



# **Basic Analysis of Traffic Citation Data for the Alexandria Police Department (2011–2015)**

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## Project Background

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The following report is a basic analysis of the Alexandria (Virginia) Police Department's traffic citation data for 2011–2015. The police department requested the Center for Evidence-Based Crime Policy (CEBCP) to conduct an independent and preliminary analysis of the totality of its traffic citation data from these years, paying particular attention to the racial and ethnic distribution of individuals given traffic citations by the Alexandria Police Department (APD). At the request of the APD, Professor Cynthia Lum, director of the CEBCP, and graduate research assistant Xiaoyun Wu volunteered to conduct this analysis without cost to the police agency as part of their interest in understanding and measuring police proactive activities, and to provide an objective analysis of the APD data.

Analyzing the characteristics of individuals who receive traffic citations in any jurisdiction for purposes of detecting disparity is fraught with difficulties. Distributions of traffic citations, as with crime more generally, are rarely, if ever, proportionately dispersed across population groups. For example, traffic citations, as well as arrests for crime, are more likely to be received by men than women, and by those who are younger. Criminologists are fairly confident that these two groups tend to commit more violations and crimes for a variety of reasons.

However, understanding disparities in traffic citations and criminal violations across racial and ethnic groups is more challenging. Minorities, in particular Blacks and Hispanics, sometimes make up a disproportionate percentage of those stopped, searched, ticketed, arrested, or incarcerated compared to their White counterparts in various local, state, and federal jurisdictions. But the difficulty is in understanding *why* such differences exist. Scholars point to a number of possible explanations (some in combination) that might explain racial and ethnic disparities in traffic stop data from police agencies:

1. Differential rates of offending in population groups: There are many explanations as to why a particular racial or ethnic group might be disproportionately committing specific types of crime or traffic violations. Researchers have pointed to a variety of social and economic reasons, from concentrated economic and social disadvantage, racial/ethnic segregation, family and social structures, and the like. There may also be specific reasons connected to an individual's routines or behaviors for why a person may receive a traffic citation, and these routines may be linked to specific groups.

2. Choice of where and when to police: If officers tend to choose to patrol and ticket in places with high proportions of minorities, or where disadvantage concentrates (which can be linked to minority populations), they may create higher levels of stops, ticketing, and/or arrests for those populations. Officers may also be directed to these areas by requests from citizens and residents who live in these places. While implicit or explicit bias can be at play in these choices, such decisions and requests may reflect real concerns as generated by citizen complaints or reports.
3. Implicit bias by officers: Unlike explicit bias (below), implicit biases are subconscious or unconscious biases that we all have which affect our decision making and interactions with others. While this type of bias may not be overt, it can create stereotypes for officers that make them believe a member of one group is more likely to commit a traffic violation. This may then affect their behavior regarding where they conduct traffic enforcement, and who they choose to stop, warn, or ticket.
4. Explicit bias by officers: Explicit bias occurs when individuals act with conscious and overt animosity towards another group. Explicit bias has declined substantially in the United States more generally in part because it is controlled by legal oversight. However, explicit bias still exists and may contribute to racial and ethnic disparities in traffic stop data.

Group differences in traffic citations most likely reflect some combination of factors 1, 2, and 3 (given that 4 is not only illegal but much less tolerated in today's society). The challenge in analyzing traffic stop data is in knowing to what extent each reason might contribute to patterns found, and, in turn, developing policies to implement both fair and effective traffic enforcement.

To do this, scholars examining traffic citations tend to use a variety of techniques known as "benchmarking" (see Fridell, 2004). Benchmarking attempts to estimate what the "true" distribution of traffic stops and citations is across different population groups. These benchmarks are then compared to existing patterns of traffic citation data to determine what types of disparities exist. So, for example, on the 100 Block of Main Street at 10:00 p.m., there may be 70% White drivers, 20% Black drivers, and 10% Hispanic drivers. If these groups were equally likely to speed (a difficult assumption to

make), and all else being equal, we would expect that the speeding tickets given on this street, at this time of night, would be proportionate to this racial/ethnic distribution. Of course, the issue is more complicated. If the vast majority of the Black drivers were older than 40 and if almost all of the White drivers were very young, then the distribution of tickets on this street at this time would likely not match the distribution of this driving population.

The most unreliable forms of benchmarking for traffic citation data compare the rates of citations given to various racial and ethnic groups to their overall proportions in the population across large geographic areas, such as census tracts. These approaches are poor because they don't take into account the driving populations at any given place and time, nor are they sensitive to factor 1, above.

Other benchmarking approaches try to improve on simple census-based methods (for a full discussion of various methods, see Fridell, 2004). For example, some compare the rates of traffic citations for different groups to their accident rates. So, if younger people are more likely to get into accidents, they may also be more likely to be ticketed for speeding. But this approach depends on whether accidents are known to the police and authorities (most minor accidents are handled without police involvement), and the correlation between accidents and traffic citations. Others have tried to estimate the actual rate of offending by using hypotheses such as "the veil of darkness" (see Grogger & Ridgeway, 2006). Here, one might believe that when darkness falls, it may be harder to see the race or ethnicity of an individual in a vehicle being stopped, thus reducing the potential of implicit or explicit bias in that stop. However, where officers stop people in the day can be different than in the night, and officers may use other cues to stop a vehicle. Again, these decision-making processes and experiences can incorporate various combinations of the four factors above.

Another benchmarking technique uses "blind" approaches to estimate true rates of offending. The term "blind" is used to describe estimation approaches that do not involve humans. Red light cameras are a case in point. Such technologies do not pick and choose who or when to ticket; everyone who runs the red light will be ticketed. The idea of benchmarking with these technologies is that they can help estimate which population groups are more likely to run a red light *at any given location*. Therefore, if an officer were to manually ticket for red light violations *in the same intersection as a red light camera*, then the racial/ethnic/age/gender distribution of those tickets should mirror those given out via the red light camera. Like other benchmarking techniques, blind benchmarking using technology is imperfect. Red light cameras can only ticket registered owners of vehicles, not drivers, who may be different people. The locations of

radar or red light cameras versus where officers choose to make discretionary stops can also differ, making comparisons challenging.

