

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

March 24, 2015

Frank R. Baumgartner, Derek Epp, and Kelsey Shoub¹
University of North Carolina at Chapel Hill
Department of Political Science
<http://www.unc.edu/~fbaum/traffic.htm>

Contact: Frankb@unc.edu

¹ 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	408,516
-2001	1
-2014	16,213
-Passengers	3,099
-Checkpoint stops	82
Total number of cases deleted	19,231
Stops for analysis	389,285
Searches	7,678
Percent of stops leading to search (search rate)	1.97%

Figure 1. Number of Traffic Stops per Year

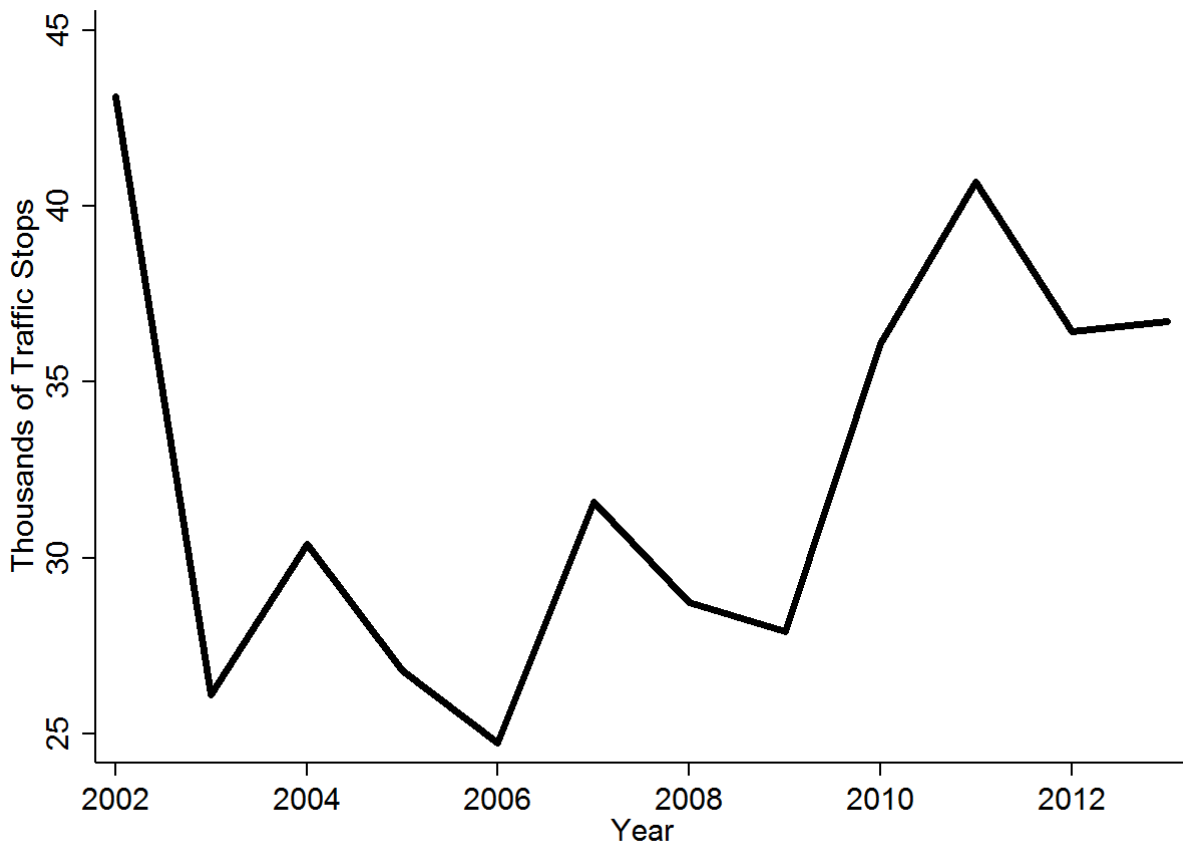


Figure 2. Racial Composition of Traffic Stops by Year

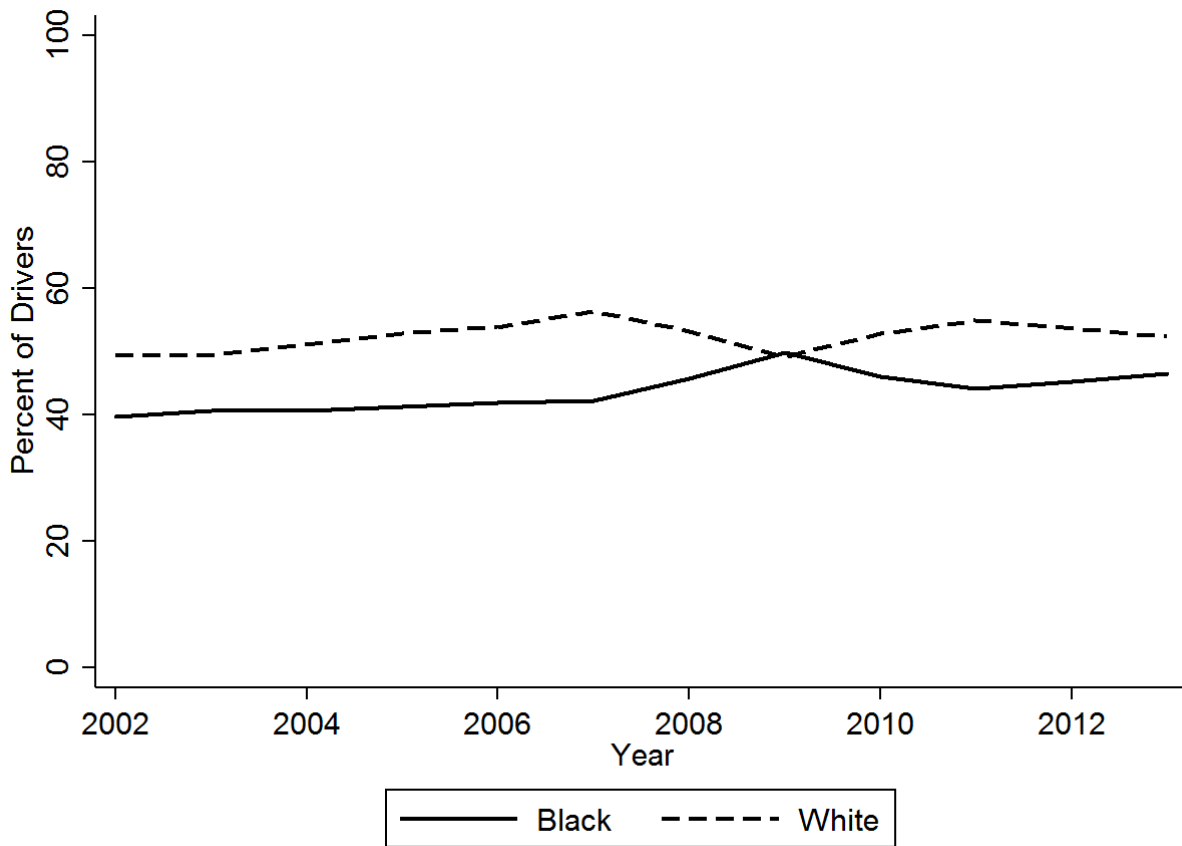


Table 2. Racial Composition of Traffic Stops by Purpose, Drivers

Purpose	Number	Percent	
		White	Black
Total Stops	389,285	52.42	43.63
Speed Limit	130,771	60.46	35.26
Stop Light/Sign	28,652	52.57	42.13
Driving Impaired	3,027	58.21	31.57
Safe Movement	19,229	55.62	39.31
Vehicle Equipment	46,911	42.80	52.63
Vehicle Regulatory	109,399	48.54	49.03
Seat Belt	13,341	45.07	48.47
Investigation	11,109	48.29	51.08
Other Vehicle	26,846	48.11	47.15

