

# **Analysis of Black-White Differences in Traffic Stops and Searches in Greenville, NC, 2002-2013**

December 7, 2014

Frank R. Baumgartner, Derek Epp, and Kelsey Shoub<sup>1</sup>  
University of North Carolina at Chapel Hill  
Department of Political Science  
<http://www.unc.edu/~fbaum/traffic.htm>

Contact: [Frankb@unc.edu](mailto:Frankb@unc.edu)

---

<sup>1</sup> Baumgartner is the Richard J. Richardson Distinguished Professor of Political Science at UNC-Chapel Hill. Epp and Shoub are graduate students in political science. We thank UNC undergraduates Katherine B. Elliott, Amirah Jiwa, Morgan Herman, and Reena Gupta for assistance on the logistics of this project. We also acknowledge the assistance of the NC Department of Justice and State Bureau of Investigation for making available the official statistics on which this analysis relies, and for answering technical questions about the organization of this complex database.

Table 1. Overview of the Data

Data Subsets	Observations
Total stops	110,277
-2001	1
-2014	2,773
-Passengers	1,915
-Checkpoint stops	47
Stops for analysis	105,547
Searches	4,044

Search Rate = 3.83

Figure 1. Number of Traffic Stops per Year

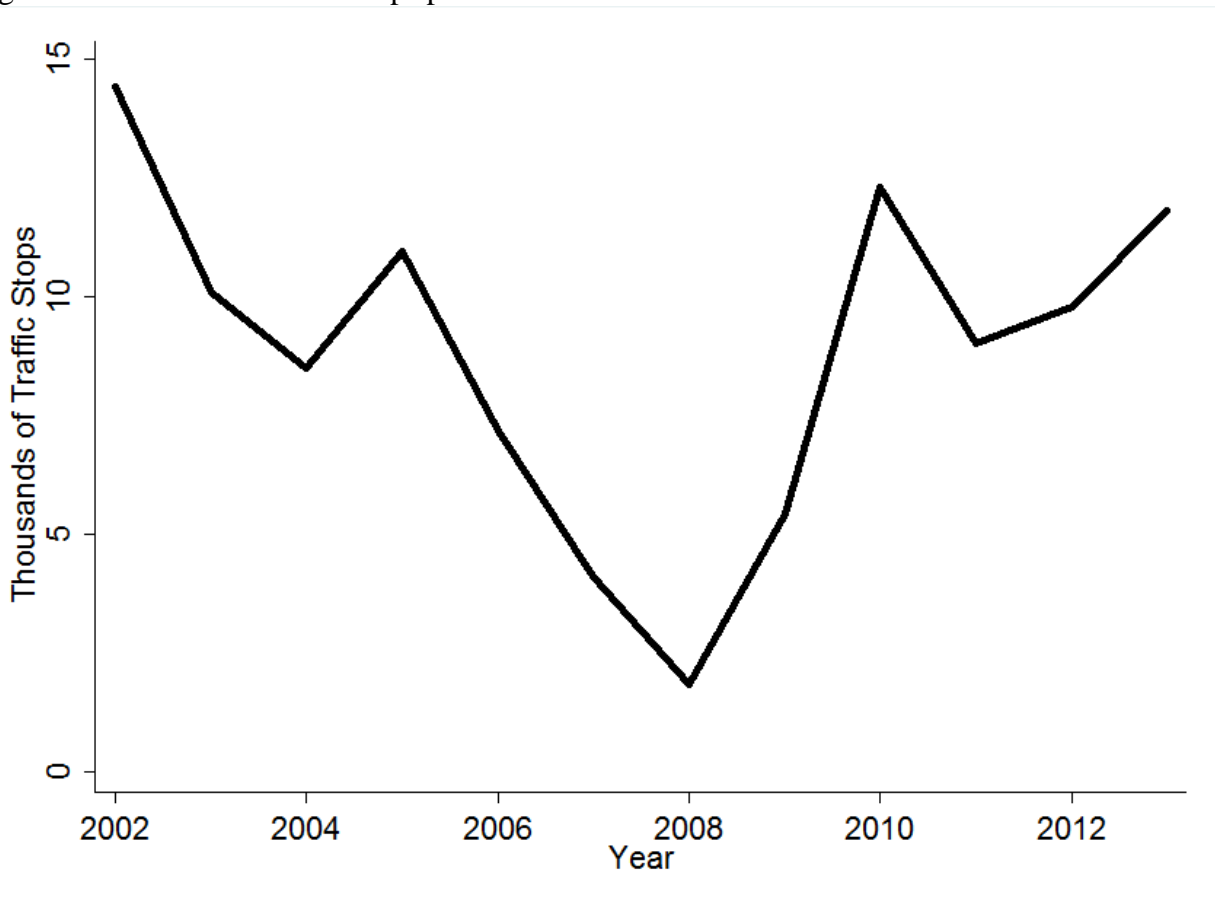


Figure 2. Racial Composition of Traffic Stops by Year

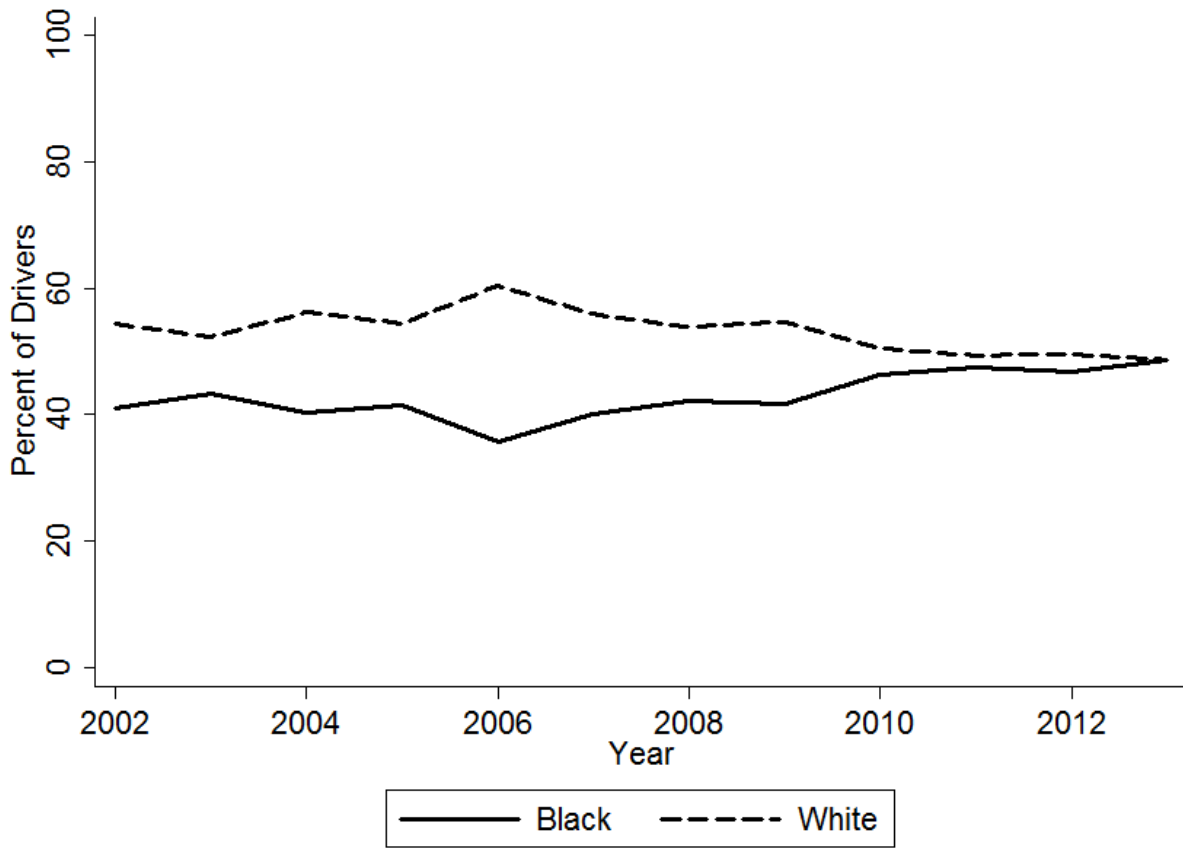


Table 2. Racial Composition of Traffic Stops by Purpose, Drivers

Purpose	Number	Percent	
		White	Black
Total Stops	105,547	52.84	43.46
Speed Limit	38,144	57.42	38.33
Stop Light/Sign	7,940	57.88	37.88
Driving Impaired	877	69.56	24.86
Safe Movement	4,662	50.79	45.17
Vehicle Equipment	8,206	41.92	55.01
Vehicle Regulatory	23,092	48.44	48.71
Seat Belt	11,648	61.63	35.20
Investigation	4,774	35.76	60.75
Other Vehicle	6,204	44.86	50.79