Another benchmarking approach is resource intensive. Researchers could, for example, select a large number of specific streets and intersections, and conduct systematic social observations of vehicles passing by in every location, noting the characteristics of the driver, car, and environmental context, and at different times of the day. This might provide a more accurate estimate of the driving population at any given place, which can then be compared to the distribution of tickets at that location. However, this type of research is expensive, and also fails to take into account differences in the real rate of offending in specific groups (factor 1, above).

The bottom line: While benchmarking tries to estimate true rates of offending by different population groups, these approaches are all fraught with complications. Additionally, it is hard to determine which of the factors above (1, 2, 3, or 4) are at play when looking at the distribution of traffic citations across age, gender, race, or ethnicity, even when using valid benchmarking techniques. This preliminary analysis explores some of these issues by examining the Alexandria Police Department traffic data for 2011–2015, but it cannot determine the causes of any disparities found within that data. Much more research would be needed to more accurately discern factors that may be at play in the distribution of traffic stops in APD.

Most importantly, research and analysis can only show possible patterns in traffic citation data. Communities and police departments will have to work together to come up with strategies to understand and mitigate the inevitable disparities that arise.



## Data and Methods of Analysis

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### Data

The traffic citation data provided by the Alexandria Police Department (APD) included all records in their traffic citation database for the years 2011–2015 (data from 2016 were not included because this analysis began in 2016). The initial data provided included a total of 91,759 traffic citations. Thus, if an individual was given two tickets during a single traffic stop, there would be two records in this database, one for each ticket given. Similarly, if two individuals during a single traffic stop were given a citation each (for not wearing their seatbelts, for example), this would result in two records in the database for that single stop.

The traffic citation data contained the following eleven fields (which are commonly collected in other jurisdictions as well):

1. Incident number, which reflects the unique identifying number for the stop. The incident number repeats if more than one citation was given in a car stop.
2. A field called “SEQ,” which numbers the various citations given in any individual incident. For example, if two citations were given in a stop, then two records would appear, each with its own information, but the first violation would be SEQ = 1, and the second, SEQ = 2, and so on.
3. The date of the violation.
4. The time of the violation.
5. The address or location of the violation.
6. How the violation was discovered (visual observation, radar, accident, etc.).
7. The type of citation given (the traffic charge and municipal/state code).
8. The race of individual (“American Indian/Alaskan,” “Asian/Pacific Islander,” “Black,” “White,” “Unknown,” or not filled out).
9. The gender of the individual (in the data the following categories were used: “Male,” “Female,” “Unknown,” “Unsexed,” or not filled out).
10. Whether the individual was Hispanic or not, or unknown/not filled out.
11. The date of birth of the person ticketed (age was calculated based on the date when the ticket was given).

It should be noted that #8 and #10 (race and ethnicity) are only estimates, as they are either voluntarily given to the officer by the person stopped, or may be guessed by the officer him/herself. Virginia driver’s licenses do not list a driver’s race or

ethnicity. Additionally, we explicitly asked the police department not to provide us with any information that would identify the name or home address of the recipient of the citation to maintain the confidentiality of individuals receiving these tickets.

A preliminary analysis of the 91,759 records revealed two charge categories that signaled records that were not citations. The first was a charge category labeled “Criminal C--” (5,265) records. According to APD personnel, this charge is not a traffic citation, but rather a misdemeanor criminal arrest. The same form (Virginia Uniform Summons) is used for all types of charges in Virginia, whether traffic or misdemeanor criminal charges. Additionally, 594 records were labeled as “No Charge.” These are citations that were voided for various reasons (a citation written in error, or an error made on a citation and a new form initiated). Because the focus of this research is traffic citations, both of these types of records were excluded from this analysis, resulting in a **final total of 85,900 traffic citations analyzed.**

This project analyzes both the total population of traffic citations (85,900) and also the characteristics of the person(s) receiving those citations. However, the data are structured according to traffic citations, not unique stops. More than one traffic citation could be given in any particular stop, either to the same individual or to multiple individuals. Thus, while analyzing the full data could provide us with knowledge about the types of citations that the APD issued in 2011–2015, we also needed to analyze unique stops to examine the characteristics of the individuals stopped. If one individual received four tickets, for example, then it would be misleading to analyze the full citation data for characteristics of individuals (this person would be counted four times, creating bias in the results).

**Thus, this study separately analyzes both the full traffic citation data (N = 85,900) as well as the unique stops (n = 75,769) within that traffic citation data.** It may be the case in the example above that there were four separate individuals, all in the vehicle, who received four different citations (for example, for not wearing their seatbelts). However, given that we do not have specific identifying information about individuals, we cannot know for certain whether there were one, two, three, or four individuals involved in receiving four traffic citations. Thus, we estimate the characteristics (race, sex, age, ethnicity) of individuals stopped using the characteristics of the person who received the first/primary citation for the stop (denoted as SEQ=1 in the data, or SEQ=2, if no SEQ=1 exists). While this may introduce some error into our analysis of unique stops (n = 75,769), we suspect this error is likely insignificant.

Additionally, when examining the field that indicates the type of charge given to an individual, we noticed that some charges appeared descriptively the same but had different violation codes. For example, “reckless speeding” was sometimes listed as “10-3-862” and at other times as “46.2-862.” Upon further investigation with the APD, we learned that these two citations are substantively the same. However, one charge reflects a municipal traffic code (10-3-862), while the other reflects a state traffic code (46.2-862). Officers have discretion as to which code they apply (the penalties are the same). Thus, we standardized every charge and code, so that our analysis would treat these two violations as the same.

## Method of Analysis

Many different types of analyses could be carried out on these data. Given the scope of our effort, we conducted basic descriptive statistical analysis and some basic benchmarking techniques to examine the data. Our analyses included:

- Traffic citations given across the five years (Figure 1);
- Types of citations/charges given (Figure 2);
- Age distribution of individuals who received tickets (Figure 3);
- Gender distribution of individuals who received tickets (Figure 4);
- Race/ethnicity of citation recipients (Figure 5);
- Race/ethnicity of citation recipients over time (Figure 6);
- Difference between the percentages of tickets given to Whites and Blacks or Hispanics over time (Figure 7);
- Traffic citations given by hour (Figure 8);
- Time of day citation(s) received across race/ethnicity groups (Figure 9);
- “Blind” benchmarking: speeding citations with and without radar (Figure 10);
- Type of citations received by ethnic groups, across citation (Figure 11);
- Type of citations received by ethnic groups, across group (Figure 12);
- Number of citations per stop (Figure 13); and
- Most frequent pairs of two citations.

