Analysis of Black-White Differences in Traffic Stops and Searches

in Roanoke Rapids, NC, 2002-2013

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Abstract
Using official data as reported by the Roanoke Rapids Police Department to the North Carolina Department of Justice, we analyze all traffic stops in the city from January 1, 2002 through December 31, 2013. Just under six percent of these stops lead to a search of the driver or vehicle. We analyze Black-White differences in the rates at which drivers are stopped and subjected to search. Results indicate that the Black / White percentage of traffic stops (49 percent Black, 48 percent White) differs considerably from 2010 census data (31 percent Black, 64 percent White). Whites are searched at a rate of 5.25 percent of all stops, while Blacks are searched in 6.40 percent of stops. This difference is more significant for men than women. Among women, there are no statistically discernible differences in rates of search. The ratio of Blacks to Whites searched is 1.22 overall; 1.34 for men, and 0.91 for women. A more complicated multiple logistic regression analysis controlling for multiple factors shows very similar results: Black men are searched at a rate 40 percent higher than White men in similar circumstances. This male-only discrepancy in search rates by race is compounded by an age factor: Young Black men see search rates regularly many times higher than search rates of other population groups.

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The tables and figures below summarize official data from the NC Department of Justice for traffic stops conducted by the Roanoke Rapids Police from 2002 through 2013.

In a previous analysis of traffic stops in Durham using similar data, Baumgartner, Epp, and Love developed a series of comparisons to assess the degree of racial disparities in that city. Here, we have replicated that analysis but provide only short explanations of the data. The Baumgartner-Epp-Love analysis provides a fuller explanation of background on the literature on traffic stops, the "driving while Black" phenomenon, and possible explanations for disparities. Rather than repeat that discussion here, we simply provide the relevant statistics for Roanoke Rapids and refer the reader to the Durham paper, which is more complete in terms of background but identical with regards to analysis conducted and sources of data. This paper, background on the NC law calling for traffic statistics to be collected, a copy of the SBI-122 form filled out by police officers conducting a stop, and other background information are available at our web site: http://www.unc.edu/~fbaum/traffic.htm.[2]

Composition of the database: In June 2014 we received over 17 million records from the NC DOJ, consisting of all records collected as of that date for all reporting departments in the state. Roanoke Rapids was listed as the reporting agency in 44,277 of these. Table 1 summarizes the construction of the dataset used in this analysis:

Table 1. Overview of the Data

| Data Subsets	Observations
Total stops in dataset received from NC DOJ	44,277
Minus stops conducted in 2014 (partial year)	1,211
Minus passengers (data not collected on all passengers)	1,623
Minus checkpoint stops (data not collected on all checkpoint stops)	67
Stops for analysis	41,376
Number of these stops resulting in a search	2,414
Percent of stops leading to a search ("search rate")	5.83%

Data from 2014 was incomplete so we deleted these cases. Checkpoint stops and passenger-related information were deleted because in both cases the law does not require that data be recorded on each stop, only those leading to searches. Since we have no information on how many drivers were stopped at checkpoints, nor how many passengers were in the cars stopped,

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[2] As we explain in greater detail in our paper on Durham, it is important to note that racial disparities in outcomes can arise for legitimate reasons. Racial groups do not necessarily commit crimes (or, in this case, driving violations) at the same rate. Certainly then, evidence of racial disparity is not the same thing as evidence of overt discrimination or prejudice on the part of the police and we do not mean to allege it. By bringing attention to observable racial differences based on official statistics, we seek to foster investigation into the factors that may have caused them. They may be due to: a) differences in driver behavior; b) institutional differences in patrolling assignments for example; or c) officer-level discretion. Further, they may be purposeful or inadvertent; based on conscious decision-making or subconscious or implicit bias. Our analysis can only tell whether racial differences exist, not what is their cause.

we do not analyze these cases. Deleting these observations (and with some overlap among them: some passengers might have been stopped in 2014, for example), we are left with 41,376 driver / vehicle stops, of which 5.83 percent led to a search.

Figure 1 shows the distribution of stops per year.

Figure 1. Number of Traffic Stops per Year
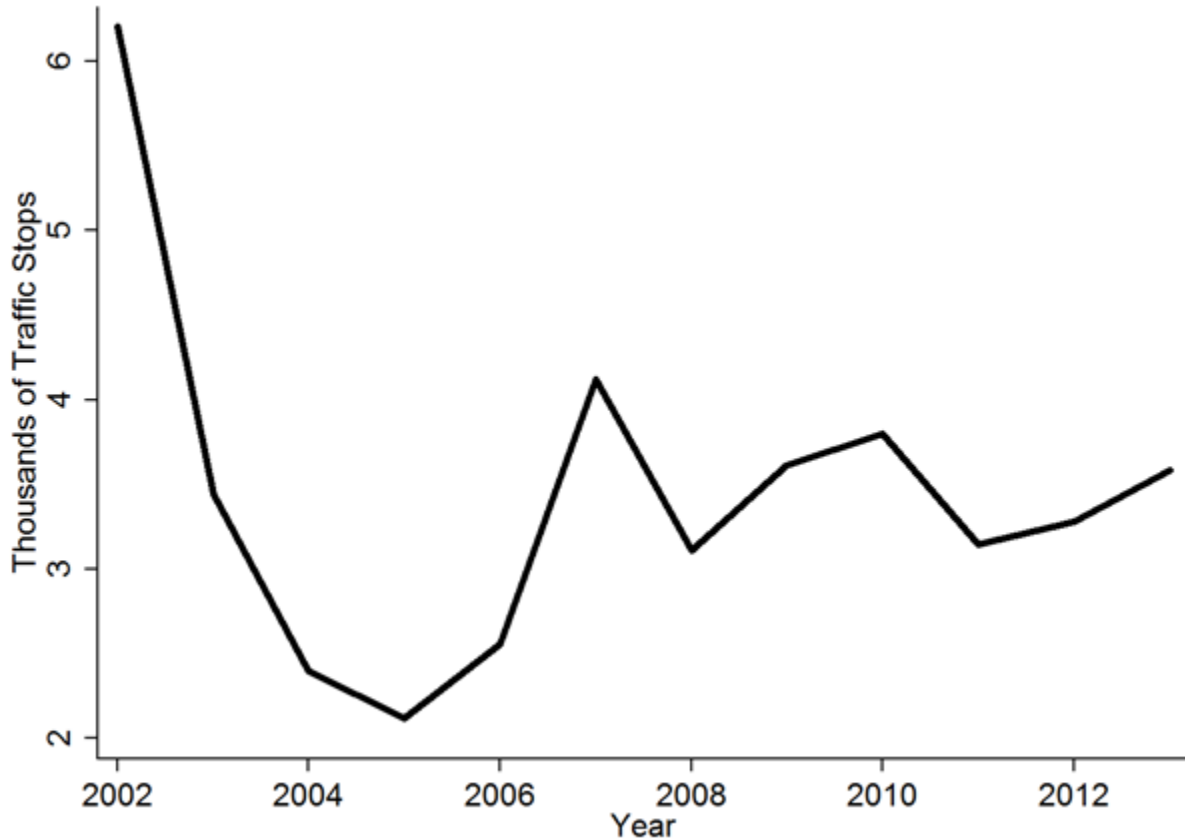
Stops range from just over 2,000 in 2005 to more than 6,000 in 2002. Note that the rate of search (shown below in Figure 9) also varies substantially by year, declining from over 10 percent of all searches in the early period to under 3 percent in later years.

Figure 2 shows the percent of these stops that are associated with White and Black drivers.

Figure 2. Racial Composition of Traffic Stops by Year
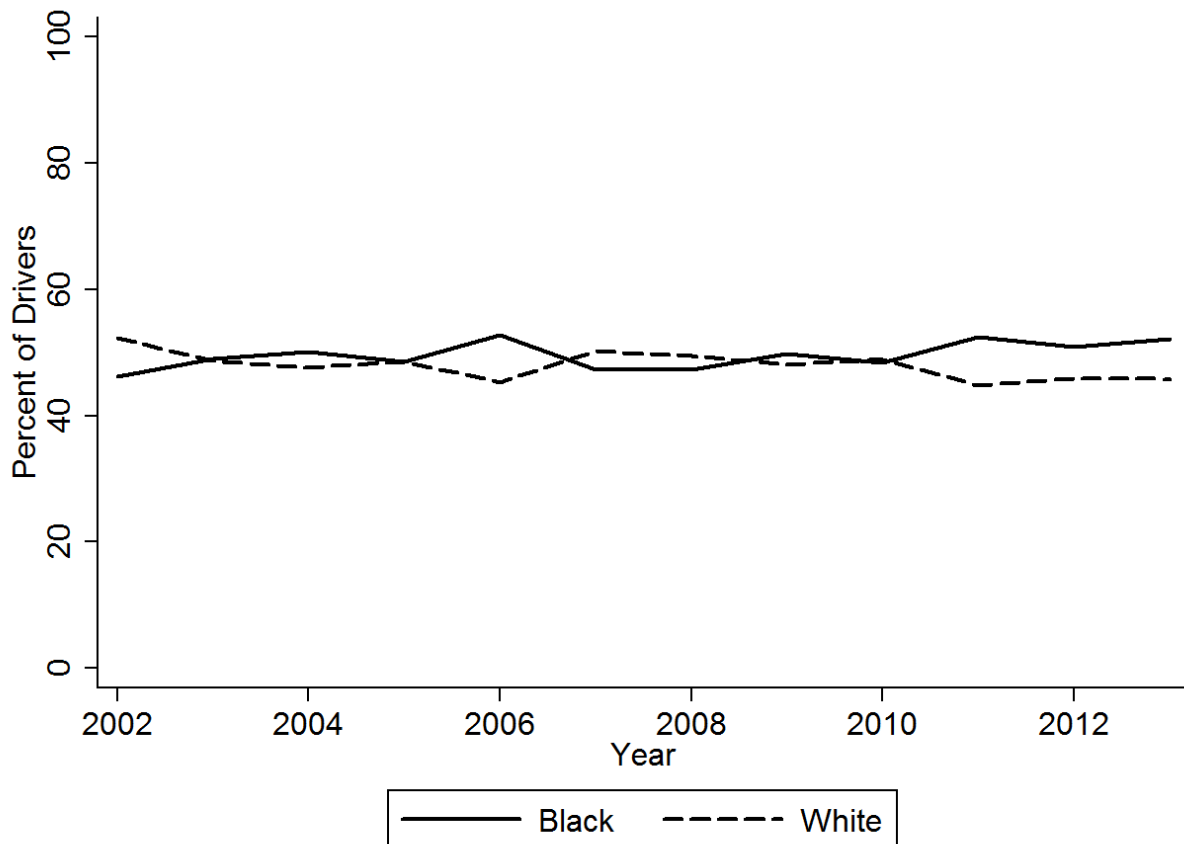
White and Black drivers consistently comprise almost equal percentages of traffic stops. Data from the 2010 census show that the city population is about 31 percent Black and 64 percent White. Roanoke Rapids is on the I-95 corridor and is an economic hub for its county, which has a population of approximately 53 percent Black. We have no information on the "driving population" and certainly no information on which drivers may have been speeding or engaging in other behaviors that may have merited a traffic stop. Since we do not know anything about the driving population on the roads, we focus here on the likelihood of a search, given a stop.

Stops may occur for many different reasons, from speeding to driving while impaired. Table 2 shows each of the nine purposes listed in the official database. For each type of stop, the table lists the number of drivers stopped and the percentage of those drivers who were White and Black.[3] The percentage of drivers stopped for each purpose who are Black ranges from a low of 41 percent for DWI to 54 percent for vehicle equipment stops.

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[3] Other race drivers are excluded from the percentage calculations, but not the total N in Table 2, which explains why the percentages do not sum perfectly to 100.