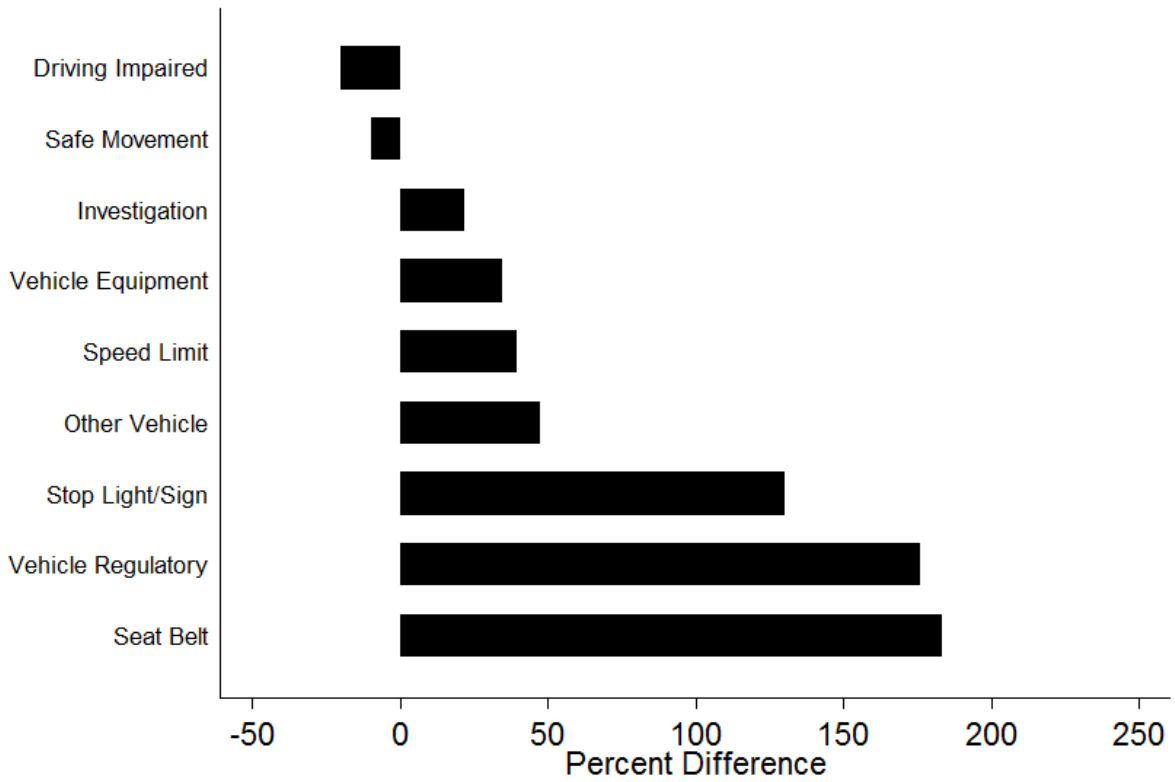
Note: Includes only drivers. Excludes 47 checkpoint stops. Excludes 1,914 passengers.

Table 3. Percent Searched by Race and Purpose of Stop

Purpose	Number	% Total	% White	% Black	Ratio
					Black:White
Total Stops	105,547	-	55,771	45,866	-
Total Searches	4,044	3.83	2.89	4.96	1.72
Speed Limit	38,144	1.55	1.32	1.85	1.40
Stop Light/Sign	7,940	3.07	2.07	4.75	2.29
Driving Impaired	877	47.55	50.00	39.91	0.80
Safe Movement	4,662	5.19	5.41	4.89	0.90
Vehicle Equipment	8,206	6.21	5.15	6.93	1.35
Vehicle Regulatory	23,092	4.06	2.14	5.89	2.75
Seat Belt	11,648	1.75	1.06	3.00	2.83
Investigation	4,774	11.52	10.25	12.48	1.22
Other Vehicle	6,204	5.63	4.53	6.66	1.47

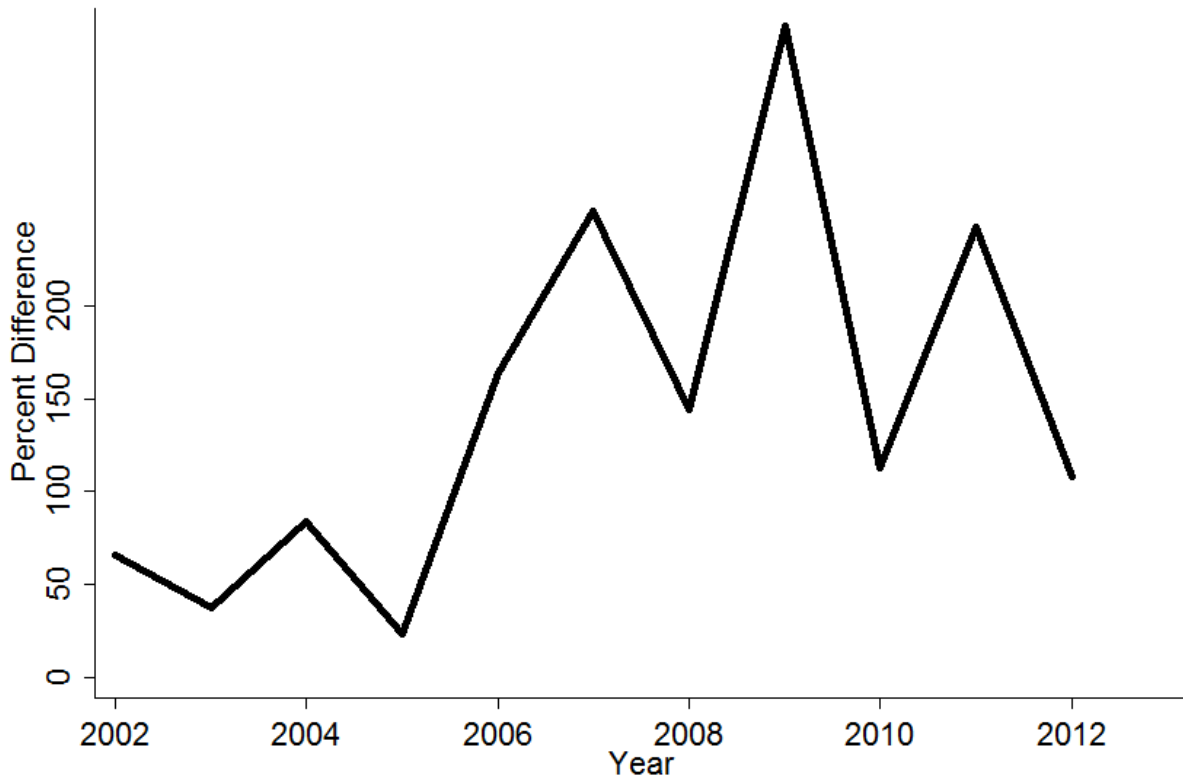
Note: See the appendix for this same table broken down for Men and Women.

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



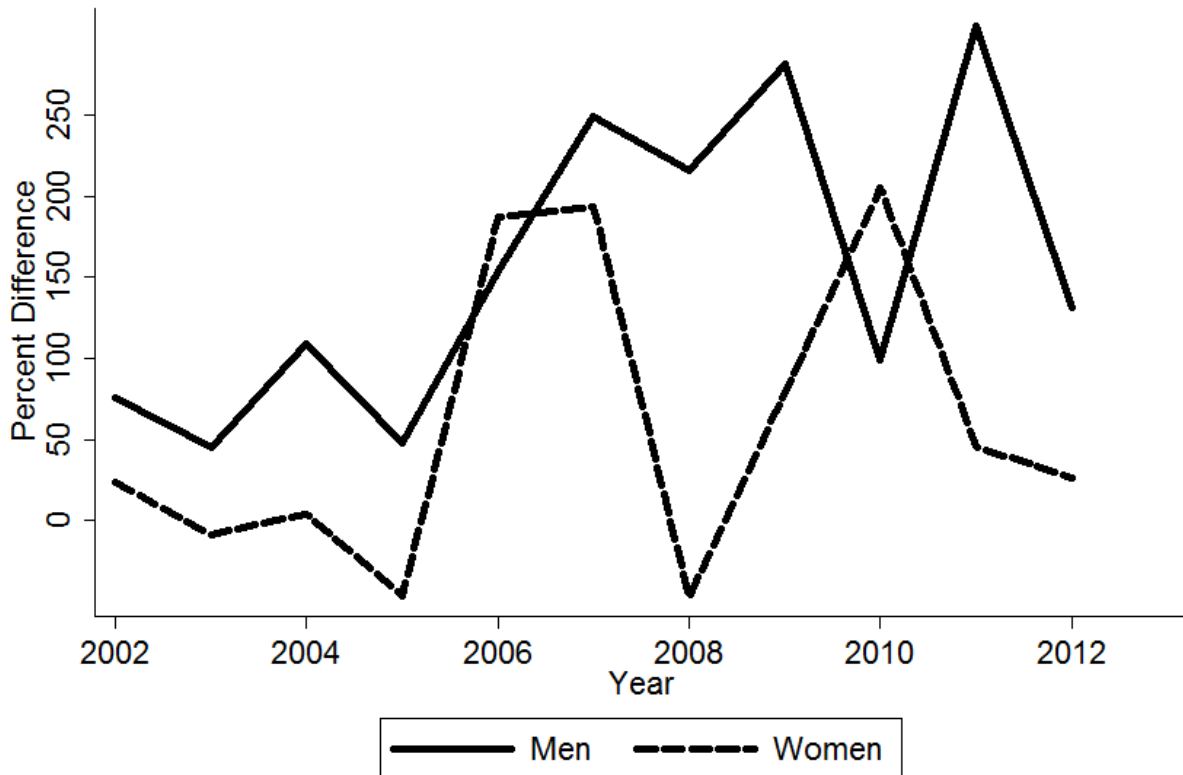
The figure shows the percentage difference in the likelihood of Blacks being searched as compared to Whites by purpose of stop.