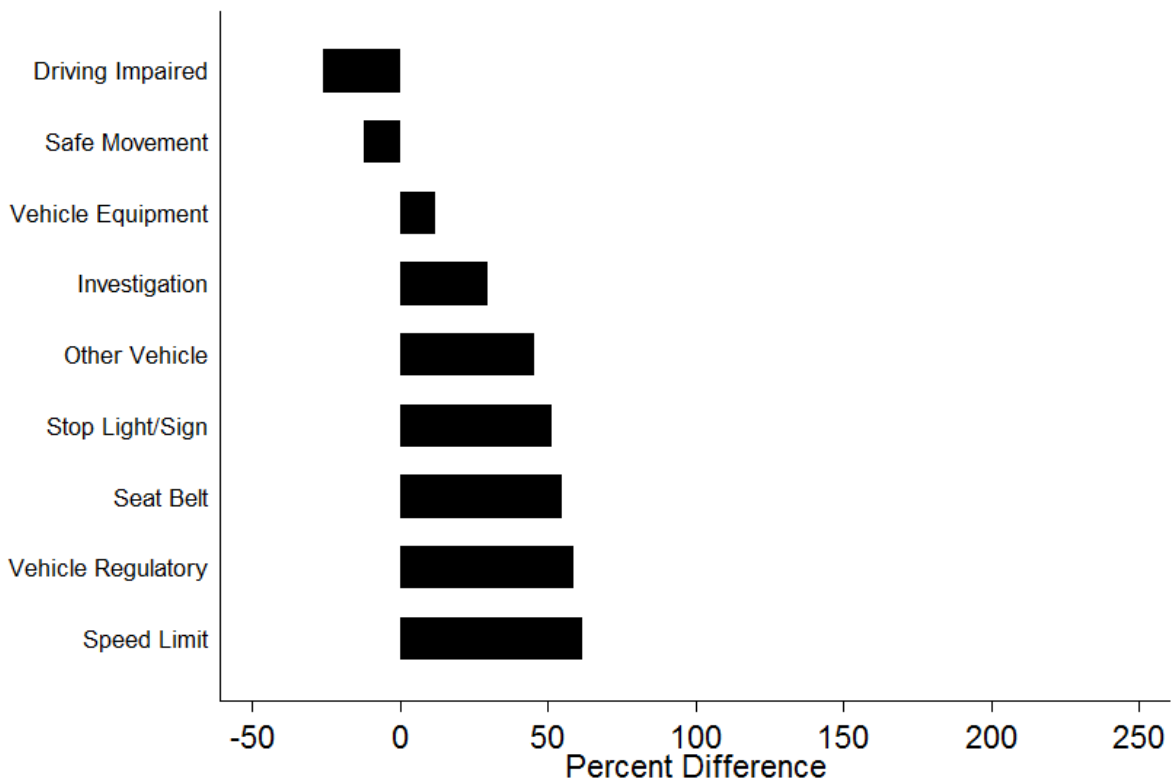
Note: Includes only drivers. Excludes 82 checkpoint stops. Excludes 3,099 passengers.

Table 3. Percent Searched by Race and Purpose of Stop

Purpose	Number	% Total	% White	% Black	Ratio
					Black:White
Total Stops	389,285	-	52.42	43.63	-
Total Searches	7,678	1.97	1.76	2.18	1.24
Speed Limit	130,771	0.82	0.66	1.07	1.62
Stop Light/Sign	28,652	1.40	1.13	1.71	1.51
Driving Impaired	3,027	38.62	42.22	31.22	0.74
Safe Movement	19,229	5.04	5.29	4.64	0.88
Vehicle Equipment	46,911	2.34	2.22	2.48	1.12
Vehicle Regulatory	109,399	1.26	0.98	1.55	1.58
Seat Belt	13,341	1.93	1.55	2.40	1.55
Investigation	11,109	5.74	4.96	6.43	1.30
Other Vehicle	26,846	2.57	2.08	3.03	1.46