Table 2. Racial Composition of Traffic Stops by Purpose, Drivers

Purpose	Number	Percent	
		White	Black
Total Stops	41,376	48.37	49.25
Speed Limit	16,028	48.96	49.03
Stop Light/Sign	3,446	53.11	44.11
Driving Impaired	475	53.05	40.63
Safe Movement	3,235	51.16	45.19
Vehicle Equipment	7,098	43.94	53.87
Vehicle Regulatory	4,603	46.99	51.08
Seat Belt	1,780	56.57	41.46
Investigation	1,904	45.17	52.31
Other Vehicle	2,807	45.56	51.16

Note: Includes only drivers. Excludes 67 checkpoint stops. Excludes 1,623 passengers.

Table 3 shows the likelihood of being searched. Overall, as the second row of the table shows, 5.83 percent of all stops led to a search. This number, however, was 5.25 for Whites and 6.40 for Blacks. The ratio in the last column of the table is simply the Black search rate divided by the White one. Numbers above 1.00 indicate that Blacks are more likely to be searched, and by what amount. A ratio of 1.22 indicates that Blacks are 22 percent more likely than Whites to be searched. (Table A7 in the appendix shows that searches are highly correlated with the likelihood of being arrested, but the data do not allow us to distinguish between those searches which lead to arrest and those which follow from the officer's decision to arrest the driver.)

Table 3. Percent Searched by Race and Purpose of Stop

Purpose	Number	Total	% White	% Black	Ratio Black:White
Total Stops	41,376	-	48.37	49.25	-
Total Searches	2,414	5.83	5.25	6.40	1.22
Speed Limit	16,028	2.75	2.24	3.27	1.46
Stop Light/Sign	3,446	3.86	2.95	5.07	1.72
Driving Impaired	475	35.58	38.10	31.61	0.83
Safe Movement	3,235	7.20	6.47	8.00	1.24
Vehicle Equipment	7,098	6.75	6.54	6.96	1.06
Vehicle Regulatory	4,603	5.52	4.39	6.47	1.47
Seat Belt	1,780	7.47	7.45	7.59	1.02
Investigation	1,904	17.80	17.44	18.57	1.06
Other Vehicle	2,807	8.30	7.27	9.33	1.28

Note: See the appendix for this same table broken down for Men and Women.

Figure 3 takes the ratios from the data in Table 3 and displays them in graphical form. It shows the stop purposes in order from least to most likely to result in searches of Blacks as compared to Whites.

Figure 3. Difference in Likelihood of Being Searched, by Race and Type of Stop
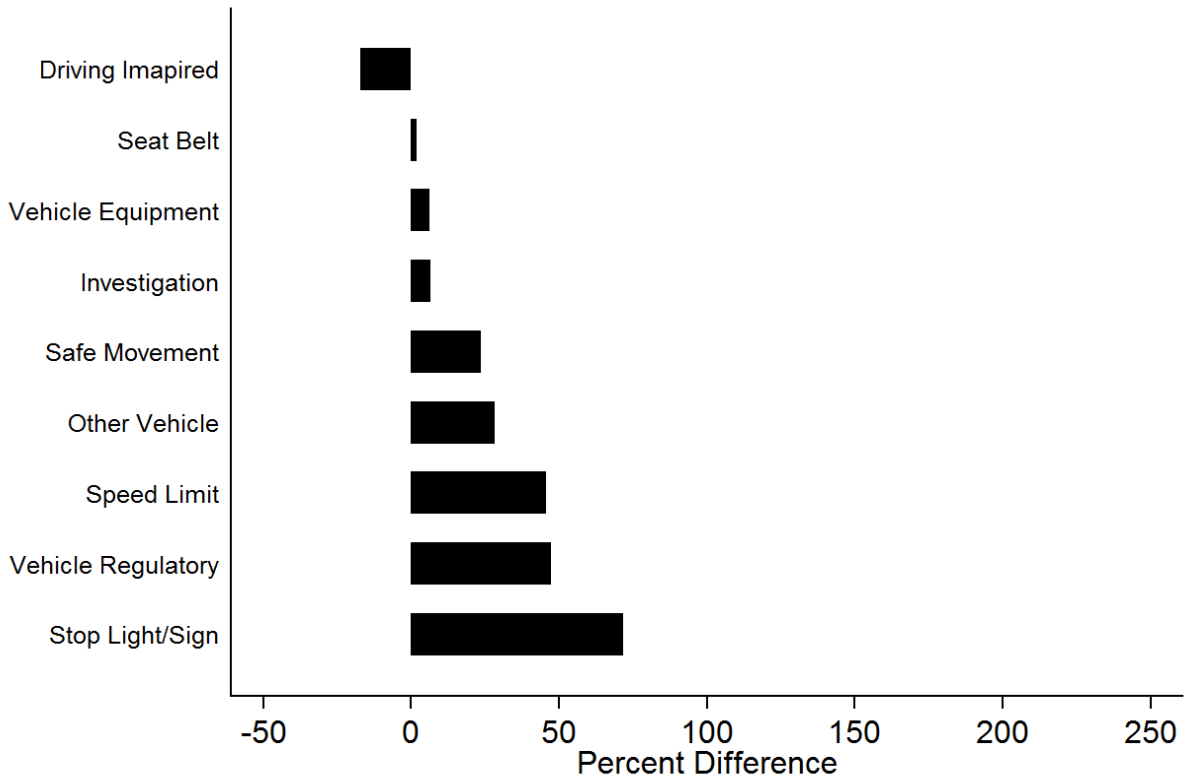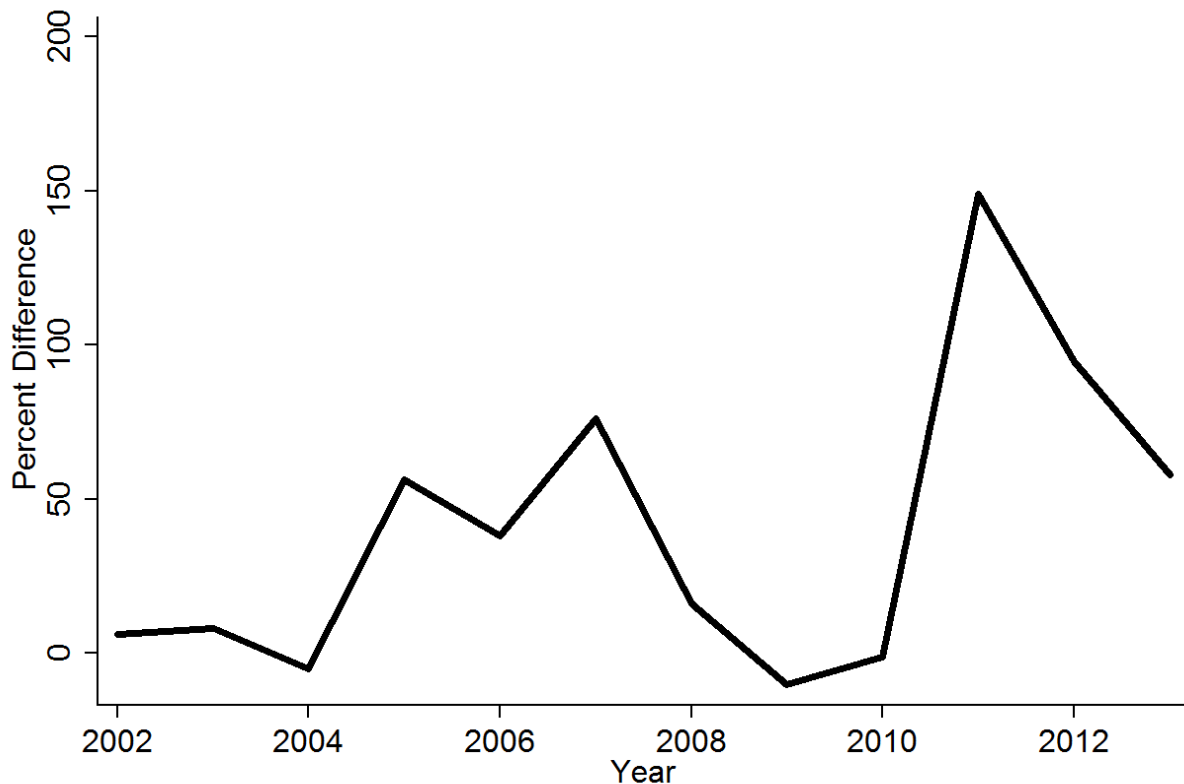

The figure shows the percentage difference in the likelihood of Blacks being searched as compared to Whites by purpose of stop.

Table 3 and Figure 3 show that, except for Driving While Impared, Blacks are more likely to be searched for all stop purposes. Three types of stop stand out with relatively great dispartes: Speed limit, vehicle regulatory, and stop light/ stop sign stops.

Table 3 showed that the overall Black/White difference in likelihood of stop is 22 percent, or a ratio of 1.22. Figure 4 shows how this has changed over time.

Figure 4. Racial Differences in the Likelihood of Search

The figure shows the percentage difference in the likelihood of Blacks being searched as compared to Whites.

The degree of disparity in Black/White search rates have varied quite substantially over time, with several years showing virtually no racial disparity. Figure 5 shows, however, that this is highly dependent on the gender of the driver, and Figure 6 limits the analysis to drivers under the age of 30, again showing significant gender differences. (In the appendix we show this same analysis when limited to consent-searches only.) Note that *rates* of search, for all types of drivers, have declined (see Figure 9 below) at the same time as the *disparities* in these rates have increased. That is, when search rates declined, they declined more substantially for White drivers than for Blacks, leading to an increased difference in search rates across races.
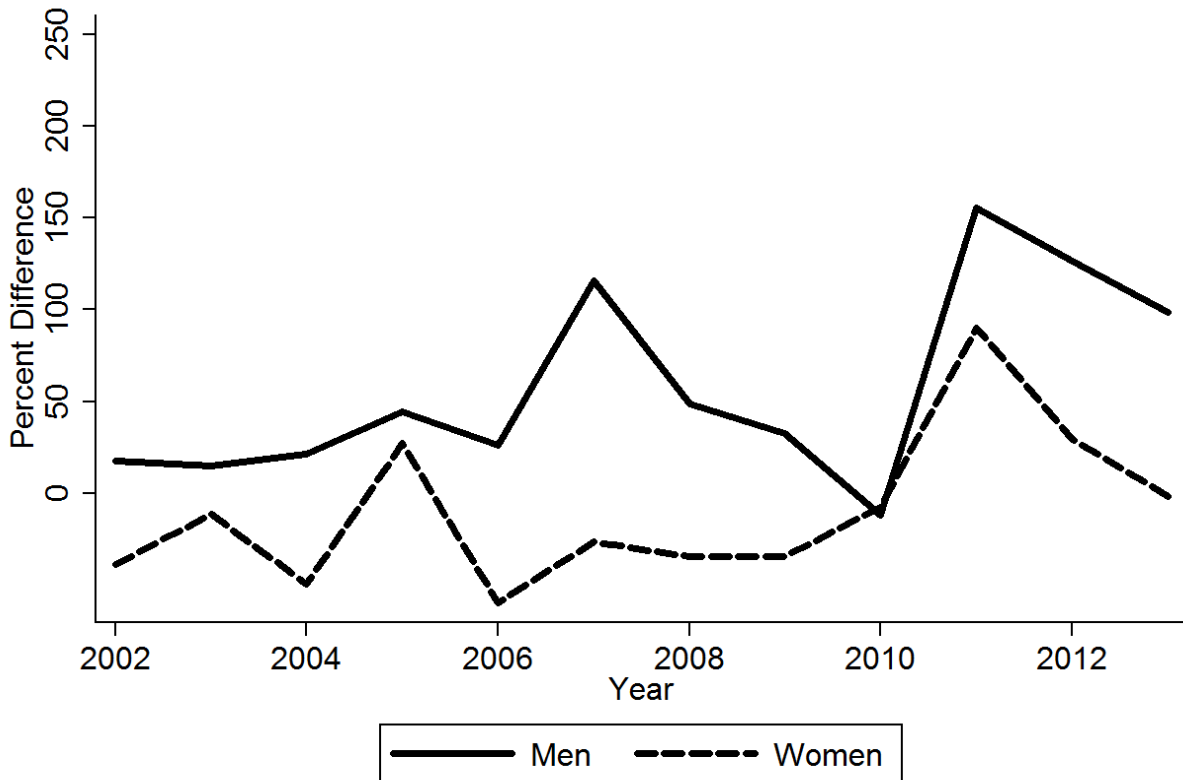
Figure 5. Racial Differences in the Liklihood of Search by Gender

The figure shows the percentage difference in the likelihood of Blacks being searched as compared to Whites by gender.