Figure 4. Racial Differences in the Likelihood of Search



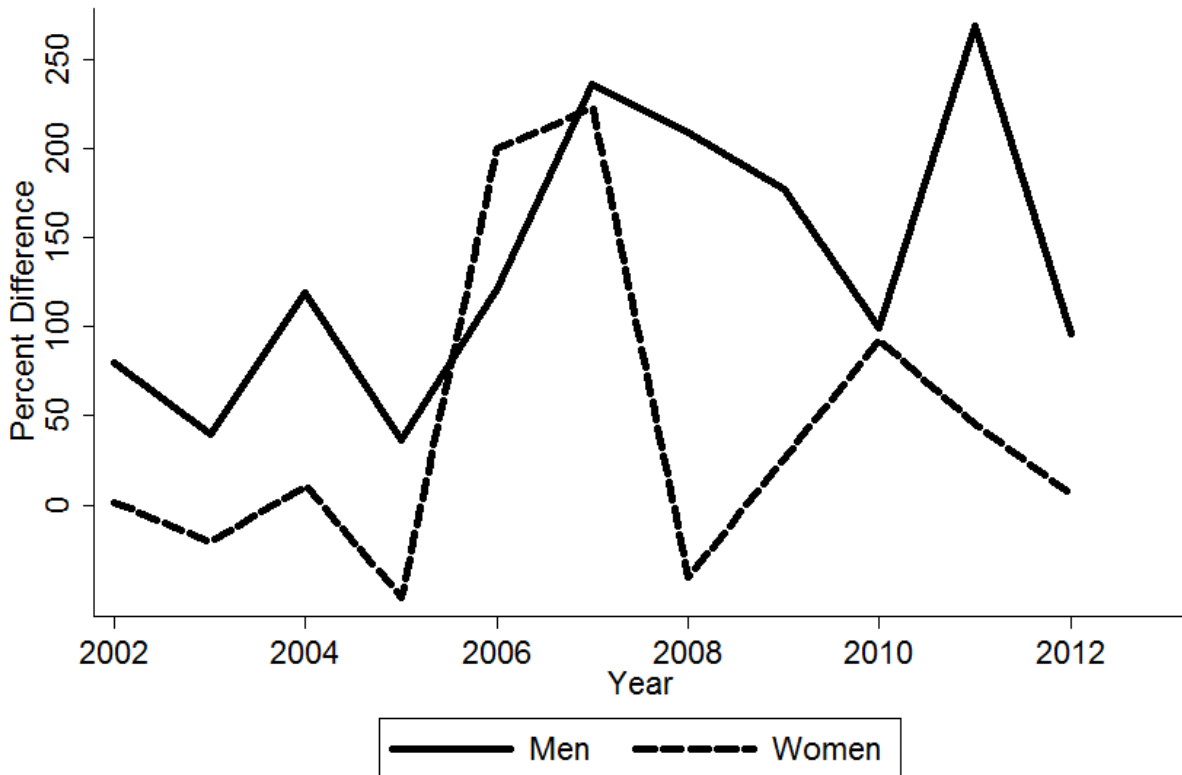
The figure shows the percentage difference in the likelihood of Blacks being searched as compared to Whites.

Figure 5. Racial Differences in the Likelihood of Search by Gender



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

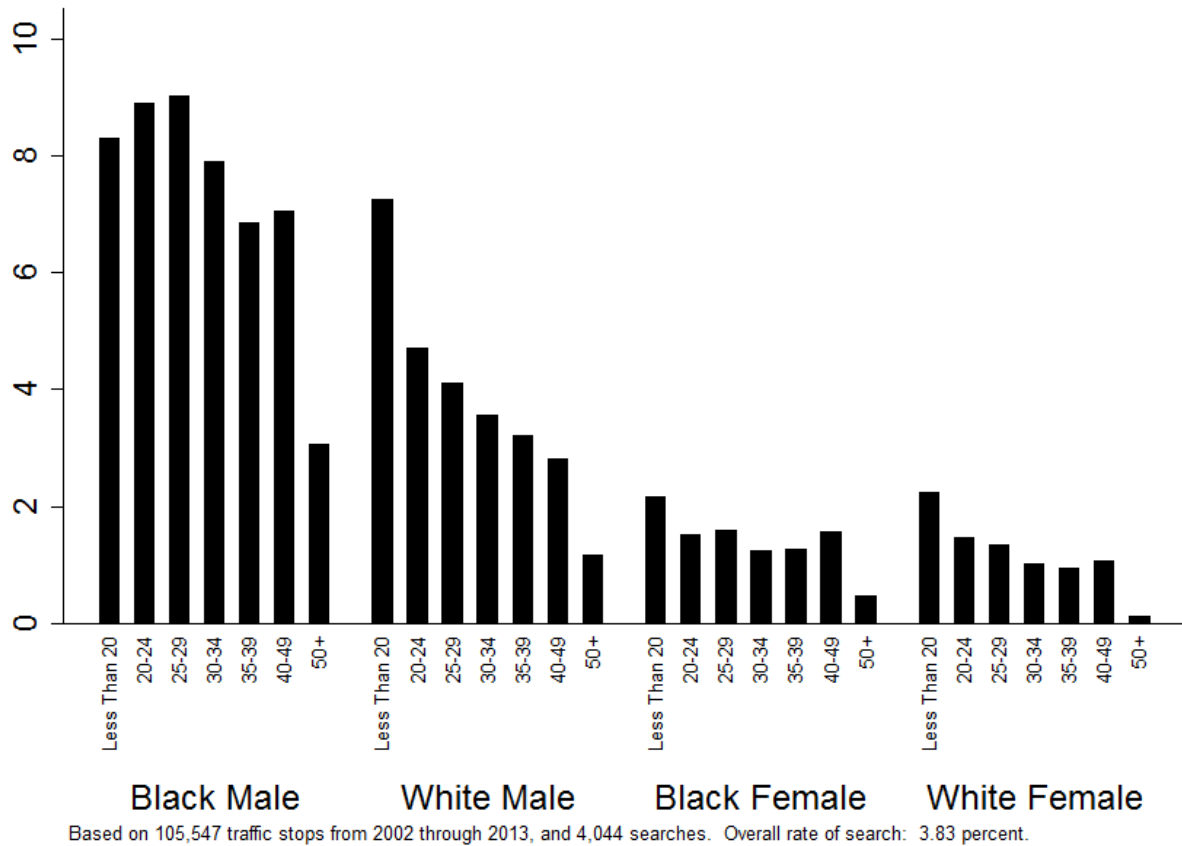
Figure 6. Racial Differences in the Likelihood of Search by Gender, for Drivers Under 30



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



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



Black men under 35 years are searched at rates around or above 8 percent; women in general are searched in less than 2 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