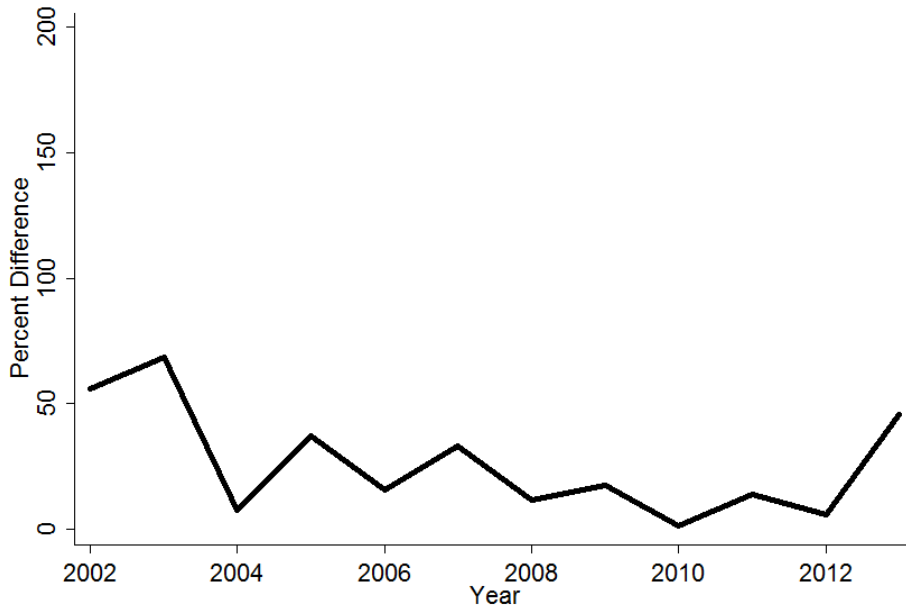
Note: See the appendix for this same table broken down for Men and Women.

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



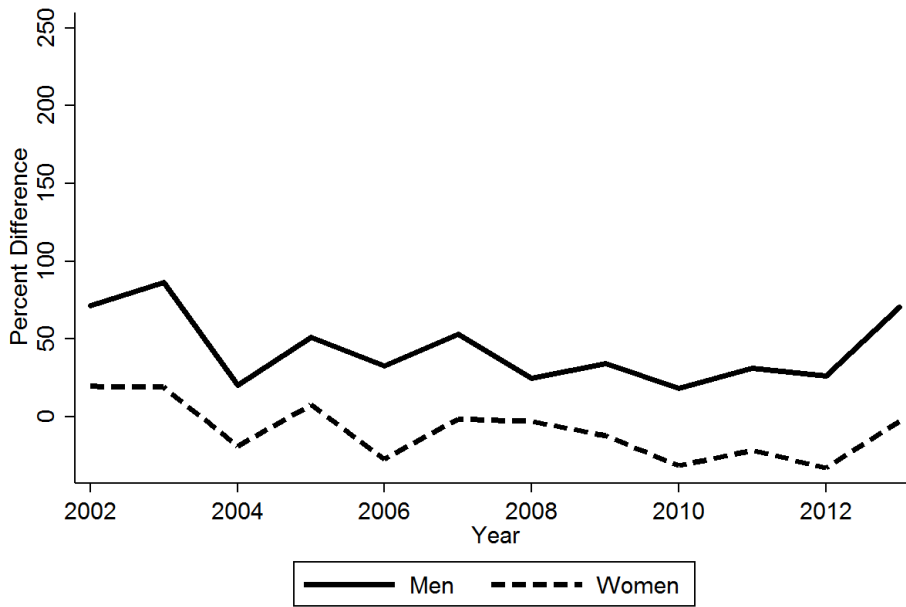
The figure shows the percentage difference in the likelihood of Blacks being searched as compared to Whites by purpose of stop.