Note: a percent difference of 0 would represent equal likelihood of search. This is equivalent to a Black-White ratio from Table 3 above of 1.00: equal odds. A percent difference of 50 reflects a ratio of 1.50 and means that Blacks are 50 percent more likely to be searched than Whites. Percent differences below zero mean that Whites are more likely to be searched than Blacks. Also note that the annual number of drivers searched can be low, particularly for female drivers. Therefore, the spike in the ratio of the percent of Black to White women searched in 2011 may be an artifact of small numbers of cases.

Figure 6. Racial Differences in the Liklihood of Search by Gender, for Drivers Under 30
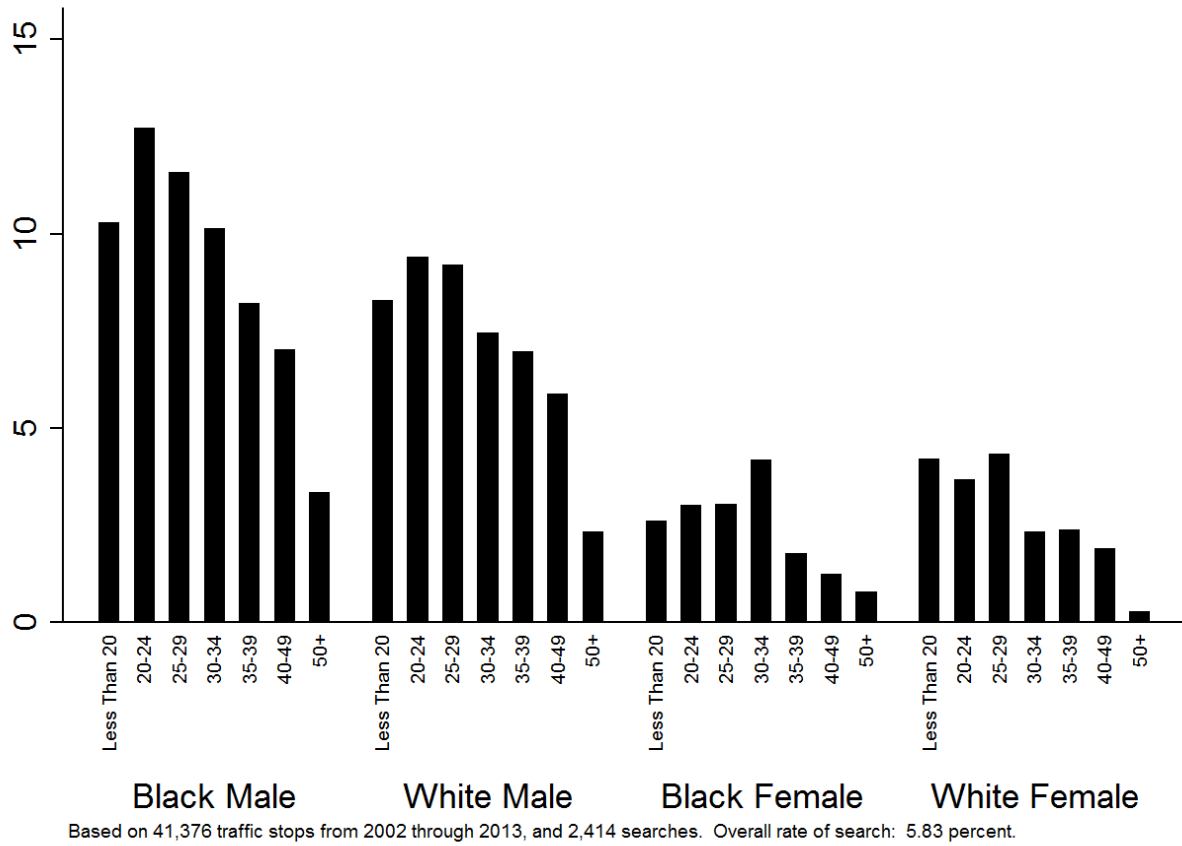

The figure shows the percentage difference in the likelihood of Blacks being searched as compared to Whites by gender for motorists under 30.

Male and female drivers clearly elicit different types of response by the police. Male drivers typically see a much more signficant racial discrepancy in the likelihood of being searched, with Black male drivers considerably more likely to be searched, often twice as likely (100 percent difference or more) as White male drivers. Among women, who are much less likely to be searched in general, Black women on average are no more likely to be searched than Whites, and indeed in many years they are less likely to be searched than White women.

Figure 7 combines all the years of data and shows by age group the likelihood that Black and White men and women will be searched.

Figure 7. Search Rates by Race, Gender, and Age Group

Based on 41,376 traffic stops from 2002 through 2013, and 2,414 searches. Overall rate of search: 5.83 percent.

Black men under 35 years are searched at rates around or above 10 percent; women in general are searched in less than 3 percent of all stops. The figure makes clear how race, age, and gender combine to indicate where searches are most likely.

The patterns in Figure 7 are highly consistent over time. Figures 8 and 9 show the number of stops, then searches, by the four race/gender groups.

Figure 8. Number of Stops, by Race and Gender
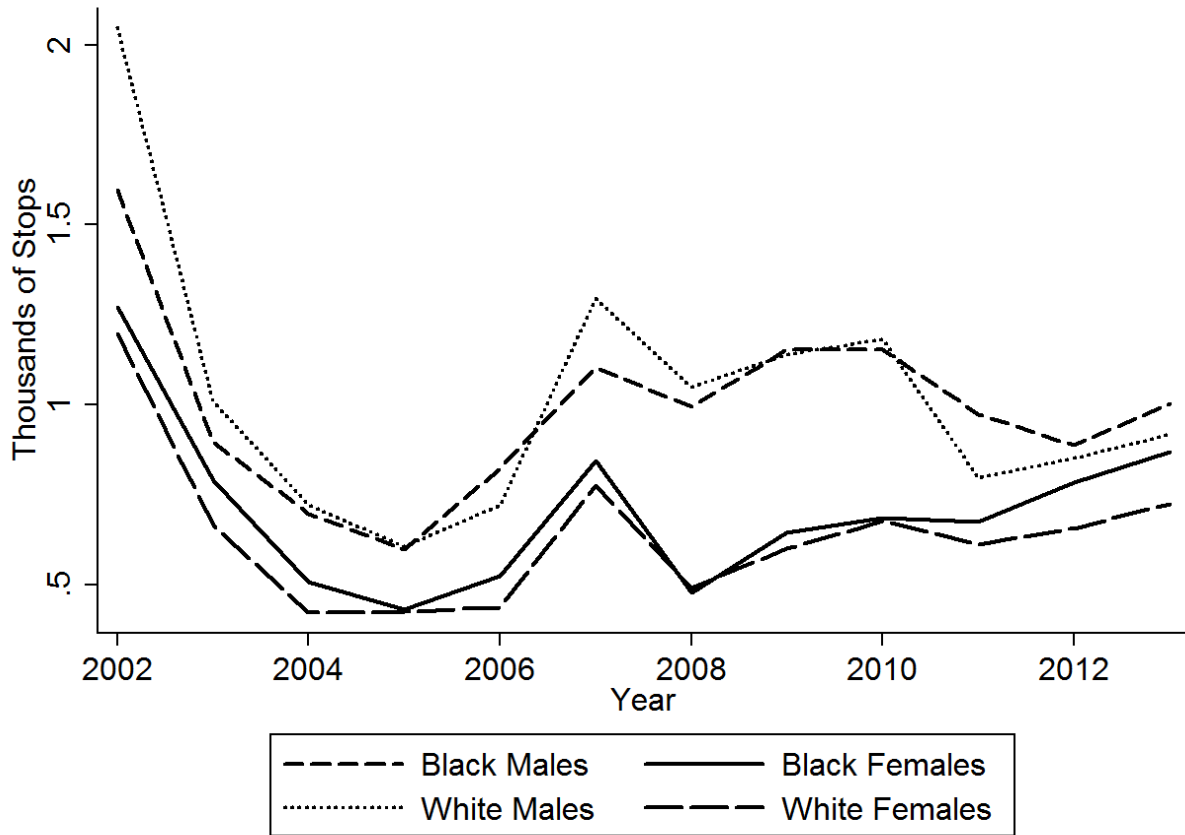
Males are much more likely to be stopped than Females. Figure 9 shows the odds that each type of driver will be searched, following a stop. Note that the thick solid line shows overall search rates to have declined from about 10 percent of all stops to below 3 percent, and that these declines have been seen in each of the four categories. However, the declines are not equal in proportion across the four groups, leading to the observed increase in racial differences in rates of search even as overall rates of search have declined for each group.

Figure 9. Percent of Stops Resulting in a Search, by Race and Gender
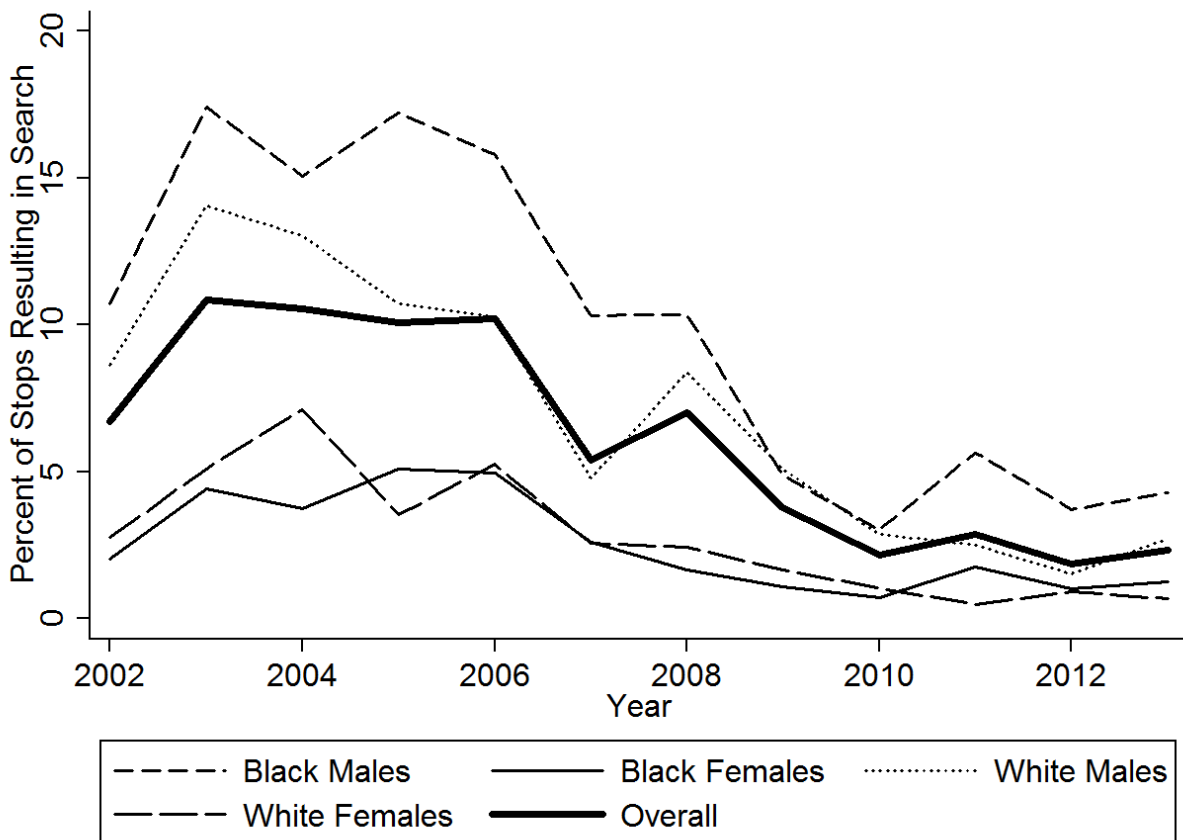
The likelihood of a search was above 15 percent for Black males during the mid-2000s, and above 10 percent for White males. Search rates significantly declined after approximlately 2007. The likelihood of a Black male being searched remains higher than any other group, however. Racial differences among women are very low compared to those seen among men.