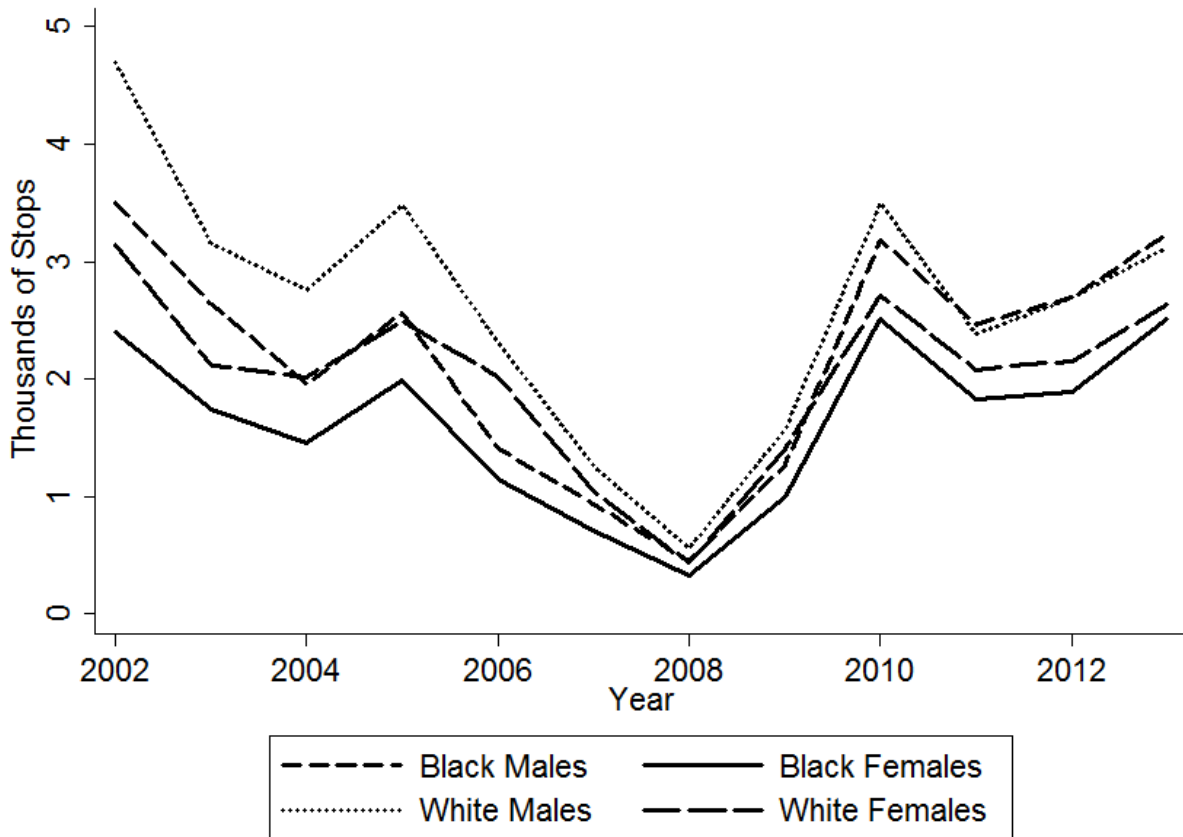


Figure 9. Percent of Stops Resulting in a Search, by Race and Gender

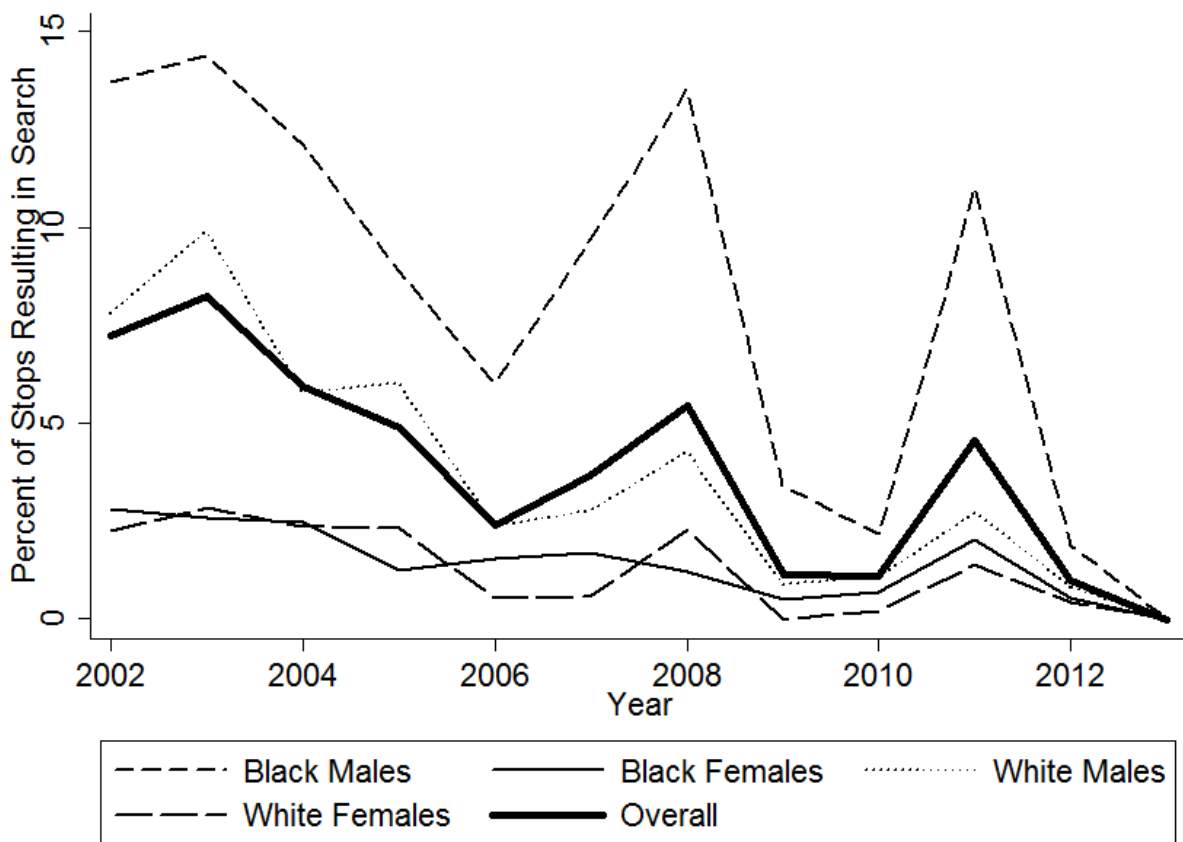


Table 4. Type of Search by Race

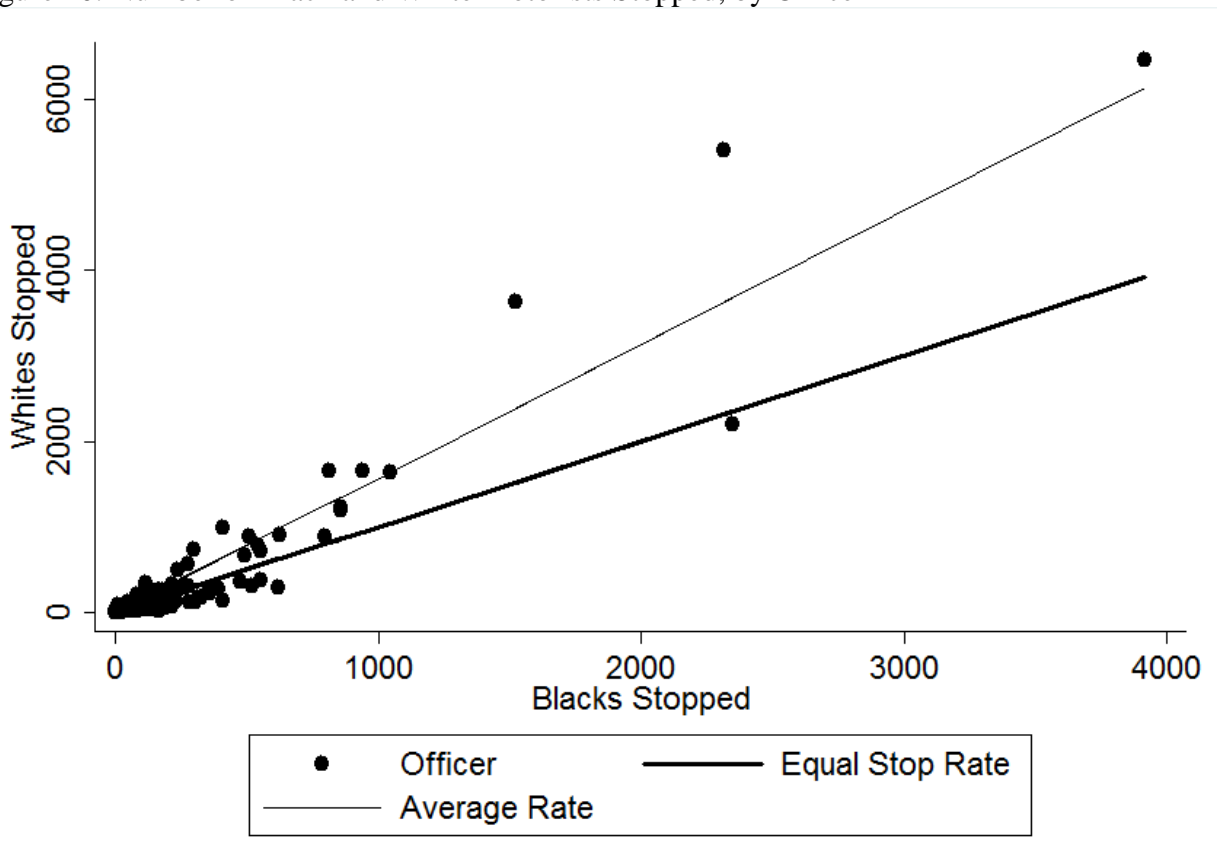
Search Type	Number	% Total	% White	% Black	Ratio
					Black:White
Total Stops	105,547	-	55,771	45,866	-
Total Searches	4,044	3.83	2.89	4.96	1.72
Consent	1,994	1.89	1.29	2.63	2.04
Search Warrant	12	-	-	-	-
Probable Cause	348	0.33	0.20	0.49	2.45
Incident to Arrest	1,613	1.53	1.35	1.73	1.28
Protective Frisk	77	0.07	0.04	0.10	2.50

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

Table 5. Distribution of Officer IDs by Stop

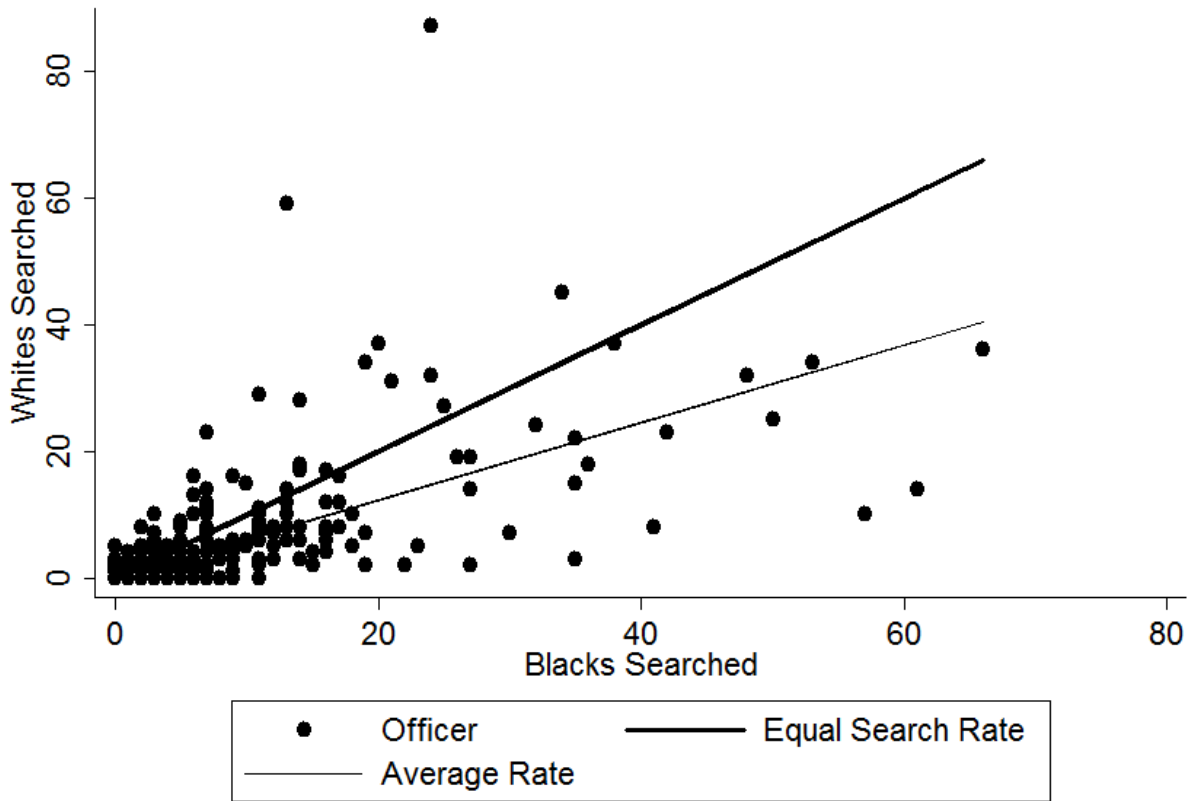
Number of Stops	Officers w/ this many Stops	Percent of Officers	Cumulative Percent	Percent of Stops	Cumulative Percent
1	405	39.59	39.59	0.38	0.38
2 – 10	233	22.78	62.37	0.92	1.30
11 - 100	213	20.82	83.19	8.43	9.73
101 – 1,000	155	15.15	98.34	40.65	50.38
1,001 +	17	1.66	100.00	49.61	100.00
Total	1,023	100	-	100	-