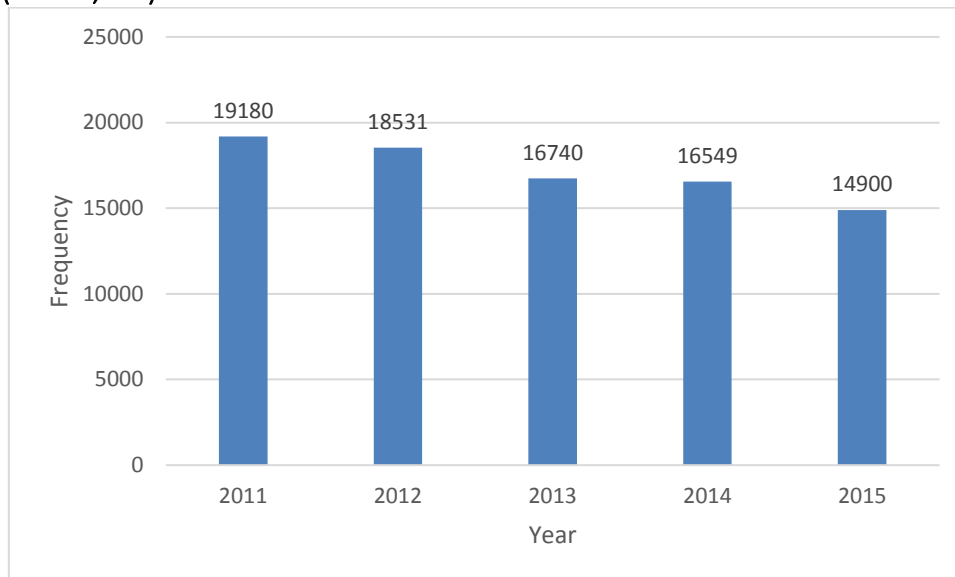
**However, we again emphasize that this analysis should be considered preliminary; more in-depth analysis would be needed to analyze various aspects of this dataset more thoroughly.**

## Results

### Analysis of All Citations (N = 85,900)

Between 2011 and 2015, the number of citations given by APD declined by 22%, as shown in Figure 1.

Figure 1. Total traffic citations given by Alexandria Police Department declined from 2011 to 2015 (N = 85,900)



A total of 293 types of municipal and state violations were cited by the APD from 2011 through 2015. However, as noted in the Data and Methods section above, many of these were the same charge, but labeled differently depending on which code was used. Thus, we standardized all violations, and so list, if appropriate, both the municipal and state traffic code next to the description of the citation. After standardizing traffic citation codes, it appears that APD used 193 unique types of charges/citations during this five-year period. However, many charge types are rarely used; Figure 2 shows the 26 most common types of violations cited by the APD in descending order of frequency of use. These 26 violations were used in 90% of the APD citations.

Figure 2. Most common violations cited in Alexandria (N = 85,900)

Charge (with similar combined)	Citations	%	Cumulative %
OFFICIAL SIGN 10-3-830, 46.2-830	14,866	17.31	17.31
SPEEDING 25 ZONE 10-3-874, 46.2-874	11,821	13.76	31.07
SPEEDING 35 ZONE 10-3-875, 46.2-875	7,947	9.25	40.33
OFF. SIGN RED LIGHT/STOPSIGN/OTHER 10-3-1	6,079	7.08	47.41
REG./LIC/TITLE/NAME/ADDR. 10-3-613, 46.2-613	5,168	6.02	53.42
NO INSPECTION 10-3-1157, 46.2-1157	4,318	5.03	58.45
FAIL TO PAY FULL TIME/ATTN 10-3-3	3,970	4.62	63.07
SUSPENDED/REVOKED LICENSE 10-3-301, 46.2-301	3,119	3.63	66.70
HOV 10-3-2, 33.1.46.2	3,105	3.62	70.32
NO OPERATORS LICENSE 10-3-300, 46.2-300	3,097	3.61	73.93
DUI/DWI OF DRUGS/ALCOHOL 10-3-266, 18-2-266	1,780	2.07	76.00
RECKLESS/SPEEDING 10-3-862, 46.2-862	1,764	2.05	78.05
IMPROPER LANE VIOLATION 10-3-804, 46.2-804	1,227	1.43	79.48
NO U TURN 10-3-845, 46.2-845	1,025	1.19	80.67
RECKLESS/CHUR/SCH/REC/LOT 10-3-864, 46.2-864	940	1.09	81.77
DEFECTIVE EQUIPMENT 46.2-1003	898	1.05	82.81
FAIL TO YIELD ON LEFT TURN 10-3-825, 46.2-825	867	1.01	83.82
FOLLOWING TOO CLOSE 10-3-816, 46.2-816	858	1.00	84.82
F/T CARRY LIC/REG 10-3-104, 46.2-104	798	0.93	85.75
CROSS DOUBLE LINE/PASS 10-3-804.6, 46.2-804.6	767	0.89	86.65
HEADLIGHTS NOT TURNED ON 46.2-1030	725	0.84	87.49
IMPROPER LEFT/RIGHT TURN 10-3-846, 46.2-846	615	0.72	88.21
FAIL TO DISPLAY CITY TAG/NO TAG 10-4-37, 3-2-336	416	0.48	88.69
SPEEDING 55 ZONE 10-3-870, 46.2-870	408	0.48	89.17
NO SIGNAL TURN/BACK/STOP 10-3-848, 46.2-848	388	0.45	89.62
RED/YELLOW/FLASH RED LIGHT 10-3-833, 46.2-833	380	0.44	90.06