The SBI database lists not only the "purpose" of the stop, shown in Tables 2 and 3 above, but also the "type" of search: driver consent, based on probable cause, and so on. Table 4 shows that about half of all searches are consent searches, but that the Black / White discrepancies mostly stem from other types of searches, in particulr those based on probable cause and those conducted in association with an arrrest.

Table 4. Type of Search by Race

					Ratio
Search Type	Number	Total	White	Black	Black:White
Total Stops	41,376	-	48.37	49.25	-
Total Searches	2,414	5.83	5.25	6.40	1.22
Consent	1,056	2.55	2.73	2.37	0.87
Search Warrant	5	-	-	-	-
Probable Cause	317	0.77	0.53	1.03	1.94
Incident to Arrest	970	2.34	1.85	2.81	1.52
Protective Frisk	66	0.16	0.12	0.19	1.58

Note: See the appendix for this same table separately for Men and Women.

The SBI traffic stops database includes an anonymous ID number for each officer, and we have no information about the officers beyond this ID number. The ID number does allow us to identify each officer's distribution of stops, however. Before looking at the racial patterns of stops and searches by officer, it is important to understand that many officers, in fact about 80 percent of the officers included in the dtabase, conduct so few traffic stops that we cannot reliably analyze their data. Table 5 shows how many officers have conducted how many traffic stops.

Table 5. Distribution of Officer IDs by Stop

Number of Stops	Officers w/ this many Stops	Percent of Officers	Cumulative Percent	Percent of Stops	Cumulative Percent
1	178	42.79	42.79	0.43	0.43
2 – 10	103	24.76	67.55	0.93	1.36
11 - 100	64	15.38	82.93	6.32	7.67
101 – 1,000	59	14.18	97.12	45.96	53.64
1,001 +	12	2.88	100.00	46.36	100.00
Total	416	100	-	100	-

A total of 416 officers are included in the database. Most of them, however, conducted fewer than 100 traffic stops, while a few (12 officers) conducted over 1,000 stops each. In fact, over 90 percent of the traffic stops were conducted by just 71 officers (those listed in the bottom two rows, with more than 100 stops, or 1,000 stops each).

Figure 10 shows the number of Black and White motorists stopped by each officer, and Figure 11 shows the number of Black and White motorists searched. Figure 10 makes clear that the average officer stops roughly equal proportions of Blacks and Whites (in fact, they stop 0.998 Whites for each Black stopped, or almost exactly equal proportions). Figure 11 shows, however, that searches are skewed towards Black motorists. The average officer searches more Black drivers than White ones.

Figure 10. Number of Black and White Motorists Stopped, by Officer
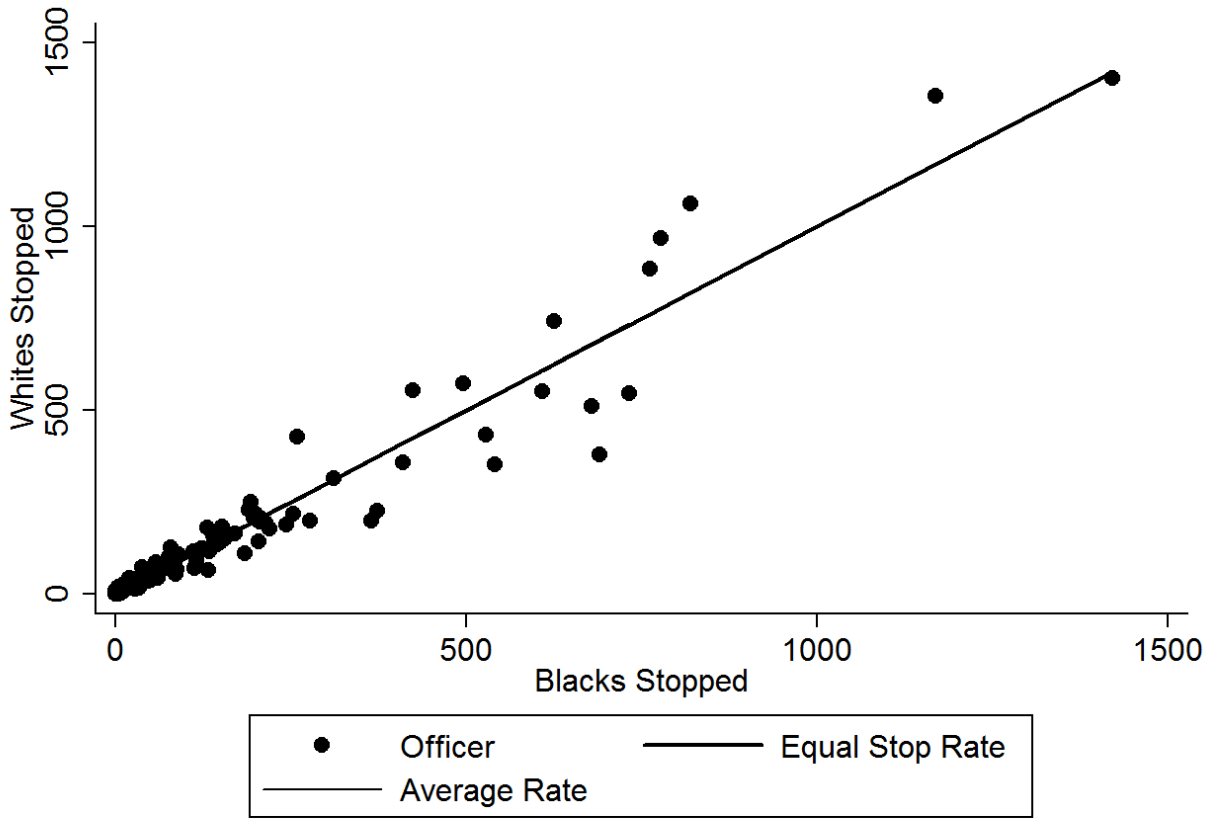
On average, officers stop 0.998 Whites for each Black stopped.

Figure 11. Number of Black and White Motorists Searched, by Officer
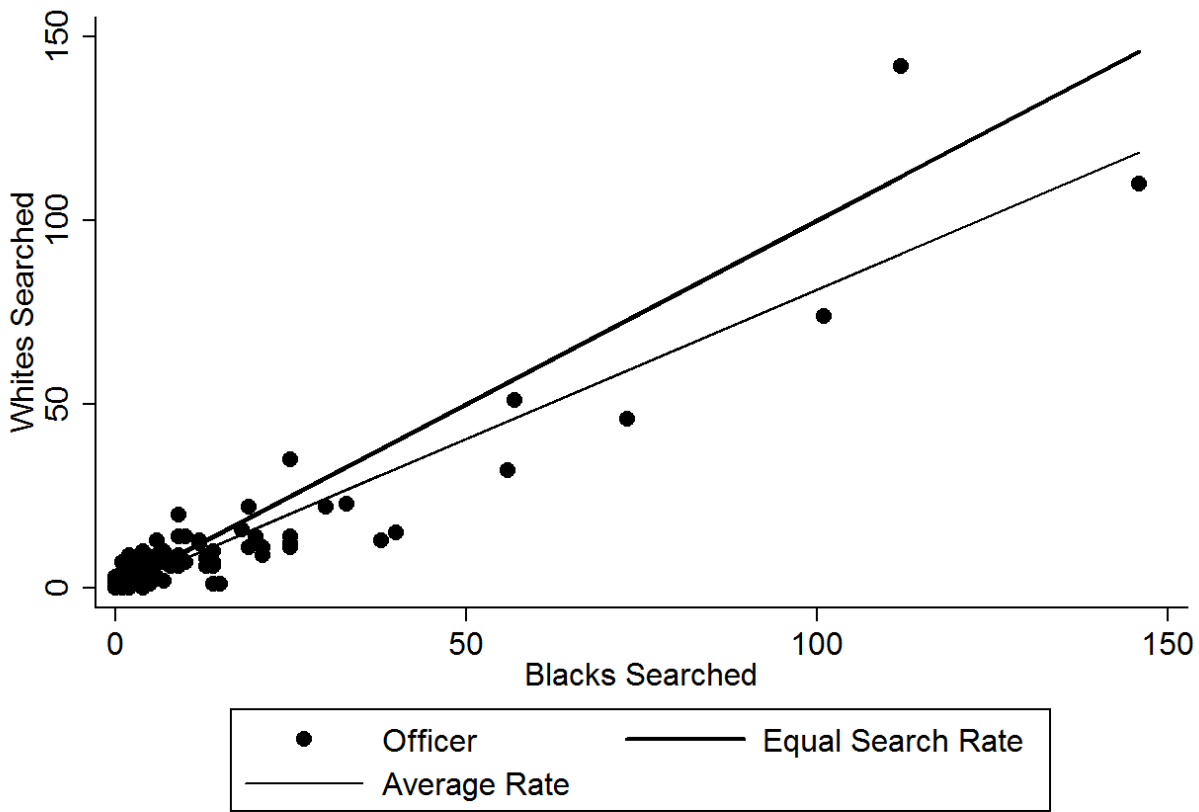
On average, officers search 0.812 Whites for each Black searched.

With some care, we can analyze the percentage of White and Black drivers searched, by officer. We do this carefully because as Figures 10 and 11 make clear, many officers have very low numbers of traffic searches. In the two figures below, we compare the percent of White and Black drivers searched. Figure 12 includes those 25 officers who searched a minimum of 10 White drivers, and Figure 13 includes 29 officers those with at least 10 Black drivers searched. In each figure, we can compare the percentage of each race of driver who is searched, looking to see if any officers have highly disparate patterns of searching, by race. We exclude officers from this analysis with too few searches to have reliable estimates of these patterns. Note that some officers search very low percentage of all the drivers they stop, and we exclude them here. One officer had over 1,700 traffic stops, but just 2 searches. We do not calculate any ratios for such officers; similarly many officers had too few searches of drivers of one race or the other for us to analyze any patterns.