Figure 10. Number of Black and White Motorists Stopped, by Officer



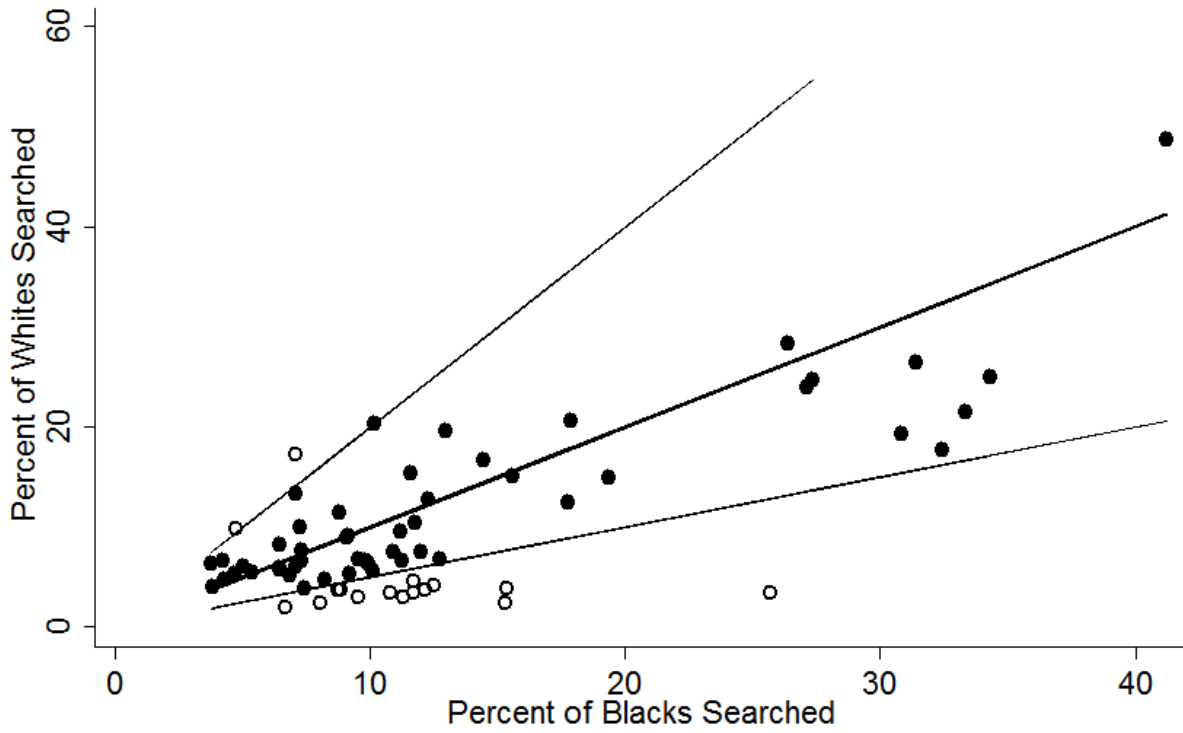
On average, officers stop 1.568 Whites for each Black stopped.

Figure 11. Number of Black and White Motorists Searched, by Officer



On average, officers search 0.614 Whites for each Black searched.

Figure 12. Percent of White and Black Drivers Searched, by Officer



Includes 66 officers with a minimum of 50 White stops, 50 Black stops, and a search rate above the department average of 3.83. The hollow circles indicate high disparity officers. 2 officers search Whites at more than twice the rate that they search Blacks. 14 officers search Blacks at more than twice the rate that they search Whites.

Table 6. Predicting the Occurrence of a Search by Greenville Police Officers for Male Motorists with Odds-Ratios and Standard Errors in Parentheses, 2002-2013

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
<b>Demographics</b>					
Race	1.95*(0.07)	2.07*(0.08)	1.96*(0.08)	1.94*(0.08)	1.68*(0.08)
Hispanic	1.95*(0.24)	1.96*(0.24)	1.52*(0.20)	1.53*(0.20)	1.40*(0.21)
Age	-	0.97*(0.00)	0.97*(0.00)	0.97*(0.00)	0.98*(0.00)
<b>Stop Purpose</b>					
Speed Limit	-	-	-	-	-
Stop Light	-	-	1.90*(0.16)	1.88*(0.16)	1.81*(0.18)
Impaired	-	-	44.89*(4.34)	43.56*(4.27)	20.42*(2.41)
Movement	-	-	2.65*(0.23)	2.63*(0.23)	2.29*(0.23)
Equipment	-	-	3.19*(0.22)	3.18*(0.22)	2.58*(0.21)
Regulatory	-	-	2.42*(0.15)	2.40*(0.15)	2.45*(0.17)
Seat Belt	-	-	0.96(0.08)	0.98(0.09)	1.36*(0.14)
Investigation	-	-	5.71*(0.40)	5.75*(0.40)	4.55*(0.37)
Other	-	-	2.93*(0.23)	2.91*(0.23)	2.87*(0.26)
<b>Officer Type</b>					
Black Disparity <sup>†</sup>	-	-	-	1.91*(0.13)	1.96*(0.15)
White Disparity <sup>‡</sup>	-	-	-	1.34*(0.17)	1.33(0.20)
<b>Time</b>					
Hour of Day	-	-	-	-	Included
Day of Week	-	-	-	-	Included
<b>Constant</b>	0.04*(0.00)	0.09*(0.01)	0.04*(0.00)	0.04*(0.00)	0.06*(0.01)
<b>N</b>	57,836	57,836	57,836	57,836	47,887
<b>Pseudo R<sup>2</sup></b>	0.01	0.03	0.10	0.10	0.12

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 14 officers who searched Blacks at twice the rate of Whites; otherwise zero.

Officers with fewer than 50 searches of Black motorists are automatically coded zero.

‡ = Coded 1 for 2 officers who searched Whites at twice the rate of Blacks; otherwise zero.

Officers with fewer than 50 searches of White motorists are automatically coded zero.



Table 7. Predicting the Occurrence of a Search by Greenville Police Officers for Female Motorists with Odds-Ratios and Standard Errors in Parentheses, 2002-2013

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
<b>Demographics</b>					
Race	1.11(0.09)	1.17(0.10)	1.13(0.10)	1.11(0.10)	0.95(0.10)
Hispanic	0.39(0.27)	0.40(0.29)	0.30(0.22)	0.30(0.22)	0.18(0.19)
Age	-	0.97*(0.00)	0.97*(0.00)	0.97*(0.00)	0.98*(0.00)
<b>Stop Purpose</b>					
Speed Limit	-	-	-	-	-
Stop Light	-	-	1.96*(0.40)	1.92*(0.39)	1.54(0.35)
Impaired	-	-	90.71*(15.70)	81.22*(14.41)	21.04*(4.65)
Movement	-	-	4.50*(0.87)	4.34*(0.84)	2.80*(0.63)
Equipment	-	-	3.92*(0.65)	3.89*(0.64)	2.36*(0.44)
Regulatory	-	-	2.71*(0.19)	2.66*(0.36)	2.69*(0.41)
Seat Belt	-	-	0.72(0.19)	0.74(0.20)	0.64(0.23)
Investigation	-	-	10.71*(1.69)	10.92*(1.72)	6.40*(1.15)
Other	-	-	3.93*(0.71)	4.01*(0.73)	2.85*(0.60)
<b>Officer Type</b>					
Black Disparity <sup>†</sup>	-	-	-	2.55*(0.40)	2.55*(0.43)
White Disparity <sup>‡</sup>	-	-	-	2.53*(0.58)	2.94*(0.78)
<b>Time</b>					
Hour of Day	-	-	-	-	Included
Day of Week	-	-	-	-	Included
<b>Constant</b>	0.01*(0.00)	0.03*(0.00)	0.01*(0.00)	0.01*(0.00)	0.03*(0.01)
<b>N</b>	43,801	43,801	43,801	43,801	36,161
<b>Pseudo R<sup>2</sup></b>	0.00	0.01	0.12	0.13	0.16