Figure 4. Racial Differences in the Likelihood of Search



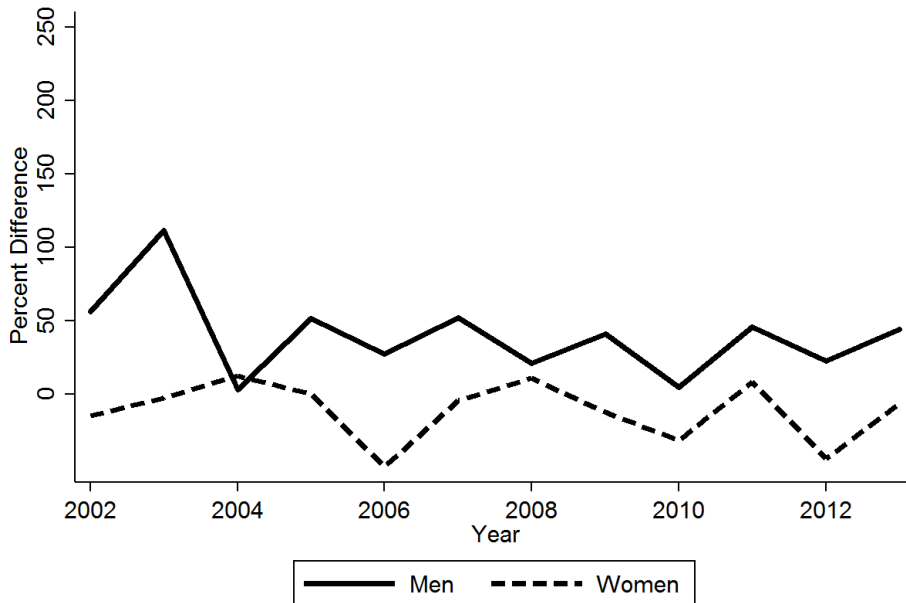
The figure shows the percentage difference in the likelihood of Blacks being searched as compared to Whites.

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



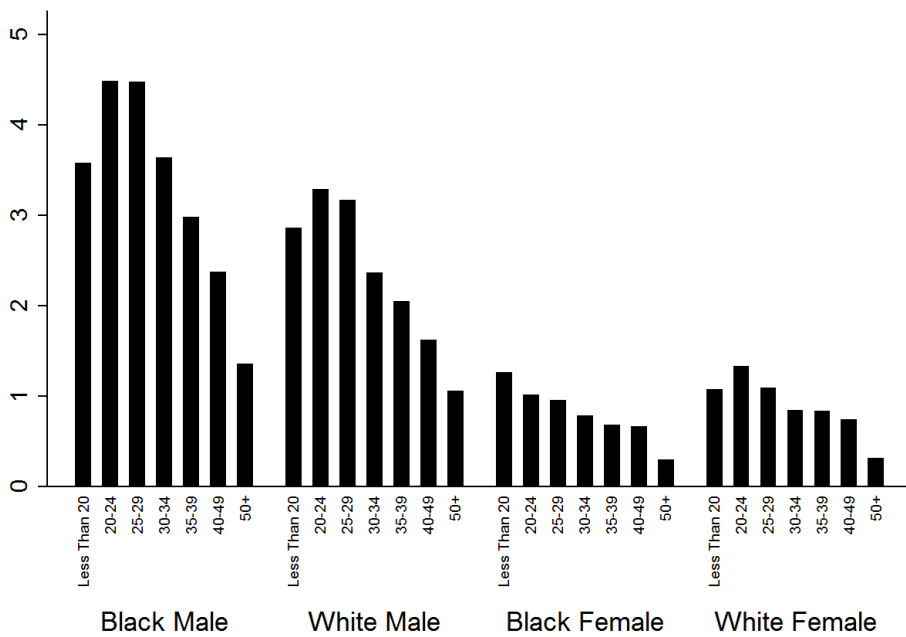
The figure shows the percentage difference in the likelihood of Blacks being searched as compared to Whites by gender.

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



Based on 389,285 traffic stops from 2002 through 2013, and 7,678 searches. Overall rate of search: 1.97 percent.

Black men under the age of 30 are searched at rates of about 6 percent whereas white men of that age see rates of about 4 percent, and women in general are typically below 2 percent. The figure makes clear how race, gender, and age 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