### Analysis of Unique Traffic Stops and Citation Recipients (N = 75,769)

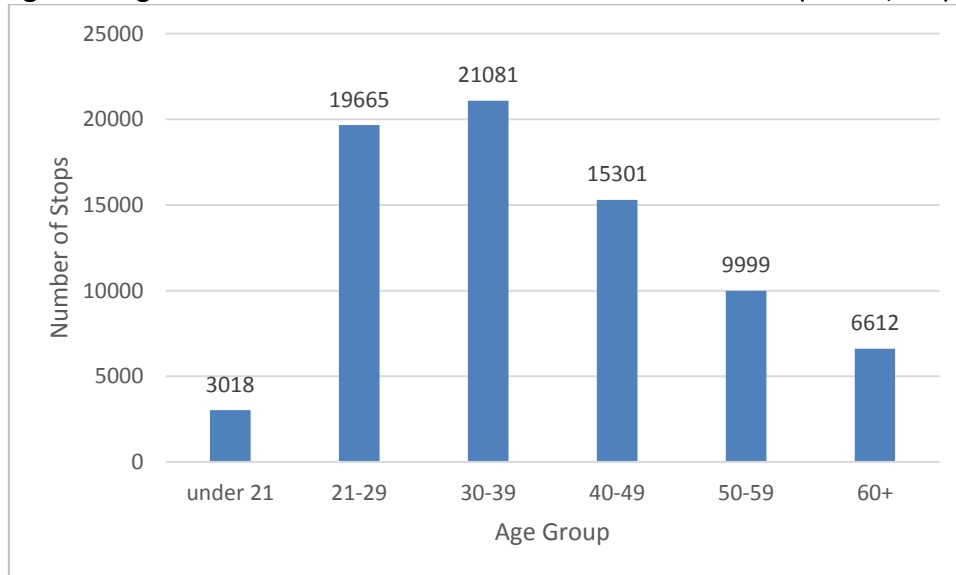
As noted in the Data and Methods section, the 85,900 citations were given in 75,769 unique traffic stops. Thus, 11.4% of traffic stops in Alexandria during this five-year period involved the writing of more than one citation. We return to an analysis of the multiticket stops later. However, to estimate<sup>1</sup> the characteristics of the individuals

<sup>1</sup> As noted in the Data and Methods section, this is an estimate given that we do not have information on the specific names of individuals cited, and therefore do not know whether the same or different individuals received multiple citations in a multiple-citation stop.

receiving traffic citations in Alexandria, we used the characteristics of the individual receiving the first citation, as denoted by SEQ=1 (or SEQ=2, if there was not a record of SEQ=1).

Similar to the trend seen for both crime and traffic accidents, younger people and males are more likely to receive traffic citations, as indicated in Figures 3 and 4.

Figure 3. Age of individuals involved in traffic citation incidents (N = 75,676)



Note: The date of birth of individuals was missing in 93 cases; the numbers in this chart therefore sum to 75,676, not the total sample of 75,769.

Figure 4. Gender of individuals involved in traffic citation incidents (N = 75,769)

	Incidents	Percent
Male	45,704	60.3%
Female	29,976	39.6%
Unknown/unsexed	89	0.1%
Total	75,769	100.0%

Figure 5 presents the racial distribution of individuals receiving traffic violations, and Figure 6 shows this distribution across time from 2011 through 2015. Again, we caution readers not to compare these figures to census information for the city of Alexandria given that census distributions do not necessarily reflect driving or offending populations (see our discussion above). Additionally, groups may be under- or overrepresented in traffic citation data due to the four factors listed at the beginning of

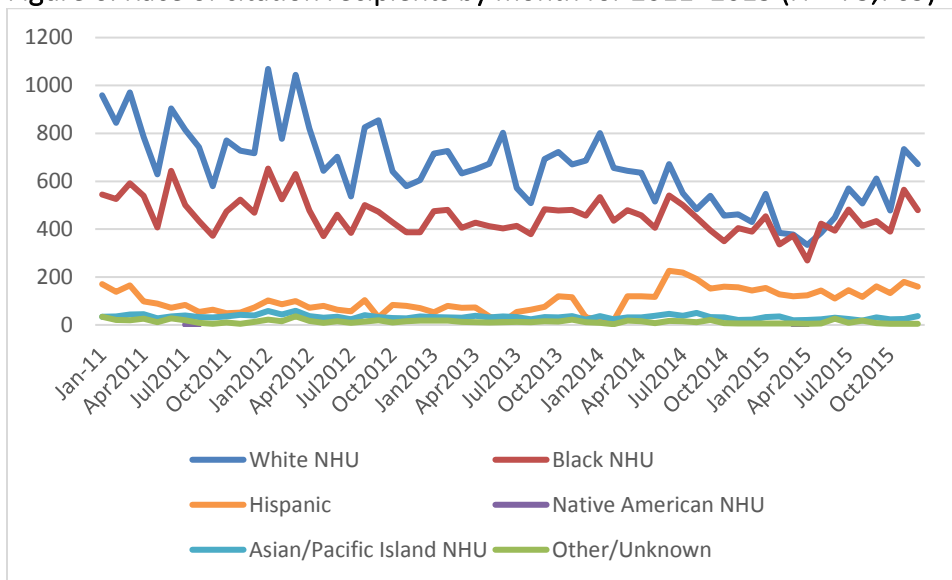
our report, though deeper analysis is needed for dissection.

Figure 5. Race of citation recipients (N = 75,769)

	Citations	Percent of total
White (NHU)	39,481	52.1%
Black (NHU)	27,336	36.1%
Hispanic	6,134	8.1%
Asian/Pacific Island (NHU)	1,997	2.6%
Other/Unknown	809	1.1%
Native American (NHU)	12	0.0%
Total	75,769	100.0%

Note. NHU = Non-Hispanic or Unknown. For all graphs below, the “NHU” is dropped, but is consistent throughout.