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

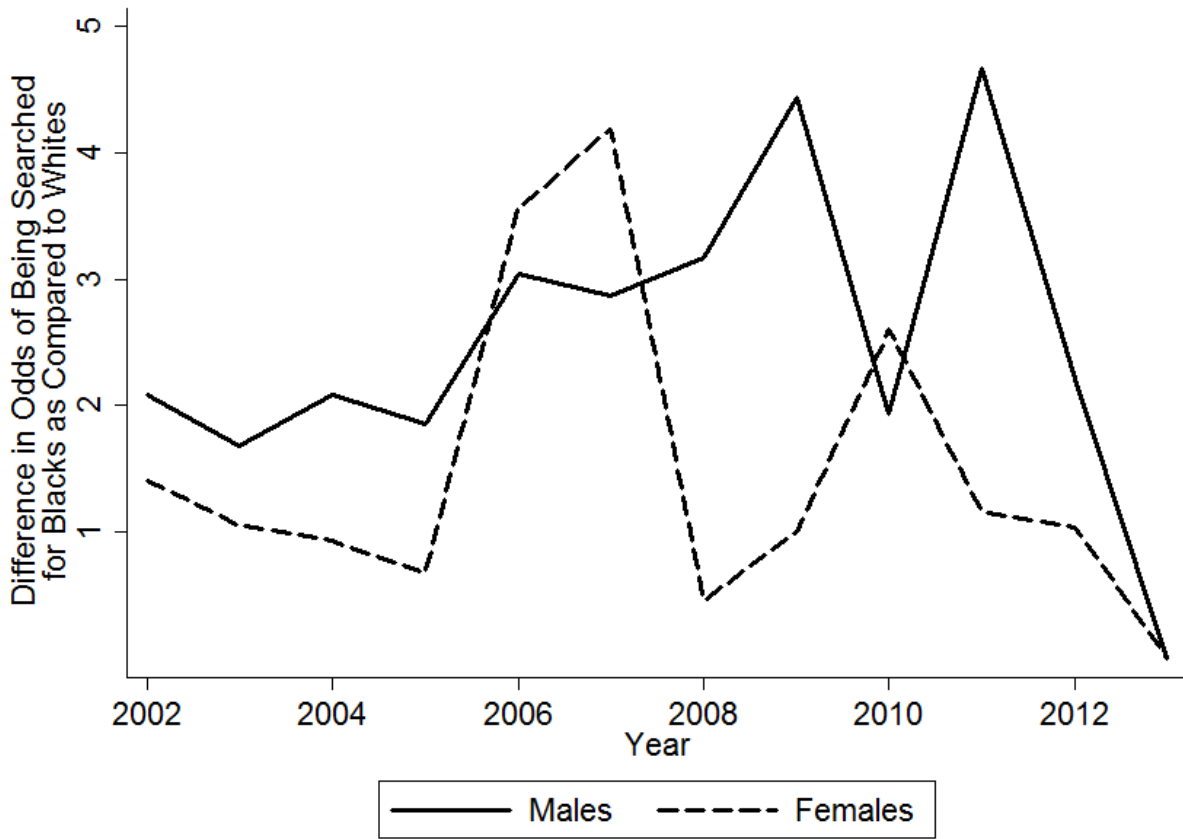
† = Coded 1 for 14 officers who searched Blacks at twice the rate of Whites; otherwise zero.

Officers with fewer than 50 searches of Black motorists are automatically coded zero.

‡ = Coded 1 for 2 officers who searched Whites at twice the rate of Blacks; otherwise zero.

Officers with fewer than 50 searches of White motorists are automatically coded zero. White Disparity omitted because of collinearity.

Figure 14. Increased Odds of Search for Blacks, by Gender, 2002-2013



## Appendix

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

Purpose	Number	Percent	
		White	Black
Total Stops	1,915	30.76	65.80
Speed Limit	227	38.77	55.95
Stop Light/Sign	116	28.45	70.69
Driving Impaired	127	71.65	25.20
Safe Movement	131	34.35	60.31
Vehicle Equipment	261	23.75	71.65
Vehicle Regulatory	433	20.79	76.21
Seat Belt	97	32.99	64.95
Investigation	358	28.77	68.44
Other Vehicle	164	26.83	70.12

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

Purpose	Number	% Total	% White	% Black	Ratio
					Black:White
Total Stops	60,567	-	52.03	43.47	-
Total Searches	3,451	5.70	4.14	7.59	1.83
Speed Limit	19,399	2.55	2.09	3.20	1.53
Stop Light/Sign	4,573	4.59	3.08	7.14	2.32
Driving Impaired	637	52.59	56.24	43.64	0.78
Safe Movement	2,975	6.86	7.03	6.56	0.93
Vehicle Equipment	5,177	8.62	7.11	9.65	1.36
Vehicle Regulatory	13,086	6.11	2.95	9.29	3.15
Seat Belt	7,486	2.50	1.45	4.46	3.08
Investigation	3,336	14.15	12.18	15.66	1.29
Other Vehicle	3,898	7.77	6.07	9.28	1.53

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

Purpose	Number	% Total	% White	% Black	Ratio
					Black:White
Total Stops	44,980	-	53.94	43.44	-
Total Searches	593	1.32	1.27	1.41	1.11
Speed Limit	18,745	0.52	0.55	0.49	0.89
Stop Light/Sign	3,367	1.01	0.75	1.43	1.91
Driving Impaired	240	34.17	35.68	28.30	0.79
Safe Movement	1,687	2.25	2.77	1.77	0.64
Vehicle Equipment	3,029	2.11	1.92	2.24	1.17
Vehicle Regulatory	10,006	1.37	1.05	1.69	1.61
Seat Belt	4,162	0.41	0.35	0.53	1.51
Investigation	1,438	5.42	6.27	4.82	0.77
Other Vehicle	2,306	1.99	2.12	2.02	0.95

Table A4. Type of Search by Race: Men

Search Type	Number	% Total	% White	% Black	Ratio Black:White
Total Stops	60,567	-	52.03	43.47	-
Total Searches	3,451	5.70	4.14	7.59	1.83
Consent	1,743	2.88	1.89	4.11	2.17
Search Warrant	12	-	-	-	-
Probable Cause	306	0.51	0.30	0.75	2.50
Incident to Arrest	1,317	2.17	1.86	2.54	1.37
Protective Frisk	73	0.12	0.07	0.16	2.29

Table A5. Type of Search by Race: Women

Search Type	Number	% Total	% White	% Black	Ratio Black:White
Total Stops	44,980	-	53.94	43.44	-
Total Searches	593	1.32	1.27	1.41	1.11
Consent	251	0.56	0.51	0.63	1.24
Search Warrant	0	-	-	-	-
Probable Cause	42	0.09	0.07	0.13	1.86
Incident to Arrest	296	0.66	0.69	0.64	0.93
Protective Frisk	4	0.01	0.00	0.02	n/a