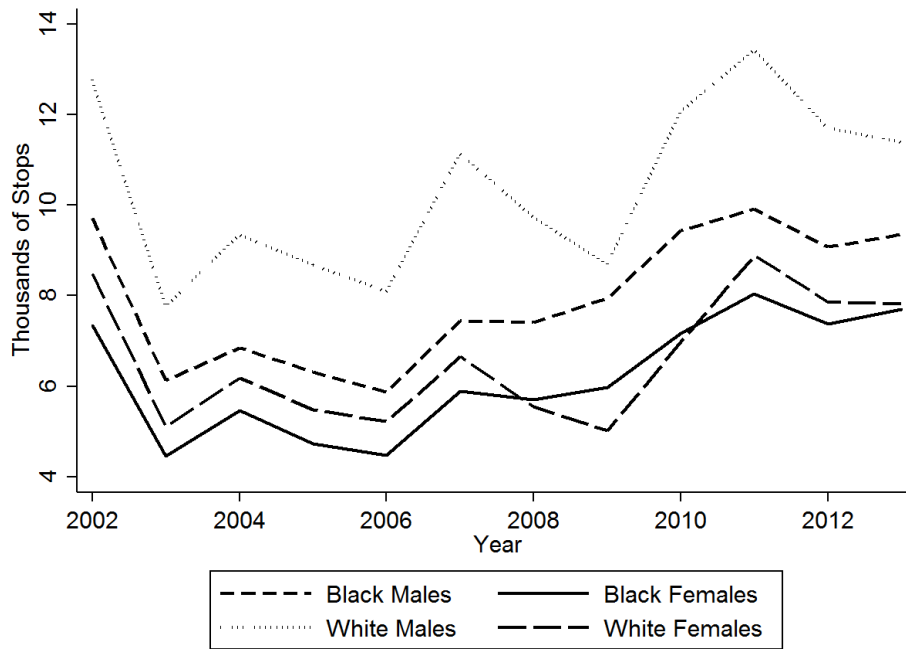


Figure 9. Percent of Stops Resulting in a Search, by Race and Gender

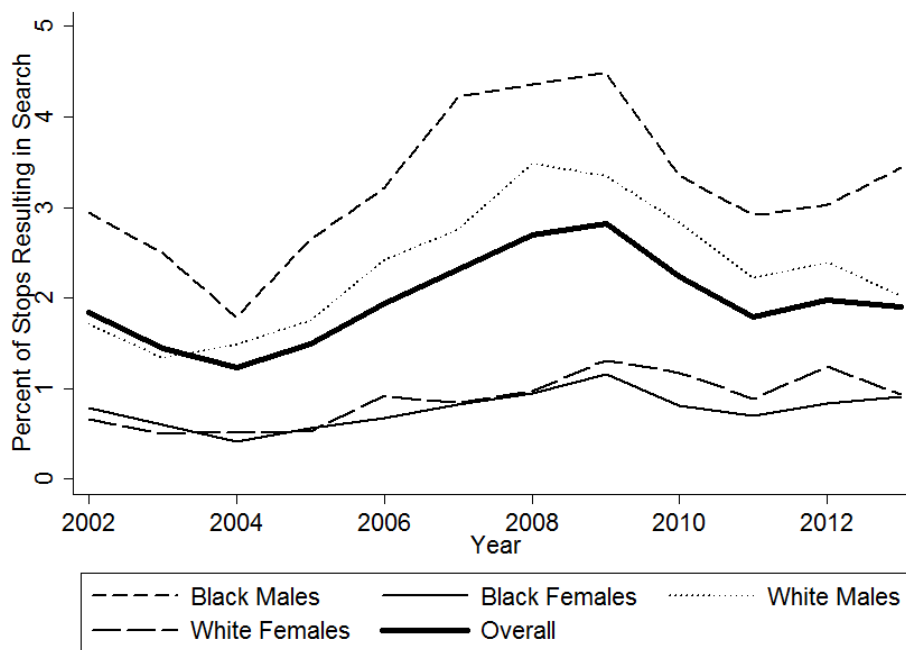


Table 4. Type of Search by Race

Search Type	Number	% Total	% White	% Black	Ratio
					Black:White
Total Stops	389,285	-	52.42	43.63	-
Total Searches	7,678	1.97	1.76	2.18	1.24
Consent	2,081	0.53	0.45	0.64	1.42
Search Warrant	3	-	-	-	-
Probable Cause	1,509	0.39	0.25	0.58	2.32
Incident to Arrest	4,015	1.03	1.05	0.93	0.89
Protective Frisk	70	0.02	0.02	0.02	1.00