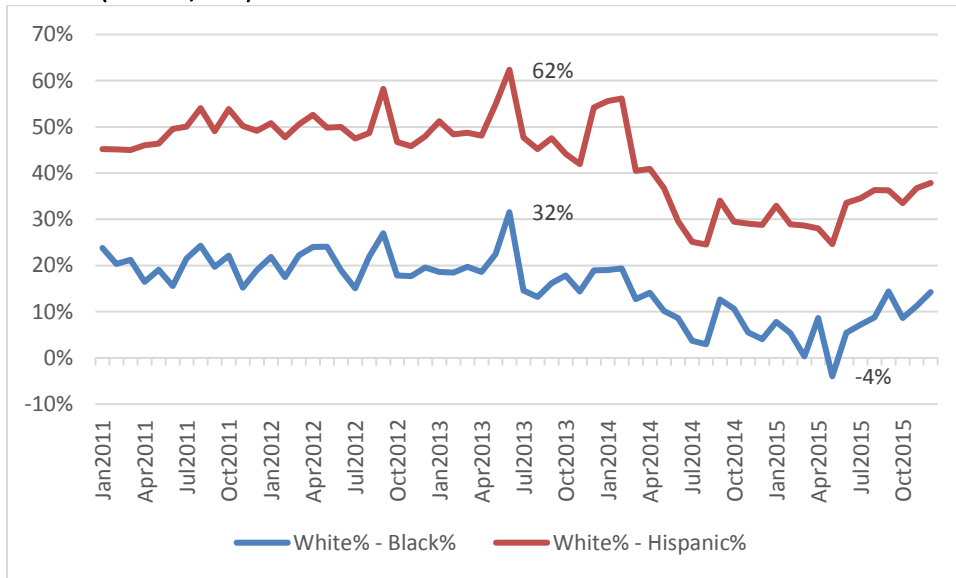
Figure 6. Race of citation recipients by month for 2011–2015 (N = 75,769)



As Figure 6 indicates, the ticketing of Whites and Blacks began declining in 2013, and then began increasing in 2015. Starting in 2011, there was a decline in the ticketing of Hispanics, and then an increase again in 2014. Figure 7 shows that the gap between the proportions of Whites and Blacks receiving tickets, and also between the proportion of Whites and Hispanics receiving tickets, generally declined after 2013, but increased again after 2015. The gap between these groups again started to widen in 2015.

However, we cannot ascertain the reasons for these longitudinal trends in the ticketing of different groups solely from police traffic data.

Figure 7. Differences between proportions of Whites and Blacks or Hispanics receiving citations by month (N = 75,769)



Citations are not distributed equally across time of day. Figure 8 shows the distribution of citations around the clock, starting at 5:00 a.m. (“0500” in Figure 8). Traffic citations increase after 5:00 a.m., and then begin to decline after 4:00 p.m. The increase in citations during the day may partly reflect the fact that the traffic unit of the police department is deployed during these hours.



Figure 8. Frequency of citations by hour of day (N = 75,769)

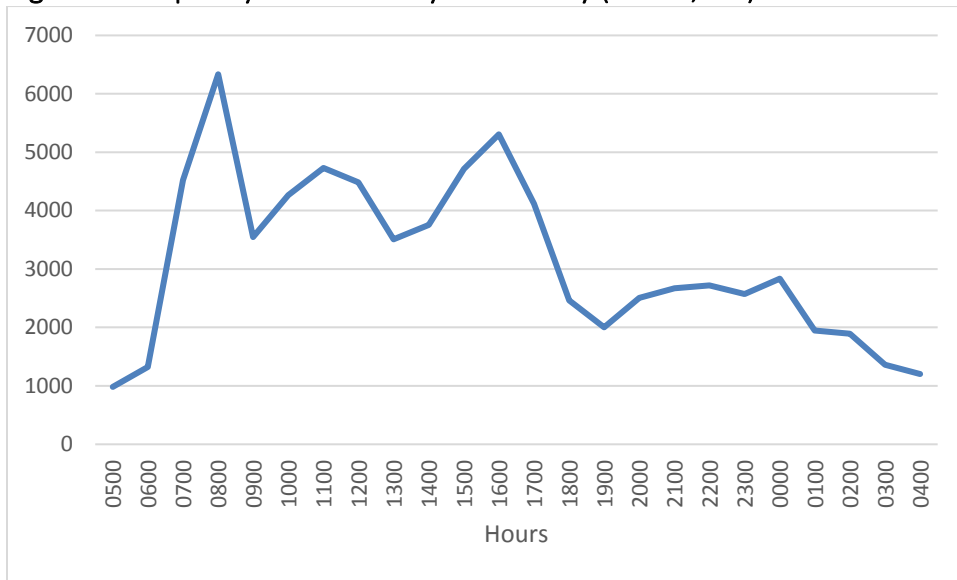
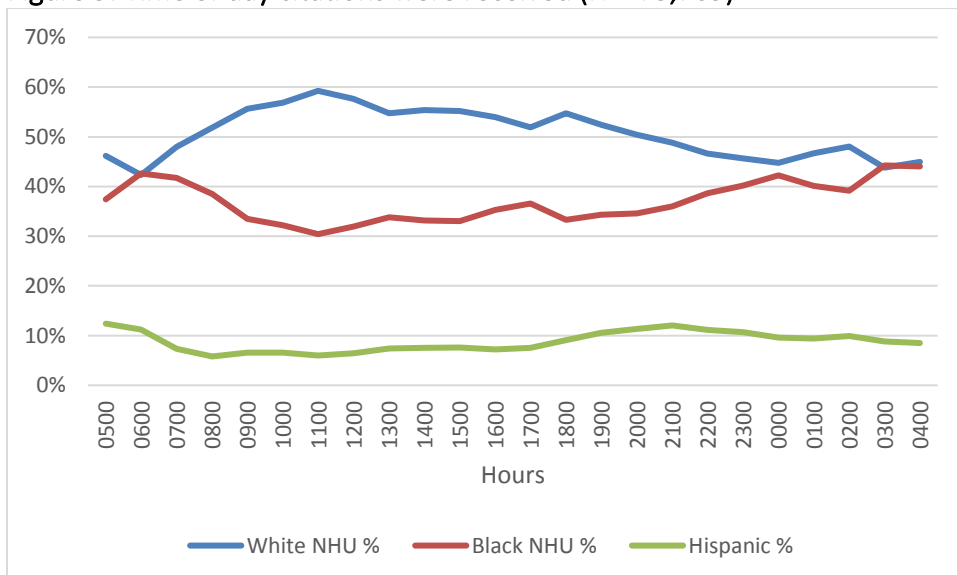


Figure 9 shows the times that Blacks (non-Hispanic), Whites (non-Hispanic) and Hispanics receive tickets. As darkness settles, there is an increased probability of being stopped if Black or Hispanic, while Whites are more likely to be stopped during the day. Again, we emphasize that the driving population and the patterns of driving by residents and nonresidents in Alexandria may change across the day and for different locations.

Figure 9. Time of day citations were received (N = 75,769)



Note. NHU = Non-Hispanic or Unknown.