Figure A6. Stops by Day of the Week

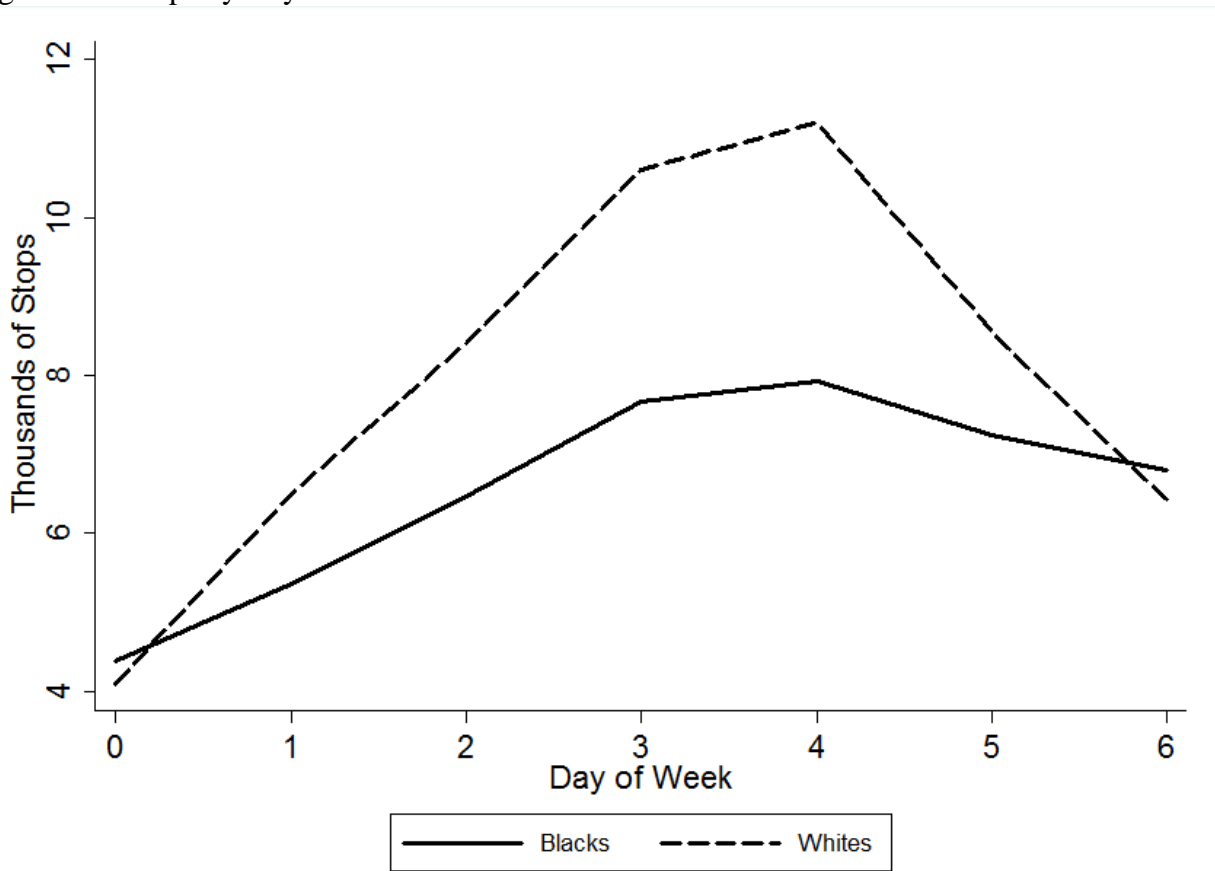


Figure A7. Searches by Day of the Week

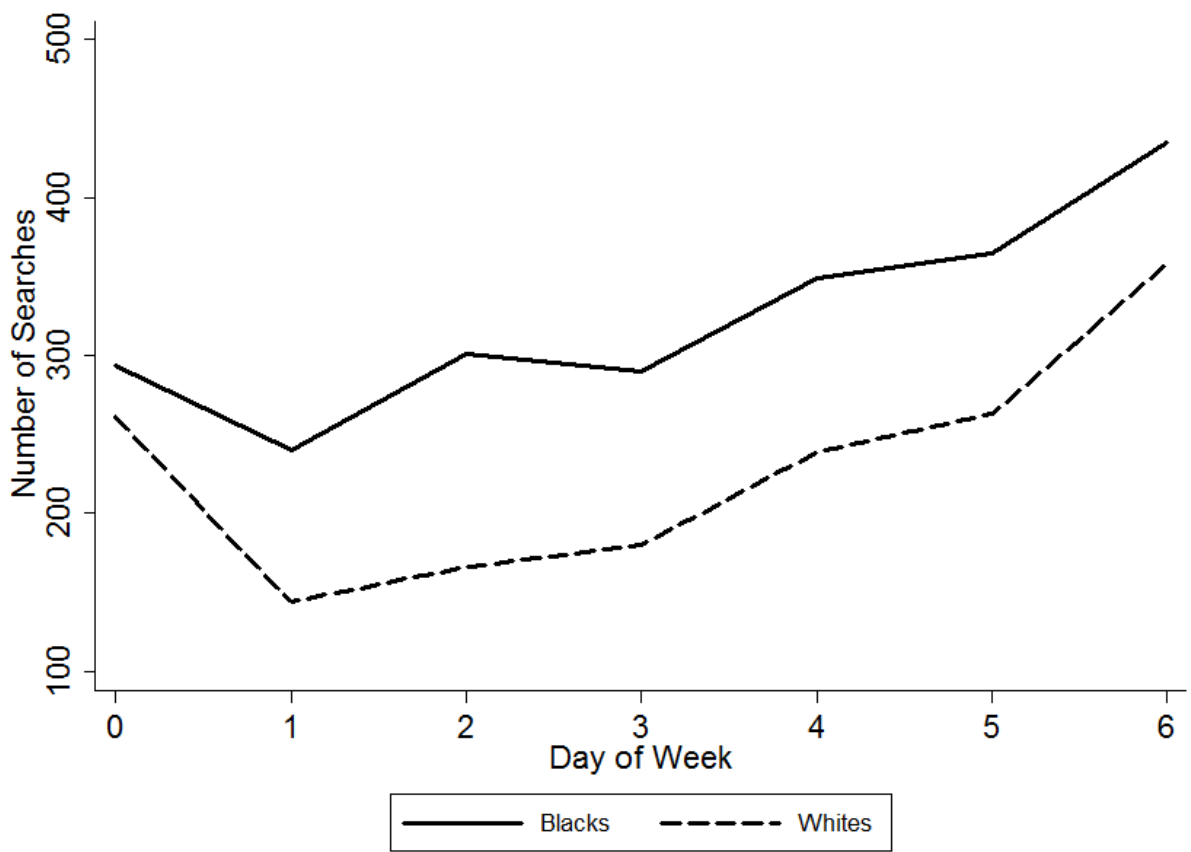
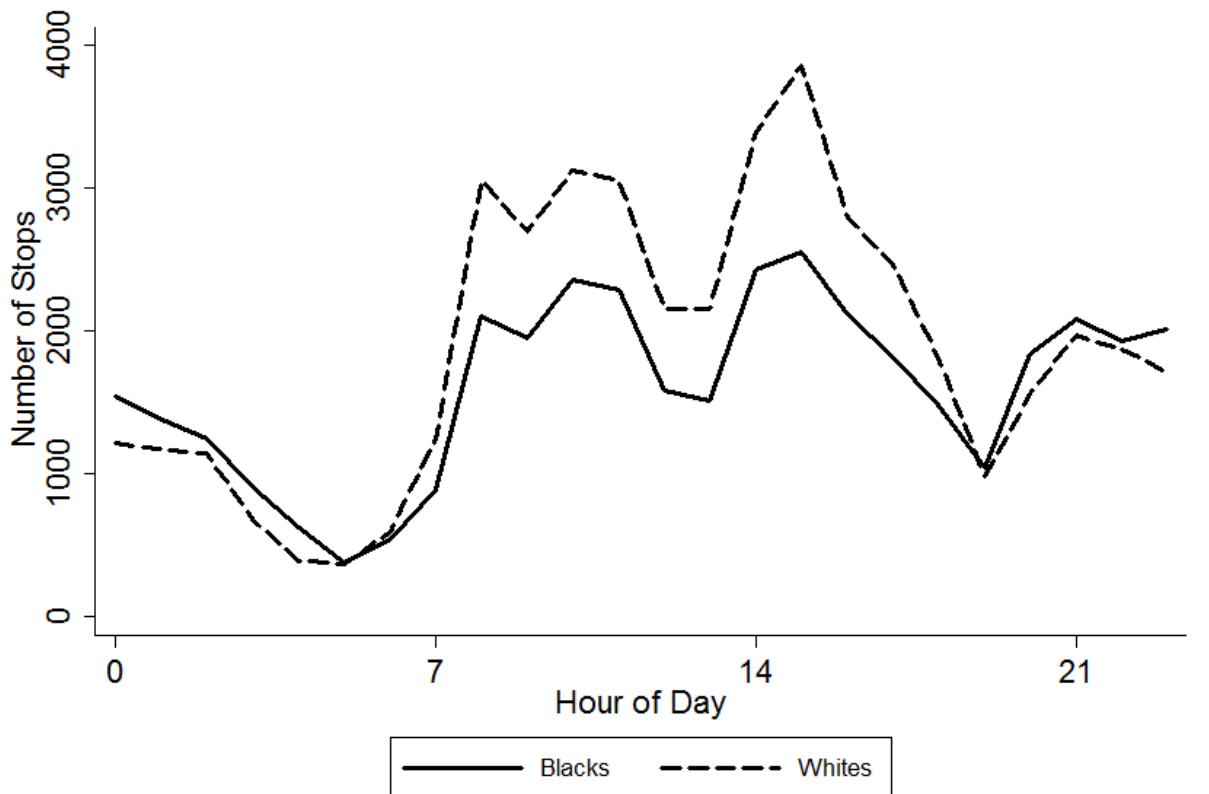
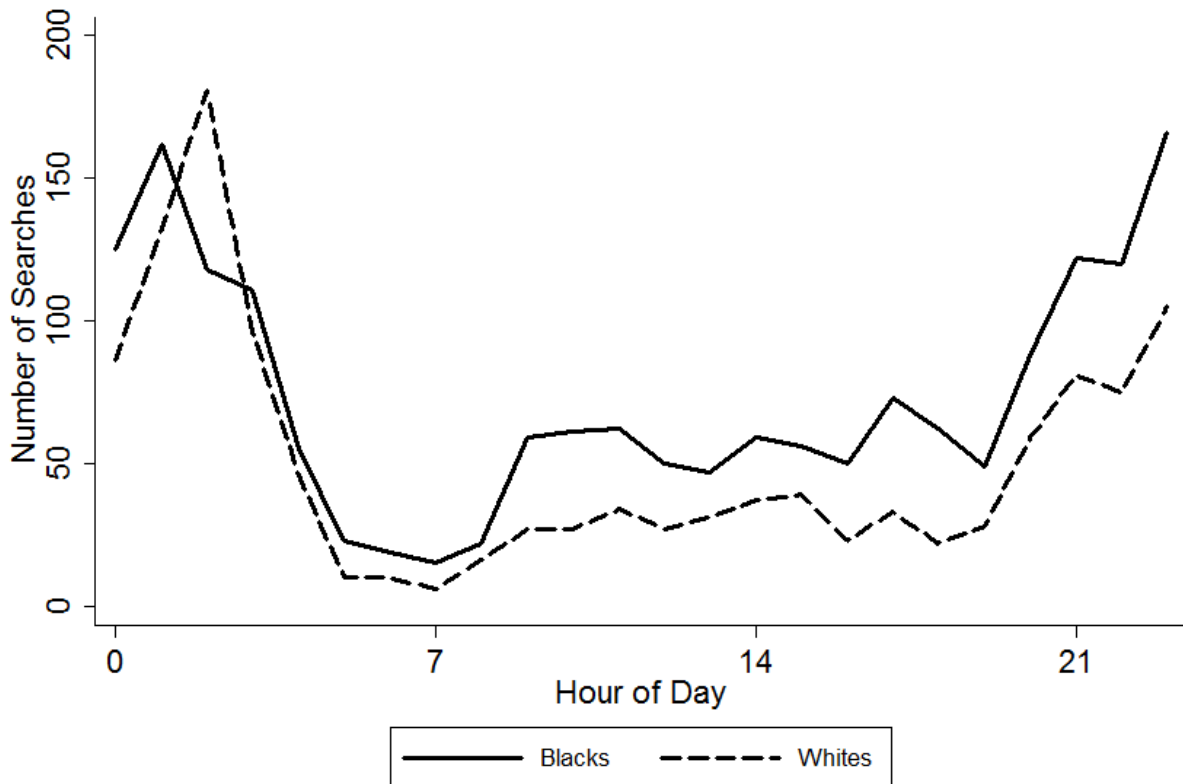


