	N/A	7.24	7.24	5.79	7.82
	Sample Size	57	8	8	10	15
North Providence	Hit-Rate	66.67%	0%	0%	16.67%	11.11%
	Chi^2	N/A	4.44	4.44	2.25	3.7
	Sample Size	3	5	5	6	9
North Smithfield	Hit-Rate	26.32%	25%	25%	0%	20%
	Chi^2	N/A	0	0	0.69	0.08
	Sample Size	19	4	4	2	5
Pawtucket	Hit-Rate	17.24%	0%***	0%***	4.88%*	3.08%**
	Chi^2	N/A	7.97	7.97	2.88	5.84
	Sample Size	29	43	43	41	65

KPT Hit-Rate		White	Non-White	Black	Hispanic	Black or Hispanic
Portsmouth	Hit-Rate	8.96%	0%	0%	0%	0%
	Chi^2	N/A	1.07	0.97	0.78	1.54
	Sample Size	67	11	10	8	16
Providence	Hit-Rate	0%	0%	0%	0%	0%
	Chi^2	N/A	N/A	N/A	N/A	N/A
	Sample Size	67	269	261	202	366
Richmond	Hit-Rate	0%	0%	0%	N/A	0%
	Chi^2	N/A	N/A	N/A	N/A	N/A
	Sample Size	5	1	1	0	1
RISP - Chepachet (Scituate Barracks)	Hit-Rate	11.76%	5%	5%	0%	3.33%
	Chi^2	N/A	0.56	0.56	2.25	1.29
	Sample Size	17	20	20	18	30
RISP - Hope Valley	Hit-Rate	3.33%	4%	4.76%	0%	3.13%
	Chi^2	N/A	0.02	0.07	0.71	0
	Sample Size	30	25	21	21	32
RISP - HQ	Hit-Rate	0%	33.33%	33.33%	50%	50%
	Chi^2	N/A	4.29	4.29	6.46	6.86
	Sample Size	12	3	3	2	4
RISP - Lincoln	Hit-Rate	1.52%	1.25%	1.32%	0%	0.9%
	Chi^2	N/A	0.02	0.01	0.9	0.14
	Sample Size	66	80	76	59	111
RISP - Wickford	Hit-Rate	8.33%	0%	0%	0%	0%*
	Chi^2	N/A	2.38	2.29	1.86	3.15
	Sample Size	48	27	26	21	36
Scituate	Hit-Rate	0%	0%	0%	0%	0%
	Chi^2	N/A	N/A	N/A	N/A	N/A
	Sample Size	9	1	1	1	2
Smithfield	Hit-Rate	10.87%	14.29%	16.67%	0%	10%
	Chi^2	N/A	0.07	0.17	0.48	0.01
	Sample Size	46	7	6	4	10
South Kingstown	Hit-Rate	6.76%	0%	0%	0%	0%
	Chi^2	N/A	1.64	1.5	0.65	1.85
	Sample Size	74	23	21	9	26
Tiverton	Hit-Rate	9.68%	0%	0%	N/A	0%
	Chi^2	N/A	0.32	0.21	N/A	0.21
	Sample Size	31	3	2	0	2
Univ Of Rhode Island	Hit-Rate	0%	0%	0%	0%	0%
	Chi^2	N/A	N/A	N/A	N/A	N/A
	Sample Size	9	3	3	1	3

KPT Hit-Rate		White	Non-White	Black	Hispanic	Black or Hispanic
Warren	Hit-Rate	2.78%	0%	0%	0%	0%
	Chi^2	N/A	0.51	0.48	0.37	0.62
	Sample Size	36	18	17	13	22
Warwick	Hit-Rate	10.2%	12.5%	13.33%	23.08%	18.18%
	Chi^2	N/A	0.07	0.12	1.51	0.87
	Sample Size	49	16	15	13	22
West Greenwich	Hit-Rate	0%	0%	0%	0%	0%
	Chi^2	N/A	N/A	N/A	N/A	N/A
	Sample Size	14	4	4	3	5
West Warwick	Hit-Rate	0%	0%	0%	0%	0%
	Chi^2	N/A	N/A	N/A	N/A	N/A
	Sample Size	26	2	2	4	6
Westerly	Hit-Rate	0%	0%	0%	0%	0%
	Chi^2	N/A	N/A	N/A	N/A	N/A
	Sample Size	39	3	3	2	5
Woonsocket	Hit-Rate	0%	0%	0%	0%	0%
	Chi^2	N/A	N/A	N/A	N/A	N/A
	Sample Size	62	47	44	37	72

Note 1: Sample includes all discretionary searches in 2016.