Figure 12. Percent of White and Black Drivers Searched, by Officer, Threshold of 10 Whites searched.
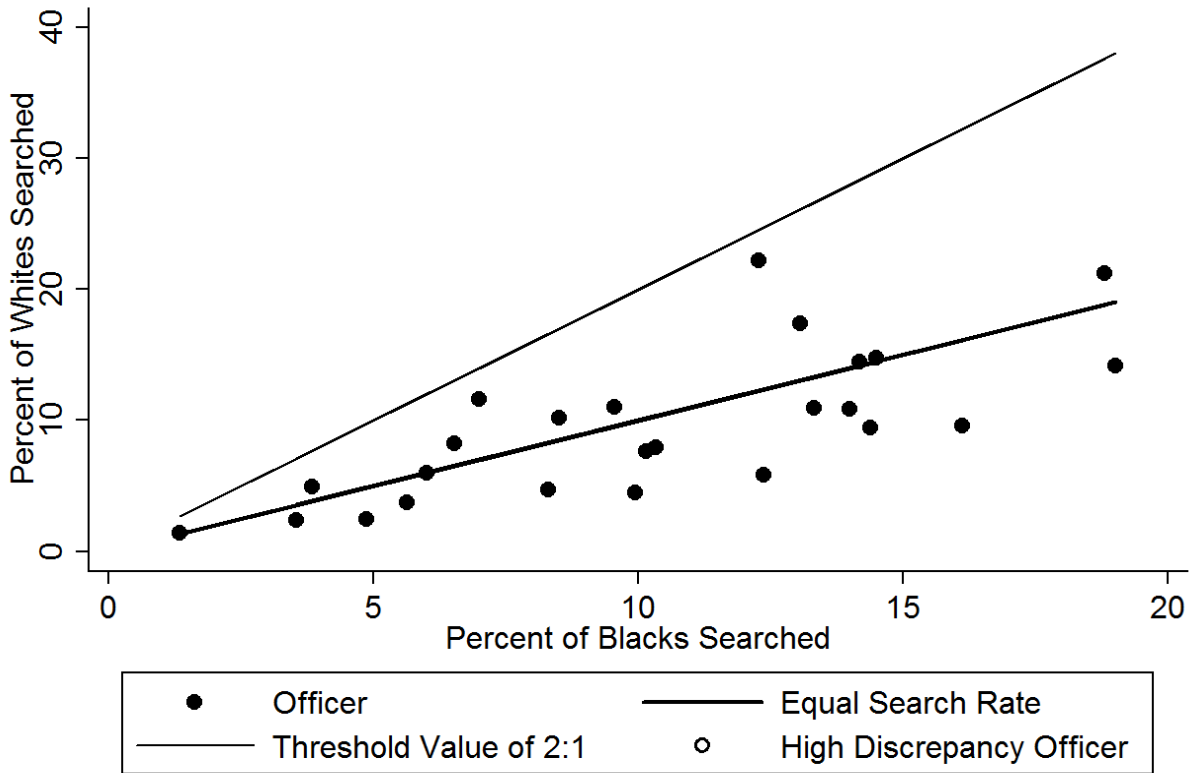
Includes 25 officers with 10 or more searches of White motorists.
Of these officers, none have rates of searching Whites more than twice their rate of searching Blacks.

No officer is listed as a high discrepancy officer with twice the rate of searching Whites as compared to Blacks.

Figure 13. Percent of White and Black Drivers Searched, by Officer, Threshold of 10 Blacks searched.
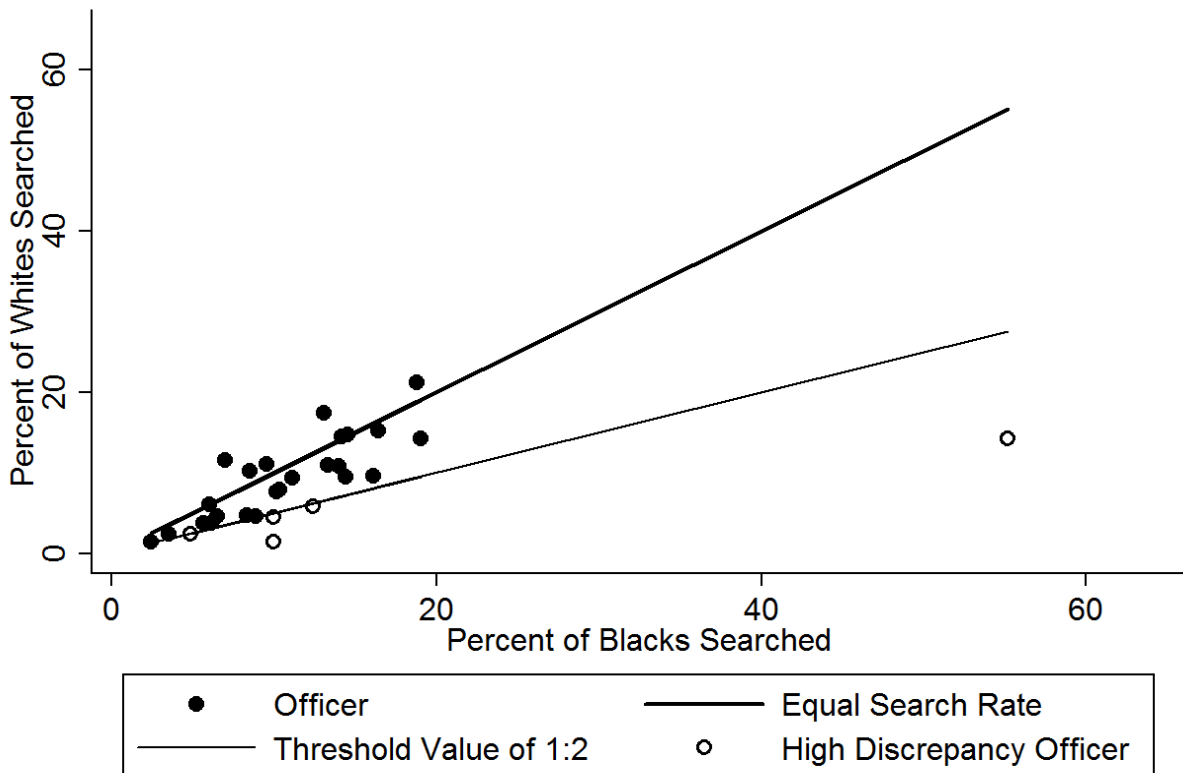
Includes 29 officers with 10 or more searches of Black motorists.
Of these officers, 5 have rates of searching Blacks more than twice their rate of searching Whites.

Five officers have twice the rate of searching Black drivers as compared to their rate of searching Whites. One officer has a rate of searching Black drivers of over 50 percent of all stops, while that officer's rate of searching White drivers is less than 15 percent. Four other officers have much lower search rates, but still can be identified as having searched more than twice the percentage of Blacks than Whites, based on a minimum threshold of having conducted at least 10 searches of Black drivers. These data are available to the administration of the police department, and it would be very easy to conduct a periodic review of these traffic stops for the individual officers involved. There may be a reasonable explanation for these patterns, or administrators may want to question if these patterns are appropriate.

Having generated a variable for "high discrepancy" officers, we can now move to a more complete statistical model allowing us to test what factors predict the likelihood of being searched. This allows us to see if, controlling for other factors, Race is a significant predictor. Tables 6 and 7 present these statistical models separately for men and women. In each case, the table shows the "odds-ratio" associated with the various predictors shown. An odds-ratio can be interpreted based on its deviation from "even" odds of 1.00: numbers above that value indicate increased odds (so, for example, Model 5 in Table 6 shows a value of 1.39 for Race, indicating a 39 percent increase in odds of being searched for Black drivers, compared to Whites, controlling for all other factors included in the model).   Numbers below 1.00 indicate reduced odds.

Tables 6 and 7 start with the simplest model, including just Race (1 = Black, 0 = White) as well as Ethnicity (1 = Hispanic, 0 = Non-Hispanic). Model 2 adds in the age of the driver, and the coefficients of about 0.97 in each case mean that for each year of age, the odds of being searched decline by about 3 percent. Model 3 adds in the stop purpose, indicating that being stopped for DWI is a very powerful predictor of being searched. Model 4 adds in the high-disparity officers, which in this case does not produce statistically significant results, as there are so few such officers in the database. Finally, model 5 adds in controls for the time of day (each hour in a 24 hour sequence, with midnight as the baseline) and day of week (each of 7 days, with Sunday as the baseline). We do not show these estimates, as the goal here is not to understand those coefficients, but to see if the Race coefficient remains statistically significant when we include these successive controls. Presenting five models in this manner allows us to see if the coefficients are stable or if they change dramatically when successive control variables are included. These results are extremely stable.

Table 6. Predicting the Occurrence of a Search for Male Motorists, 2002-2013

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Demographics					
Race	1.44*(0.07)	1.42*(0.07)	1.42*(0.07)	1.42*(0.07)	1.39*(0.07)
Hispanic	3.82*(0.58)	3.76*(0.58)	3.33*(0.53)	3.34*(0.53)	3.54*(0.57)
Age	-	0.97*(0.01)	0.97*(0.00)	0.97*(0.00)	0.97*(0.00)
Stop Purpose					
Speed Limit	-	-	-	-	-
Stop Light	-	-	1.35*(0.15)	1.36*(0.15)	1.28*(0.15)
Impaired	-	-	14.29*(1.80)	14.41*(1.82)	10.58*(1.40)
Movement	-	-	2.14*(0.20)	2.16*(0.20)	2.12*(0.20)
Equipment	-	-	2.00*(0.15)	2.02*(0.15)	1.86*(0.15)
Regulatory	-	-	1.89*(0.17)	1.90*(0.18)	1.90*(0.18)
Seat Belt	-	-	2.57*(0.29)	2.59*(0.29)	2.77*(0.32)
Investigation	-	-	5.19*(0.46)	5.23*(0.47)	4.77*(0.43)
Other	-	-	2.22*(0.21)	2.24*(0.21)	2.18*(0.21)
Officer Type					
Black Disparity[†]	-	-	-	1.10(0.09)	1.08(0.09)
White Disparity[ϕ]	-	-	-	(omitted)	(omitted)
Time					
Hour of Day	-	-	-	-	Included
Day of Week	-	-	-	-	Included
Constant	0.07*(0.00)	0.19*(0.01)	0.09*(0.01)	0.09*(0.01)	0.14*(0.02)
N	24,215	24,215	24,215	24,215	24,014
Pseudo R^2	0.01	0.03	0.07	0.07	0.08

Note: Entries are odds-ratios, with standard errors in parenthesis.

Note : The number of observations is smaller for Model 5 because the "hour of stop" variable is missing in some cases.

* = Significant at 0.05 p-value

† = Coded 1 for 5 officers who searched Blacks at twice the rate of Whites; otherwise zero. Officers with fewer than 10 searches of Black motorists are automatically coded zero.

ϕ = White Disparity omitted because no officers have this value.

Table 7. Predicting the Occurrence of a Search for Female Motorists, 2002-2013

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Demographics					
Race	0.92(0.09)	0.92(0.09)	0.93(0.10)	0.93(0.10)	0.90(0.10)
Hispanic	2.32(1.08)	2.35(1.10)	2.27(1.08)	2.28(1.09)	2.28(1.11)
Age	-	0.96*(0.00)	0.96*(0.00)	0.96*(0.00)	0.96*(0.00)
Stop Purpose					
Speed Limit	-	-	-	-	-
Stop Light	-	-	1.64*(0.40)	1.66*(0.40)	1.52(0.37)
Impaired	-	-	40.77*(10.58)	41.58*(10.85)	26.22*(7.16)
Movement	-	-	3.17*(0.73)	3.21*(0.74)	2.71*(0.64)
Equipment	-	-	3.07*(0.50)	3.10*(0.51)	2.33*(0.40)
Regulatory	-	-	2.63*(0.49)	2.65*(0.49)	2.71*(0.51)
Seat Belt	-	-	2.03*(0.62)	2.07*(0.63)	2.41*(0.74)
Investigation	-	-	13.20*(2.28)	13.39*(2.33)	11.07*(1.99)
Other	-	-	3.39*(0.75)	3.44*(0.76)	3.06*(0.69)
Officer Type					
Black Disparity[†]	-	-	-	1.15(0.21)	1.11(0.21)
White Disparity[φ]	-	-	-	(omitted)	(omitted)
Time	-				
Hour of Day	-	-	-	-	Included
Day of Week	-	-	-	-	Included
Constant	0.03*(0.00)	0.10*(0.01)	0.04*(0.01)	0.04*(0.01)	0.07*(0.02)
N	16,177	16,177	16,177	16,177	16,050
Pseudo R^2	0.00	0.03	0.11	0.11	0.13

Note: Entries are odds-ratios, with standard errors in parenthesis.
Note : The number of observations is smaller for Model 5 because the "hour of stop" variable is missing in some cases.
* = Significant at 0.05 p-value
† = Coded 1 for 5 officers who searched Blacks at twice the rate of Whites; otherwise zero. Officers with fewer than 10 searches of Black motorists are automatically coded zero.
φ = White Disparity omitted because no officers have this value.