Figure A8. Stops by Hour of the Day



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

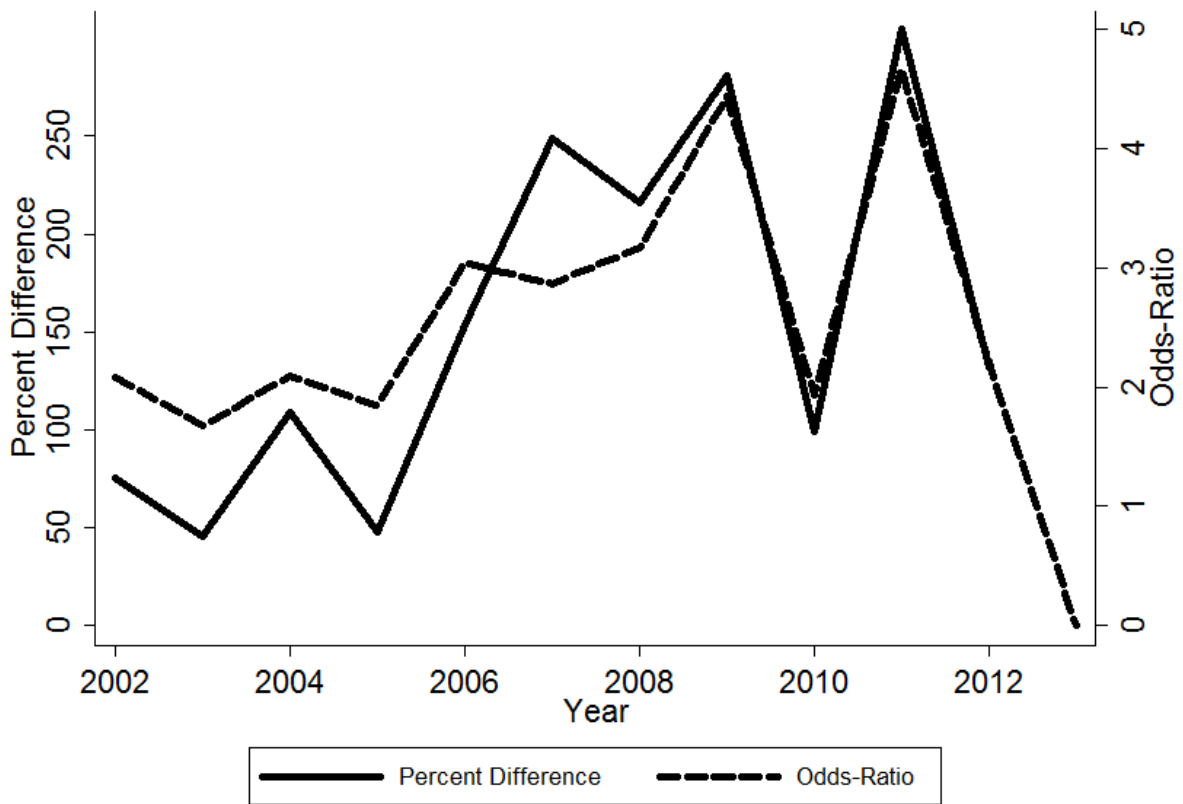
Figure A9. Searches by Hour of the Day



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



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



Correlation: 0.932

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

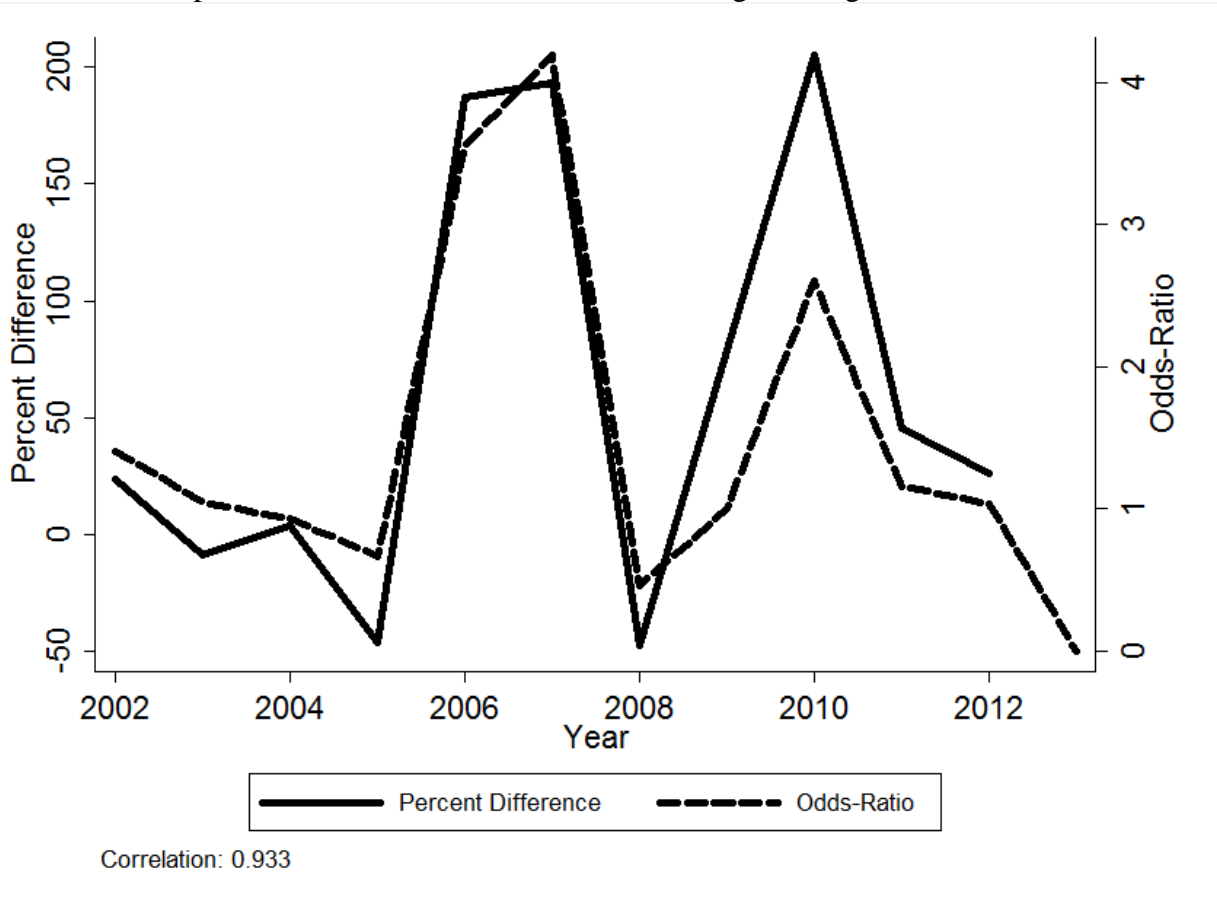
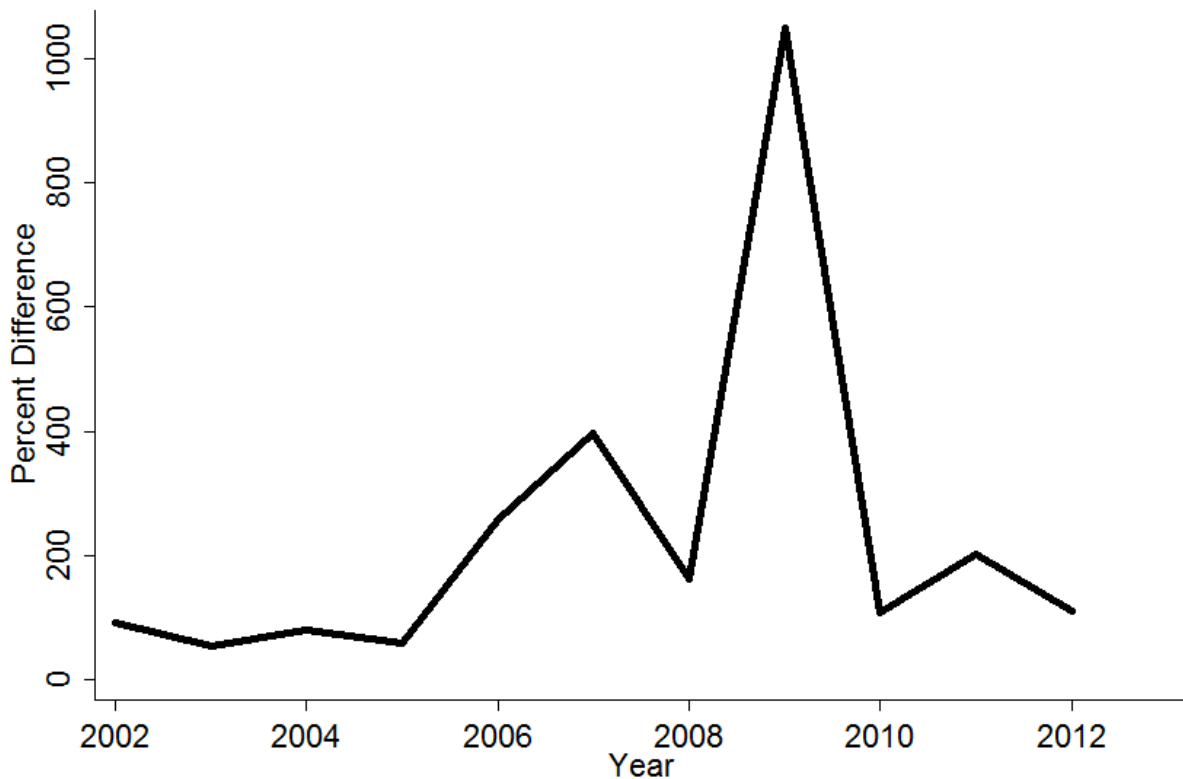


Figure A12. Racial Differences in the Likelihood of Search: Consent Searches Only



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

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

Contraband	Number	% Total	% White	% Black
Yes	927	22.92	22.78	23.66
No	3,117	77.08	77.22	76.34
Total	4,044	100.00	100.00	100.00

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	54,160	2.28	8.47	7.11	81.27	0.87	100.0
Black	No	43,592	4.20	13.54	6.12	74.79	1.35	100.0
Total	No	101,503	3.12	10.71	6.58	78.51	1.08	100.0
White	Yes	1,611	3.41	8.07	3.41	42.40	42.71	100.0
Black	Yes	2,274	3.21	10.25	2.37	50.31	33.86	100.0
Total	Yes	4,044	3.17	9.17	2.77	47.33	37.56	100.0