## Benchmarking

As discussed in the first section of this report, scholars have tried to examine racial and ethnic disparities in traffic stops using approaches known as “benchmarking.” These techniques are often used to estimate and compare rates of traffic violations committed by different population groups.

In this analysis, we use three preliminary forms of benchmarking, but again emphasize to the reader that deeper analysis is needed to examine why these findings emerge. The first is “blind” benchmarking, where we examine speeding violations caught by radar versus those detected by individual officers. Hypothetically, racial and ethnic distributions of violations would likely be more accurate when radar is used, although officers can still exercise discretion as to whether or not to follow through on a speeding violation detected by radar. Additionally, if radar is being used in different locations than where officers are conducting manual traffic stops, this may also contribute to differences in racial/ethnic distributions of traffic violations in radar and non-radar tickets. In APD, radar is most often used by a specialized traffic unit, not by patrol officers (who also give tickets). Behavioral patterns of ticketing may be different between these two groups.

The second analysis we undertake compares the types of charges received by different groups. All else being equal, population groups should have similar distributions of traffic charges. Of course, this may be an unreasonable assumption, if different population groups are more prone to different types of traffic violations. Additionally, different groups may be prone to receiving different charges at different times of the day and different locations depending on their routine activities (such as whether they have children, or whether they drive alone to work), their rates of offending, and also where and when officers choose to enforce specific traffic laws (for example, around schools in the morning versus in crime hot spots late at night). The reasons for racial and ethnic differences in charge-type distribution can be due to any one of the four factors mentioned at the beginning of this report.

Finally, we examine traffic stops in which one citation was given versus those that involved multiple citations. Again, all else being equal, the racial/ethnic distributions of single versus multicitation stops should be similar. However, this may not be the case, again due to any one of the four factors mentioned earlier in this report.

Figure 10 shows the distribution of Whites (non-Hispanic), Blacks (non-Hispanic) and Hispanics with regard to four speeding violations that are captured both by radar and non-radar. Significant differences in proportions for each race/ethnicity are shown

in red. It is important to note that APD uses radar to detect speeding much more frequently than without radar (up to 17 times more frequently for speeding in a 25 miles-per-hour (mph) zone, and almost eight times more frequently for speeding in a 35 mph zone), lending to very small sample sizes for the non-radar citations. Because of these vastly different sample sizes, readers should be cautious about interpreting this table. We do not know, for example, whether the radar proportions reflect true offending, because we do not know to what extent discretion is exercised when radar is used (discretion as to where to deploy radar or discretion with regard to following through on a violator).

Figure 10. “Blind” benchmarking: Speeding citations with and without radar

Type of Citation	N	White %	Black %	Hispanic %
SPEEDING 25 ZONE 10-3-874, 46.2-874	635	52%	33%	10%
SPEEDING 25 ZONE RADAR 10-3-874, 46.2-874	11,186	58%*	33%	6%*
SPEEDING 35 ZONE 10-3-875, 46.2-875	915	48%	38%	9%
SPEEDING 35 ZONE RADAR 10-3-875, 46.2-875	7,032	50%	38%	6%*
SPEEDING 55 ZONE 10-3-870, 46.2-870	208	58%	32%	7%
SPEEDING 55 ZONE RADAR 10-3-870, 46.2-870	200	52%	41%	4%
RECKLESS SPEEDING 10-3-862, 46.2-862	546	40%	43%	13%
RECKLESS SPEEDING RADAR 10-3-862, 46.2-862	1,218	44%	43%	9%*

Notes. \* denotes that the difference within race/ethnic category for radar and non-radar is statistically significant.

Figure 10 indicates that for 25-mph zones, ticketing proportions for radar and non-radar use are generally similar for Blacks, but (statistically) significantly different for Whites and Hispanics (see numbers in red; \* denotes statistically significant difference between radar and non-radar). In other words, when the police use radar, Whites tend to receive a greater proportion of tickets given compared to when radar is not used. For Hispanics, the opposite is the case; when radar is used, Hispanics receive a significantly lower proportion of tickets given for speeding in a 25-mph zone than when radar is not used. This trend for Hispanics persists in 35-mph zones, but not for Whites; Blacks tend to be stopped at the same rates with and without radar). For 55-mph zones, while the statistics appear different (e.g., 58% seems larger than 52% for Whites without and with radar), the differences in these proportions are **not** statistically significant given the

small sample sizes. In other words, Whites, Blacks, and Hispanics are rarely ticketed in Alexandria for speeding in a 55-mph zone, but when they are, their proportion of tickets received are the same with or without radar.

The trend for Hispanics persists for the reckless speeding category.<sup>2</sup> When radar is not used, Hispanics receive 13% of the reckless speeding tickets, but when radar is used, they receive a significantly smaller proportion of reckless speeding tickets (9%). The proportions of tickets with and without radar given to Whites and, similarly, given to Blacks are not significantly different.

Figure 11 shows the charges received by Whites (non-Hispanics), Blacks (non-Hispanics), and Hispanics. The percentages shown are the proportions of total tickets that each group received (e.g., 17.6% of tickets received by Whites was for “Official sign 10-3-830, 46.2-830”). The “top ten” most frequent types of citations each group received are highlighted in yellow.

Figure 11. The within-group proportion of types of citations received by racial/ethnic groups

Charges	Citations	% of total	White %	Black %	Hispanic %
OFFICIAL SIGN 10-3-830, 46.2-830	14,866	17.3%	17.6%	17.6%	13.8%
SPEEDING 25 ZONE 10-3-874, 46.2-874	11,821	13.8%	15.5%	12.4%	9.2%
SPEEDING 35 ZONE 10-3-875, 46.2-875	7,947	9.3%	9.1%	9.7%	6.8%
OFF. SIGN RED LIGHT/STOPSIGN/OTHER 10-3-1	6,079	7.1%	7.4%	6.3%	7.9%
REG./LIC/TITLE/NAME/ADDR. 10-3-613, 46.2-613	5,168	6.0%	6.9%	5.4%	3.8%
NO INSPECTION 10-3-1157, 46.2-1157	4,318	5.0%	5.8%	4.3%	3.2%
FAIL TO PAY FULL TIME/ATTN 10-3-3	3,970	4.6%	5.1%	4.0%	4.1%
SUSPENDED/REVOKED LICENSE 10-3-301, 46.2-301	3,119	3.6%	2.1%	5.8%	4.3%
HOV 10-3-2, 33.1.46.2	3,105	3.6%	3.1%	4.8%	2.0%
NO OPERATORS LICENSE 10-3-300, 46.2-300	3,097	3.6%	2.9%	3.0%	11.2%
DUI/DWI OF DRUGS/ALCOHOL 10-3-266, 18-2-266	1,780	2.1%	2.2%	1.7%	3.3%
RECKLESS/SPEEDING 10-3-862, 46.2-862	1,764	2.1%	1.7%	2.4%	2.3%
IMPROPER LANE VIOLATION 10-3-804, 46.2-804	1,227	1.4%	1.4%	1.5%	1.4%