Tables 6 and 7 make several things clear. Controlling for relevant factors, Black male drivers are about 39 percent more likely to be searched as compared to White male drivers. Among women, there is no statistically significant difference in search rates according to race. Note from the appendix or Figure 7 above that women are unlikely, compared to men, to be searched at all.

Figure 14 takes the coefficient for Race from Model 5 and plots it over time, showing the evolution and consistency of racial disparities in search rates, controlling for other factors.

Figure 14. Increased Odds of Search for Blacks, by Gender, 2002-2013
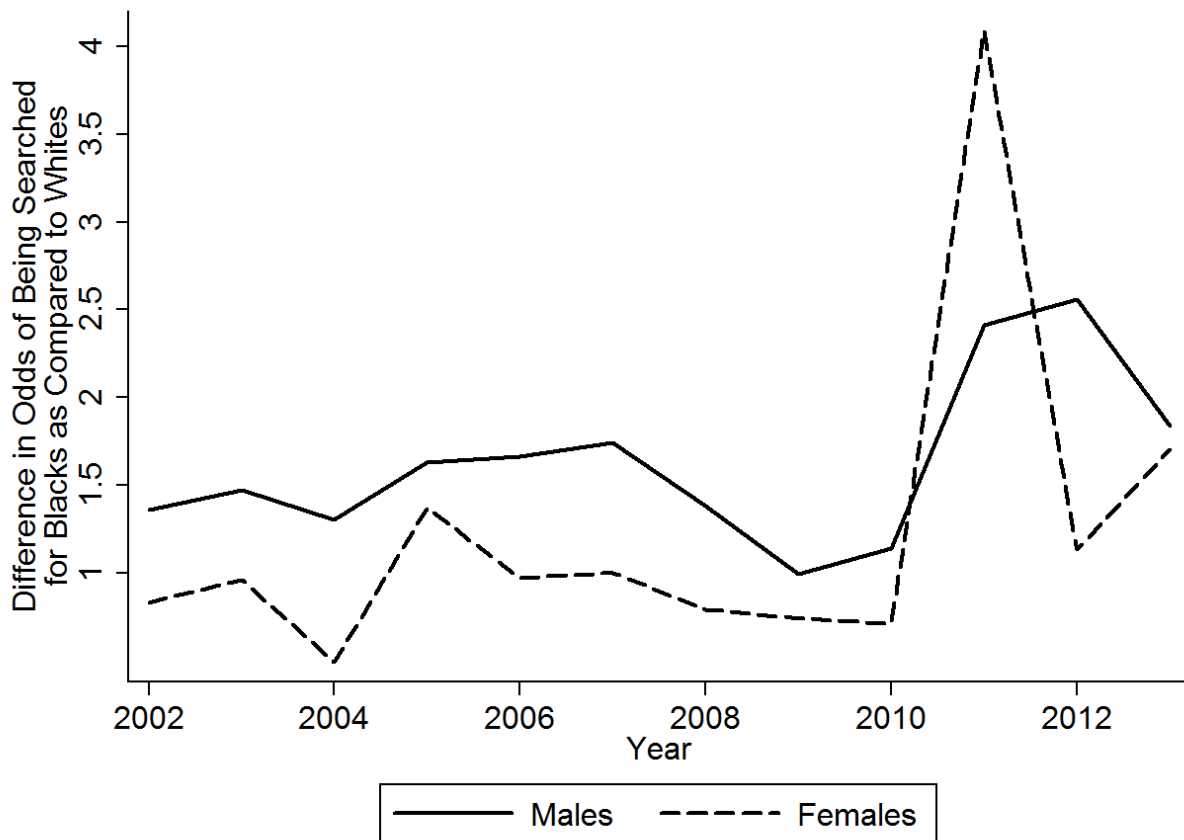
Among men, the likelihood of search is consistently greater for Blacks than Whites, and in recent years has grown to values over 2.00, indicating more than double the rate of search, compared to similarly situated Whites. Among women, the numbers fluctuate wildly but are typically low; in any case they are not statistically different from 1.00, indicating no systematic racial disparity.

Conclusion

This review of traffic stops supports these conclusions: Black men in Roanoke Rapids are subject to a 20 to 40 percent increased likelihood of search, given a stop. Compared to their numbers in the local population, Blacks are also significantly more likely than Whites to be stopped. The racial disparties in traffic stops identified here related almost exclusively to men, as women are searched at very low rates, and these rates are not statistically discernable between Black and White women drivers. Rates of search have also significantly declined in Roanoke Rapids since the late 2000s. This has not, however, reduced the racial disparities in those stops and searches, though it has indeed reduced their incidence by a substantial margin for all drivers. While our officer-level analysis does identify a small number of individuals who appear to have highly disparate rates of searching Black drivers as compared to Whites, the disparities we document cannot be attributed only to a few "bad apples." Rather, it is widespread and consistent.

Appendix

In this appendix we provide information about some basic statistics such as stops and search by hour of the day, day of the week, and more detailed tables for example breaking down some of the analysis presented in the main text to give separate data for males and females. We provide minimal commentary but explain how to read the table and what it shows.

Table A1 provides data on passengers. Data in the main text refer to drivers. Information on passengers is required to be gathered only in the small percentage of cases where they are searched, although we find many cases in the database where they are not searched. In any case, we exclude passengers from the main analysis in the body of the paper because data on passengers is generally not recorded.

Table A1. Racial Composition of Traffic Stops by Purpose, Passengers

Purpose	Number	Percent	
		White	Black
Total Stops	1,623	38.45	59.52
Speed Limit	291	35.40	64.26
Stop Light/Sign	94	41.49	56.38
Driving Impaired	99	48.48	40.40
Safe Movement	127	43.31	54.33
Vehicle Equipment	357	37.25	61.34
Vehicle Regulatory	156	25.00	73.72
Seat Belt	87	52.87	44.83
Investigation	271	40.59	57.56
Other Vehicle	141	36.17	62.41

See Table 2 in the text for a similar table relating to drivers. Data on passengers is not systematically collected for all traffic stops. Driver searches were shown in Table 2 to be 49 percent among Blacks.

Tables A2 through A5 break down driver searches for men and women, replicating Tables 2 and 3 showing racial break-downs for searches of different type and purpose:

Table A2. Percent of Men Searched by Race and Purpose of Stop

Purpose	Number	Total	% White	% Black	Ratio Black:White
Total Stops	24,945	-	49.45	47.62	-
Total Searches	2,011	8.06	6.91	9.29	1.34
Speed Limit	8,641	4.26	3.25	5.43	1.67
Stop Light/Sign	2,037	5.40	3.89	7.47	1.92
Driving Impaired	370	38.11	40.61	34.25	0.84
Safe Movement	2,361	8.73	7.25	10.52	1.45
Vehicle Equipment	4,514	8.77	8.19	9.34	1.14
Vehicle Regulatory	2,582	7.86	5.99	9.48	1.58
Seat Belt	1,167	10.28	10.51	10.19	0.97
Investigation	1,307	20.20	18.62	22.11	1.19
Other Vehicle	1,966	10.33	9.01	11.72	1.03

Table A3. Percent of Women Searched by Race and Purpose of Stop

Purpose	Number	Total	% White	% Black	Ratio Black:White
Total Stops	16,431	-	46.72	51.73	-
Total Searches	403	2.45	2.58	2.36	0.91
Speed Limit	73	0.99	0.94	1.06	1.13
Stop Light/Sign	23	1.63	1.52	1.85	1.22
Driving Impaired	28	26.67	29.09	23.40	0.80
Safe Movement	27	3.09	4.12	2.25	0.55
Vehicle Equipment	83	3.21	3.58	2.95	0.80
Vehicle Regulatory	51	2.52	2.33	2.68	1.15
Seat Belt	13	2.12	1.47	3.00	2.04
Investigation	75	12.56	15.00	10.53	0.70
Other Vehicle	30	3.57	3.32	3.88	1.17

Table A4. Type of Search by Race: Men

Search Type	Number	Total	White	Black	Ratio Black:White
Total Stops	24,945	-	49.45	47.62	-
Total Searches	2,011	8.06	6.91	9.29	1.34
Consent	872	3.50	3.50	3.49	1.00
Search Warrant	4	-	-	-	-
Probable Cause	271	1.09	0.71	1.52	2.14
Incident to Arrest	807	3.24	2.51	3.96	1.58
Protective Frisk	57	0.23	0.17	0.29	1.71

Table A5. Type of Search by Race: Women

Search Type	Number	Total	White	Black	Ratio Black:White
Total Stops	16,431	-	46.72	51.73	-
Total Searches	403	2.45	2.58	2.36	0.91
Consent	184	1.12	1.48	0.79	0.53
Search Warrant	1	-	-	-	-
Probable Cause	46	0.28	0.23	0.33	1.43
Incident to Arrest	163	0.99	0.79	1.19	1.51
Protective Frisk	9	0.05	0.05	0.06	1.20

Note: The very low number of women searched (just 403 cases over 11 years) suggests that the analysis of these numbers should be done with great caution. Clearly, the bulk of activity discussed in this paper relates to male drivers and should be interpreted as such.

In the statistical models predicting the likelihood of search, we control for time of day and day of week. Figures A6 through A9 show the number of searches, then stops, for Black and White drivers by day of week (zero = Sunday, 6 = Saturday) and time of day (0 = midnight, 23 = 11pm).
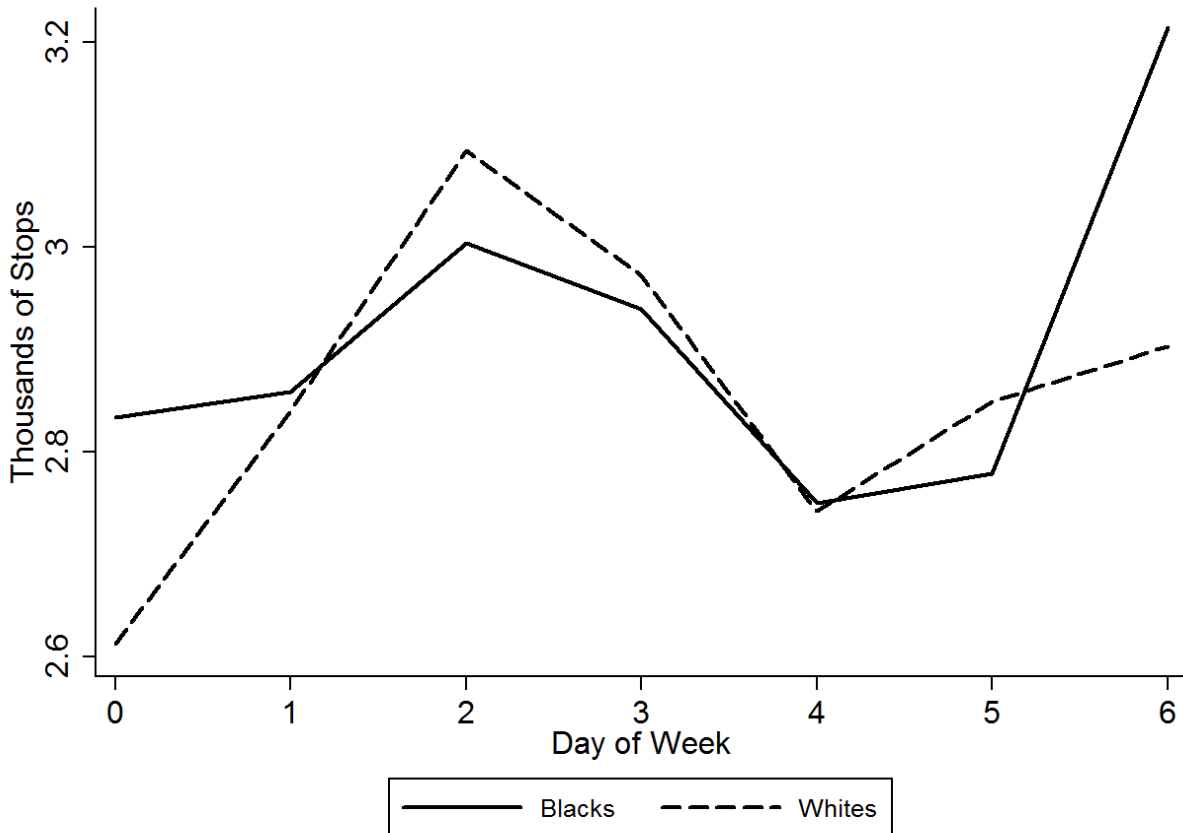
Figure A6. Stops by Day of the Week
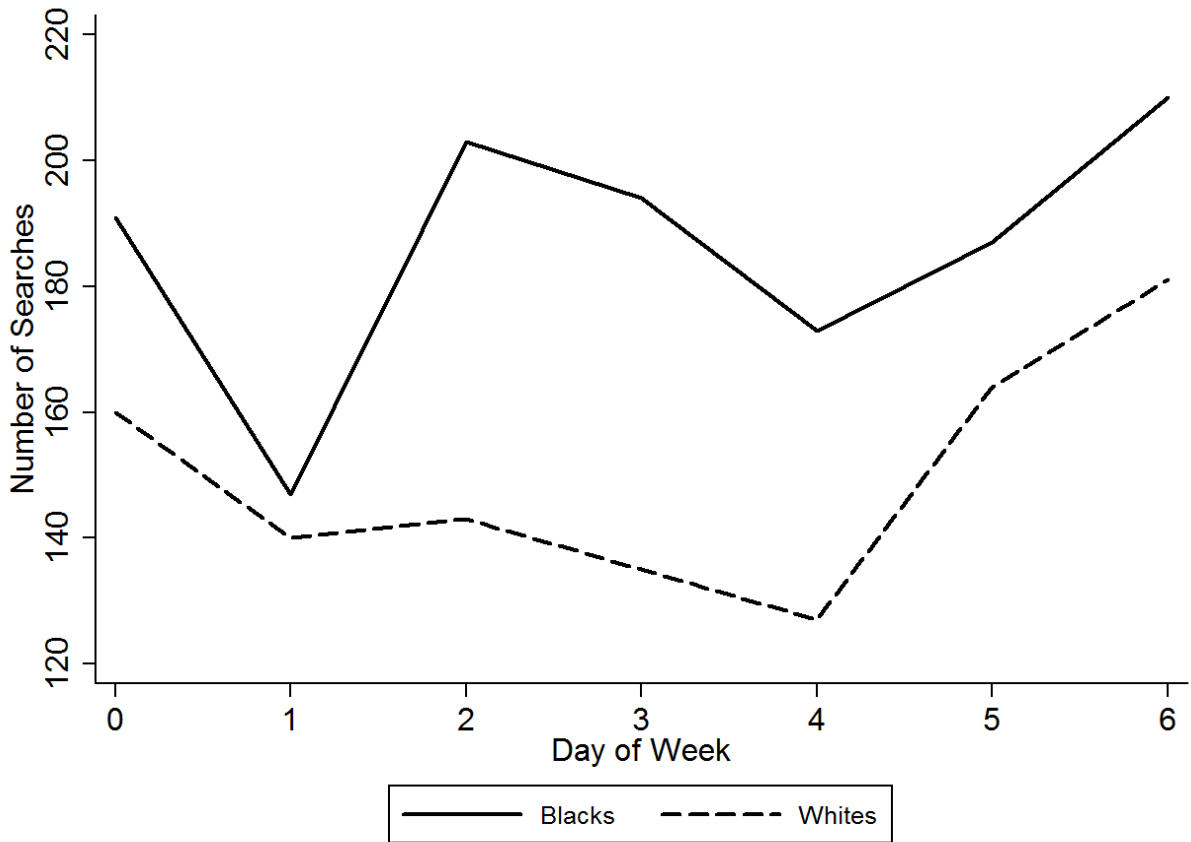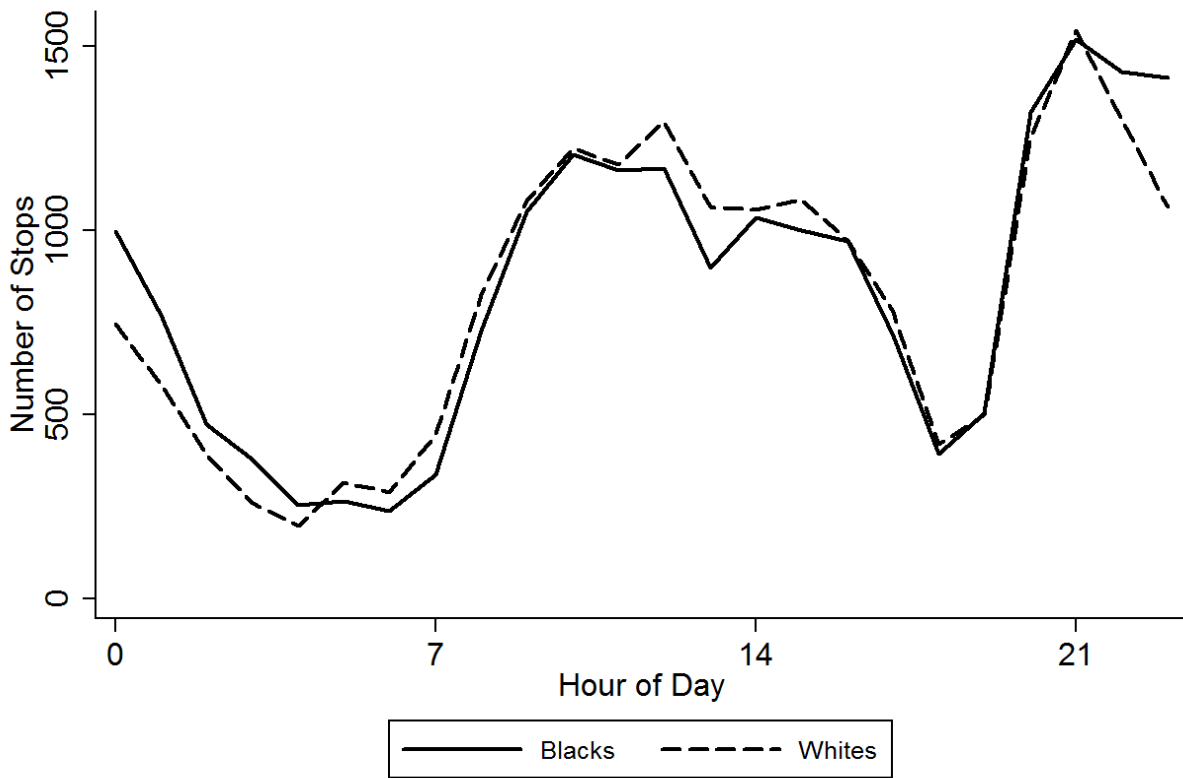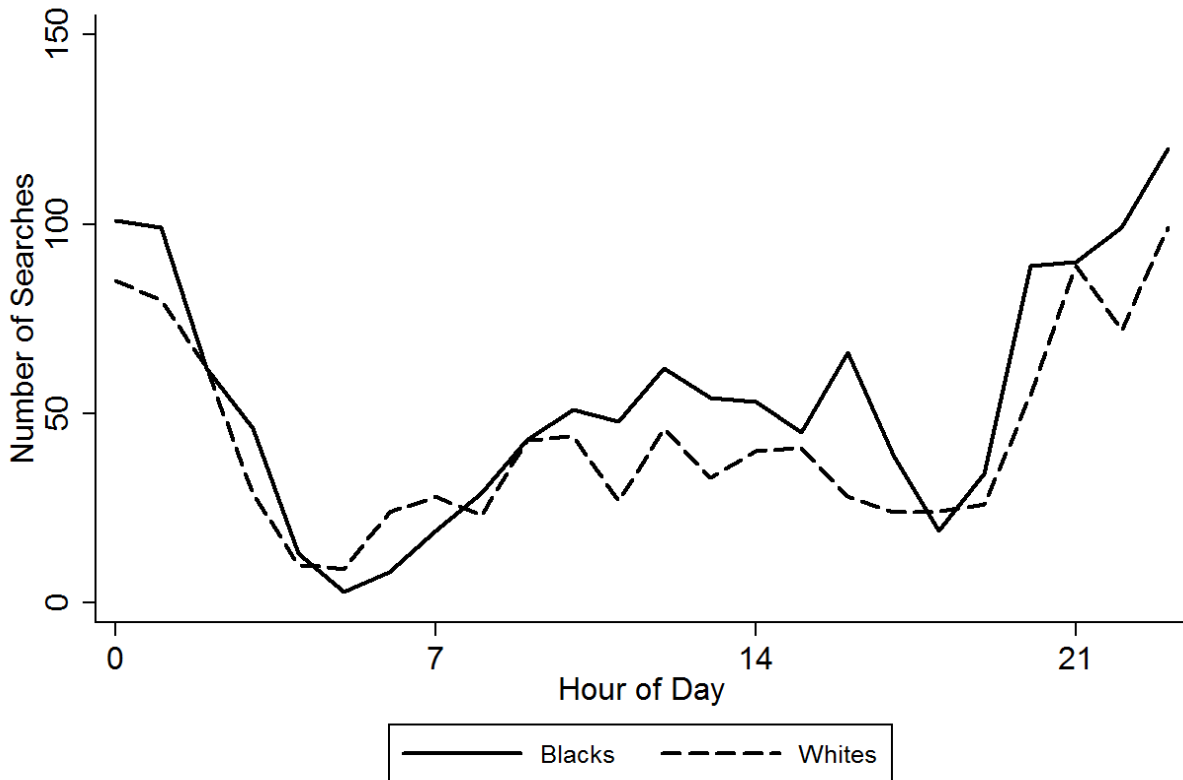
Figure A7. Searches by Day of the Week

Figure A8. Stops by Hour of the Day

The figure excludes cases where the hour and minute was exactly 0:00.
These cases were presumed to be missing data.

Figure A9. Searches by Hour of the Day

The figure excludes cases where the hour and minute was exactly 0:00.
These cases were presumed to be missing data.

Table 3 presents a simple percent difference ratio for the likelihood of Blacks and Whites being searched, and Tables 6 and 7 present more complicted "odds-ratios" from a logistic regression. Figure 5 showed how the percent difference figure varied over time when these are calculated on a yearly basis, and Figure 14 did this for the odds-ratios. Figures A10 and A11 show, for men and women, that these two approaches to the same question provide virtually identical information. They show the correlation between the percentage differences and the odds-ratios, and in each case the correlation in these annual figures is above 0.90, indicating a very strong relationship. This is interesting because the simple percentage difference in rates of being searched is very easy to calculate as compared to the more complicated multiple logistic regression. Where one indicator shows high disparity, so does the other.