<sup>2</sup> The Motor Vehicle Code of Virginia, Section 46.2-862 describes driving recklessly as follows: “A person shall be guilty of reckless driving who drives a motor vehicle on the highways in the Commonwealth (i) at a speed of twenty miles per hour or more in excess of the applicable maximum speed limit or (ii) in excess of eighty miles per hour regardless of the applicable maximum speed limit.”

Charges	Citations	% of total	White %	Black %	Hispanic %
NO U TURN 10-3-845, 46.2-845	1,025	1.2%	1.1%	1.2%	1.4%
RECKLESS/CHUR/SCH/REC/LOT 10-3-864, 46.2-864	940	1.1%	1.4%	0.8%	0.5%
DEFECTIVE EQUIPMENT 46.2-1003	898	1.0%	0.8%	1.2%	1.8%
FAIL TO YIELD ON LEFT TURN 10-3-825, 46.2-825	867	1.0%	1.1%	0.8%	1.0%
FOLLOWING TOO CLOSE 10-3-816, 46.2-816	858	1.0%	1.0%	0.9%	1.1%
F/T CARRY LIC/REG 10-3-104, 46.2-104	798	0.9%	0.8%	1.0%	1.1%
CROSS DOUBLE LINE/PASS 10-3-804.6, 46.2-804.6	767	0.9%	0.9%	0.8%	1.4%
HEADLIGHTS NOT TURNED ON 46.2-1030	725	0.8%	0.7%	1.0%	1.2%
IMPROPER LEFT/RIGHT TURN 10-3-846, 46.2-846	615	0.7%	0.8%	0.8%	0.3%
FAIL TO DISPLAY CITY TAG/NO TAG 10-4-37, 3-2-336	416	0.5%	0.5%	0.6%	0.2%
SPEEDING 55 ZONE 10-3-870, 46.2-870	408	0.5%	0.5%	0.5%	0.3%
NO SIGNAL TURN/BACK/STOP 10-3-848, 46.2-848	388	0.5%	0.4%	0.6%	0.5%
RED/YELLOW/FLASH RED LIGHT 10-3-833, 46.2-833	380	0.4%	0.4%	0.5%	0.5%

Note. Only first 90% of tickets are shown.

All else being equal, if the patterns of traffic offenses by Whites, Hispanics, and Blacks were similar, and if officers conducted traffic enforcement equally, then we might expect the proportions for each type of traffic citation to be equal across these three groups. Of course, this is likely not the case, as we already discussed when identifying four factors that might contribute to differences. Figure 11 indicates that while the top ten types of charges each group receives are similar, there are some notable differences. For example, Whites and Blacks are more likely to be cited for violating official signage and for speeding in 25- and 35-mph zones. However, Blacks and Hispanics are more likely to receive citations for having suspended or revoked licenses. Hispanics are much more likely to receive tickets for not having a driver’s license.

A different way to look at these same data is presented in Figure 12. Here, percentages listed are the proportion of citations for any given charge type for each population group. Again, Whites tend to receive more than half of the most frequently given charges in Alexandria. However, interesting anomalies are noted in yellow. For example, Blacks receive the largest proportion of charges such as suspended/revoked license or HOV violations. Whites also seem to receive a higher share of tickets related to reckless driving around churches and schools. The Hispanic proportion of specific

charges tends to be under 10% for many charges, but increases to 28% for driving without a license, 15% for defective equipment, and 14% for DUI/DWIs.

Figure 12. The within-citation proportion of types of citations received by racial/ethnic groups

Charge	Citations	White %	Black %	Hispanic %
OFFICIAL SIGN 10-3-830, 46.2-830	14,866	51.8%	37.2%	7.1%
SPEEDING 25 ZONE 10-3-874, 46.2-874	11,821	57.3%	33.0%	6.0%
SPEEDING 35 ZONE 10-3-875, 46.2-875	7,947	50.0%	38.3%	6.6%
OFF. SIGN RED LIGHT/STOPSIGN/OTHER 10-3-1	6,079	53.5%	32.7%	10.0%
REG./LIC/TITLE/NAME/ADDR. 10-3-613, 46.2-613	5,168	58.6%	32.9%	5.7%
NO INSPECTION 10-3-1157, 46.2-1157	4,318	58.9%	31.1%	5.8%
FAIL TO PAY FULL TIME/ATTN 10-3-3	3,970	56.6%	31.5%	8.0%
SUSPENDED/REVOKED LICENSE 10-3-301, 46.2-301	3,119	29.3%	58.9%	10.6%
HOV 10-3-2, 33.1.46.2	3,105	43.3%	49.1%	4.9%
NO OPERATORS LICENSE 10-3-300, 46.2-300	3,097	40.5%	30.6%	27.7%
DUI/DWI OF DRUGS/ALCOHOL 10-3-266, 18-2-266	1,780	53.2%	30.8%	14.2%
RECKLESS/SPEEDING 10-3-862, 46.2-862	1,764	43.0%	42.9%	10.1%
IMPROPER LANE VIOLATION 10-3-804, 46.2-804	1,227	48.2%	38.4%	8.9%
NO U TURN 10-3-845, 46.2-845	1,025	47.8%	36.8%	10.2%
RECKLESS/CHUR/SCH/REC/LOT 10-3-864, 46.2-864	940	63.5%	26.7%	4.3%
DEFECTIVE EQUIPMENT 46.2-1003	898	40.3%	42.3%	15.4%
FAIL TO YIELD ON LEFT TURN 10-3-825, 46.2-825	867	57.9%	30.1%	8.9%
FOLLOWING TOO CLOSE 10-3-816, 46.2-816	858	53.0%	34.3%	10.0%
F/T CARRY LIC/REG 10-3-104, 46.2-104	798	45.6%	39.5%	11.0%
CROSS DOUBLE LINE/PASS 10-3-804.6, 46.2-804.6	767	49.8%	33.2%	14.3%
HEADLIGHTS NOT TURNED ON 46.2-1030	725	39.6%	43.3%	13.1%
IMPROPER LEFT/RIGHT TURN 10-3-846, 46.2-846	615	53.5%	40.3%	3.4%
FAIL TO DISPLAY CITY TAG/NO TAG 10-4-37, 3-2-336	416	49.8%	42.3%	3.1%
SPEEDING 55 ZONE 10-3-870, 46.2-870	408	54.7%	36.3%	5.1%
NO SIGNAL TURN/BACK/STOP 10-3-848, 46.2-848	388	41.5%	44.8%	10.8%