Figure A10. Correlation Between Percent Difference in Likelihood of Black Men being Searched as Compared to Whites and Odds-Ratios from Logistic Regression
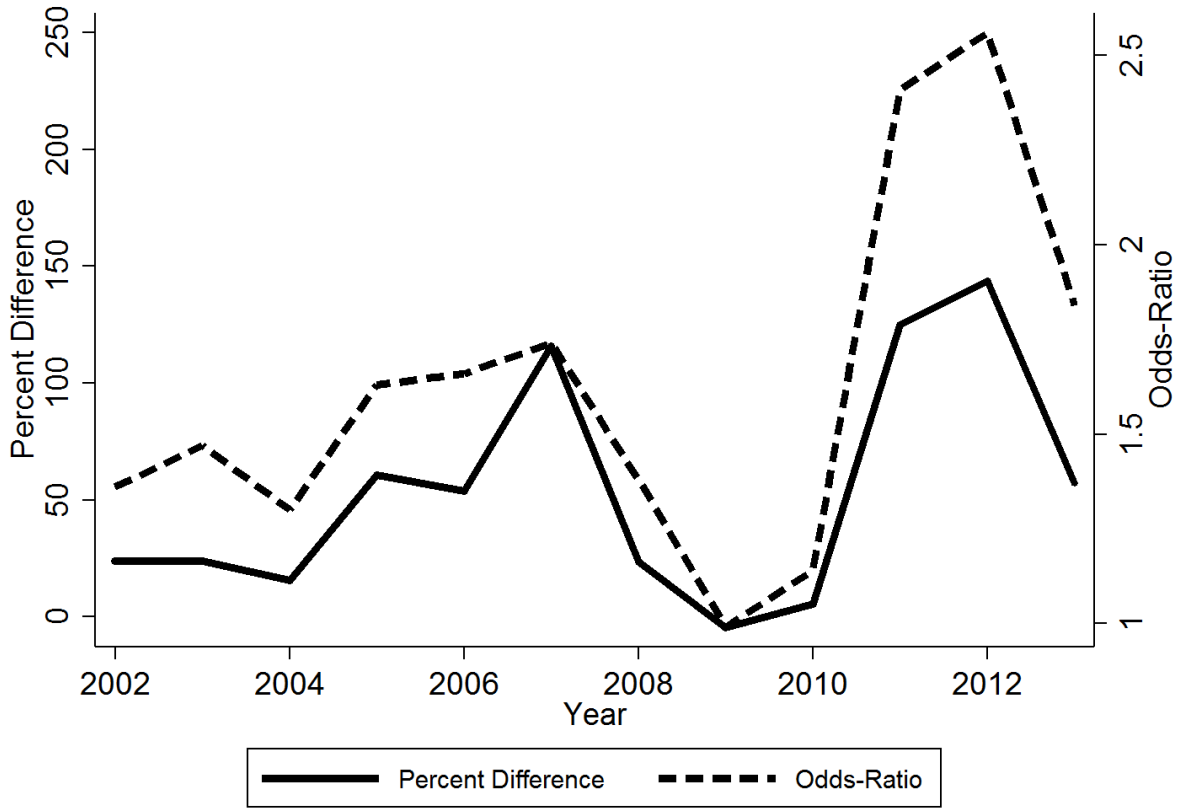

Correlation: 0.94

Figure A11. Correlation Between Percent Difference in Likelihood of Black Women being Searched as Compared to Whites and Odds-Ratios from Logistic Regression
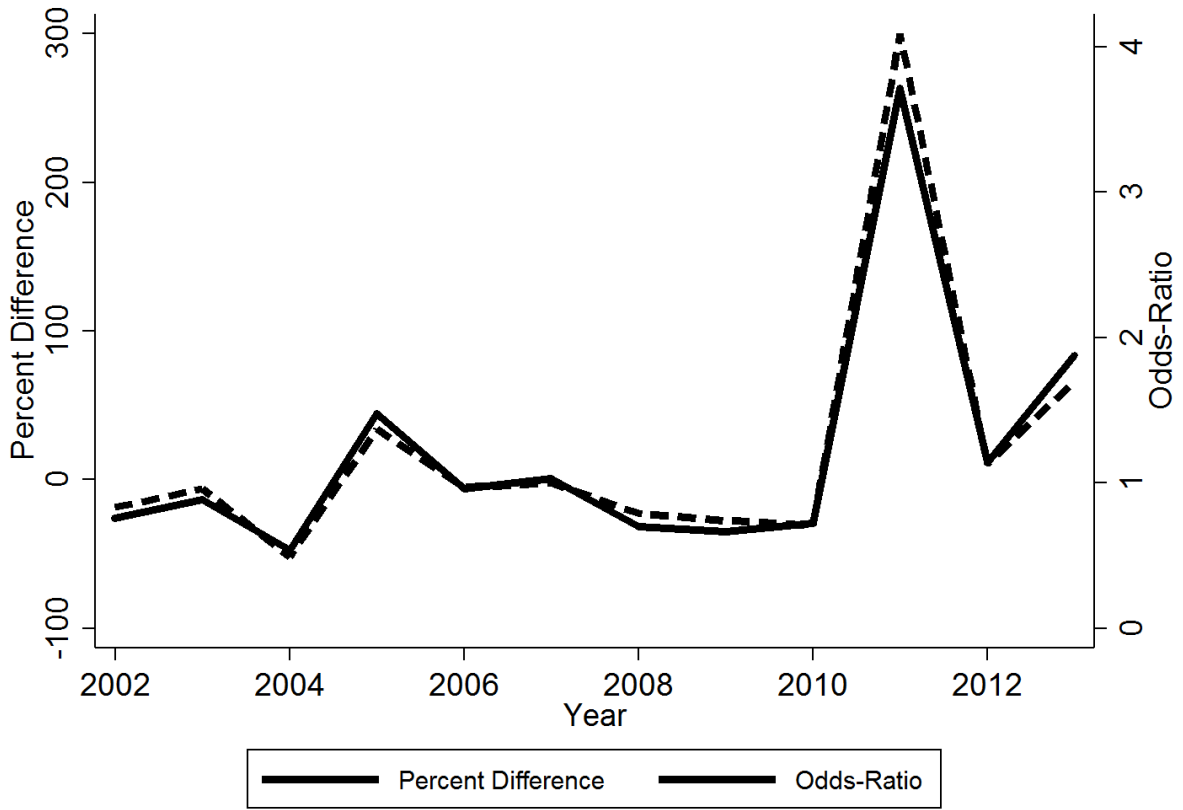
Correlation: 0.99

Figures 4, 5, and 6 in the main text showed the percent differences in the likelihood of search for all drivers by race and gender, and separately for those under 30. Figure A12 shows a similar figure including only consent searches.

Figure A12. Racial Differences in the Likelihood of Search: Consent Searches Only
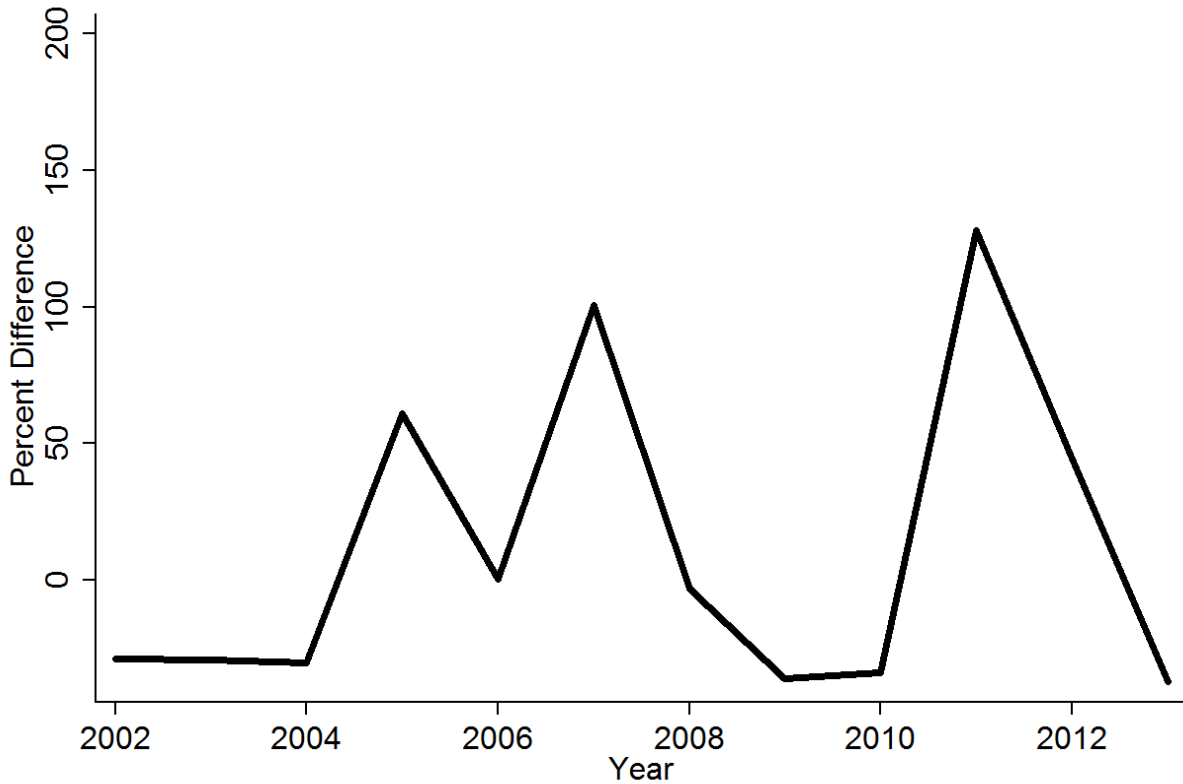
The figure shows the percentage difference in the likelihood of Blacks being searched as compared to Whites; consent searches only.

We do not focus in the text on the likelihood of finding contraband, as our main dependent variable is whether a search occurs. Table A6 shows that contraband is found in about 30 percent of all searches, and that there are no racial differences in this rate of successful search.

Table A6. Likelihood of Finding Contraband Given a Search, by Race

Contraband	Number	Total	White	Black
Yes	723	29.95	30.19	30.50
No	1,691	70.05	69.81	69.50
Total	2,414	100.00	100.00	100.00

Finally, Table A7 shows that being searched is a highly significant outcome variable. It shows, among those searched and not searched, what was the final outcome of the traffic stop: was the driver arrested, issued a citation, or let go with a warning or no action?

Table A7. Differential Outcomes by Whether or not a Search Occurs

Race	Search Occur	N	No Action	Verbal Warning	Written Warning	Citation Issued	Arrest	Total
White	No	18,963	1.60	34.50	7.89	54.88	1.14	100.0
Black	No	19,074	1.62	32.65	7.23	56.64	1.85	100.0
Total	No	38,962	1.60	33.49	7.61	55.78	1.52	100.0
White	Yes	1,050	0.86	16.10	11.62	36.67	34.76	100.0
Black	Yes	1,305	1.30	9.27	5.67	39.46	44.29	100.0
Total	Yes	2,414	1.12	12.22	8.41	37.95	40.31	100.0

Among drivers not searched, just 1.5 percent are arrested. Among those searched, 40 percent are arrested. Blacks searched are more likely than Whites to be arrested, 44 to 35 percent. When we use searches as an indicator of the outcome, we are aware that many searches come after the officer decides to arrest the individual whereas other searches lead to the arrest.