Charge	Citations	White %	Black %	Hispanic %
RED/YELLOW/FLASH RED LIGHT 10-3-833, 46.2-833	380	49.2%	38.2%	10.5%

Note. Only first 90% of tickets are shown.

Again, these data do not tell us *why* there is over- or underrepresentation of different groups for different charges. However, they may present opportunities for communities and police agencies to work together to problem-solve regarding traffic violations received for specific groups.

Finally, we examined the total number of citations received for each unique traffic stop, and estimated the race/ethnicity of individuals within these stops. Figure 13 shows that 88.6% of all traffic stops made by the APD in 2011–2015 only resulted in a single citation. Approximately 54% of these one-citation stops involved White non-Hispanics, 36% involved Black non-Hispanics, and 7% involved Hispanics. The 8,659 stops that involved more than one citation tended to include significantly higher proportions of Blacks and Hispanics. Hispanics were involved in 15.5% of multiple-citation stops, compared to 40% for Blacks and 42% for Whites.

Figure 13. Other benchmarking: Number of citations per stop

Number of citations per stop	Stops	% of Total Stops	White%	Black%	Hispanic%
Any	75,769	100.0%	52.1%	36.1%	8.1%
Only 1	67,110	88.6%	53.5%	35.6%	7.1%
2 or more	8,659	11.4%	42.2%	40.1%	15.5%

Note. There were 155 incidents in which one of the multiple charges may have been dropped prior to the case being entered into the records management system. This may affect the percentages, but insignificantly due to the small number of incidents.

The most common multiple-citation stop were two-citation stops (7,480 out of the 8,659 multiple-citation stops). When examining these pairs of citations more closely, we found that the most frequent citation pairs<sup>3</sup> given were:

<sup>3</sup> Each pair of citations shown appeared 100 or more times in our data. Pairs of citations appearing less than 100 times are not shown here.

- Official Sign (10-3-830, 46.2-830) and No Operators License (10-3-300, 46.2-300)
- Official Sign (10-3-830, 46.2-830) and No Inspection (10-3-1157, 46.2-1157)
- Official Sign (10-3-830, 46.2-830) and Suspended/Revoked License (10-3-301, 46.2-301)
- Off. Sign Red Light/Stopsign/Other (10-3-1) and No Operators License (10-3-300, 46.2-300)
- Reg./Lic/Title/Name/Addr. (10-3-613, 46.2-613) and Suspended/Revoked License (10-3-301, 46.2-301)
- Speeding 25 Zone (10-3-874, 46.2-874) and No Operators License (10-3-300, 46.2-300)
- Speeding 25 Zone (10-3-874, 46.2-874) and Suspended/Revoked License (10-3-301, 46.2-301)
- Off. Sign Red Light/Stopsign/Other (10-3-1) and Suspended/Revoked License (10-3-301, 46.2-301)
- Speeding 35 Zone (10-3-875, 46.2-875) and Suspended/Revoked License (10-3-301, 46.2-301)
- No Inspection (10-3-1157, 46.2-1157) and Reg./Lic/Title/Name/Addr. (10-3-613, 46.2-613)
- No Operators License (10-3-300, 46.2-300) and Official Sign (10-3-830, 46.2-830)

It should be noted that in most of these cases, the second citation given is often for a violation an officer discovers after running the license or registration of an individual (e.g., no license, suspended/revoked license, no registration, etc.). These checks are done for all traffic stops, and therefore may not reflect discretionary activity by officers. In other words, Figure 13 might indicate that the lack of operator's licenses and registrations, and/or suspended/revoked licenses may reflect real offending (factor 1 described above), rather than implicit or explicit biases by officers, or even the choices about where they decide to carry out traffic enforcement.



## Conclusion

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This analysis of the Alexandria Police Department Traffic Citation Data is preliminary and basic; more in-depth research needs to be conducted using a variety of benchmarking, evaluation, and observational techniques to better understand racial and ethnic disparities that tend to exist in traffic stop data in jurisdictions. Such analysis, for example, could be done at micro-place and time levels to examine comparisons in relation to their environmental and temporal context. Even with more precise analysis, it will be difficult to determine whether racial/ethnic disparities are the result of any of the four possible explanations mentioned at the beginning of this report. In other words, disparities across racial and ethnic groups with regard to traffic citations may be the result of actual rates of offending across different population groups, the decisions officers make about where and when to conduct traffic enforcement, or implicit or explicit biases of officers. This could not be discerned here.

However, acknowledging the potential for disparity and trying to address it using research, analysis, and problem-solving is an important goal of modern democratic police agencies. By taking a proactive approach with its own traffic data, the Alexandria Police Department makes an important step towards fair and effective policing. Just as law enforcement agencies try to identify traffic stops at highest risk for officer injury or safety, agencies may also consider which types of citations are at the greatest risk for officer discretion or bias, and determine whether the enforcement benefits of those citations outweigh the risk of bias. Further, perceptions of disparity (whatever the reason) can be just as damaging to police-citizen relations as actual disparity. Police agencies and their communities might consider working together to increase understanding and collaborative problem-solving in efforts to reduce specific types of violations or potential disparities among specific communities.

## References

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

Grogger, J., & Ridgeway, G. (2006). Testing for racial profiling in traffic stops from behind a veil of darkness. *Journal of the American Statistical Association*, *101*(475), 878–887.