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	2,424	51.77	51.77	0.15	0.15
2 – 10	1,020	21.79	73.56	0.37	0.52
11 - 100	473	10.10	83.66	3.39	3.91
101 – 1,000	689	14.72	98.38	45.04	48.95
1,001 +	76	1.62	100.00	51.05	100.00
Total	4,682	100	-	100	-

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

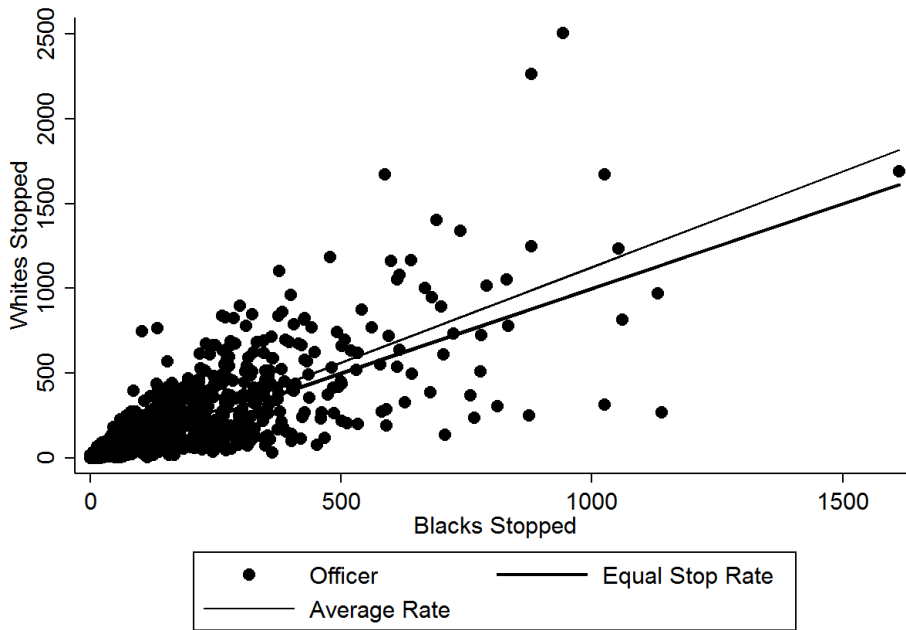


Figure 11. Number of Black and White Motorists Searched, by Officer

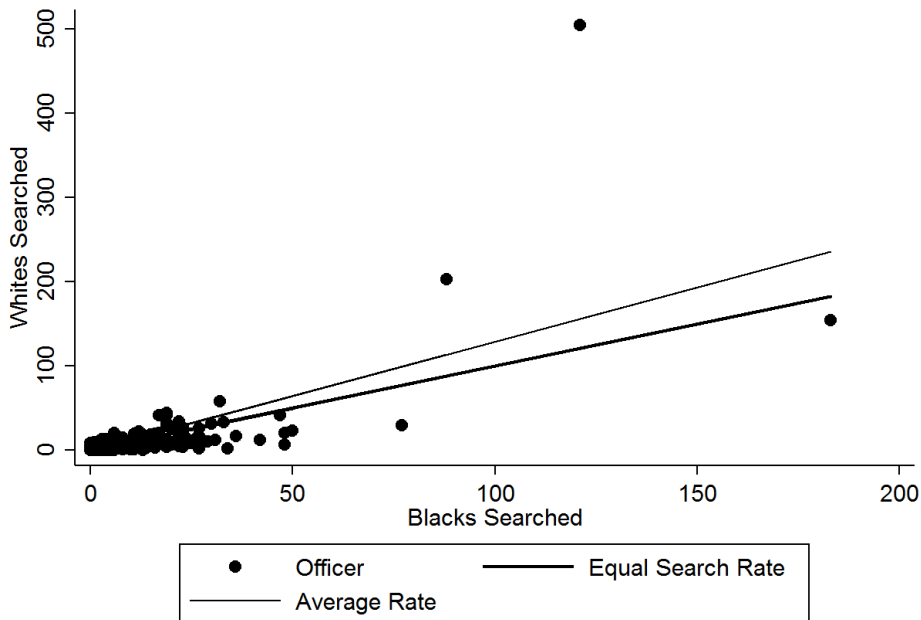
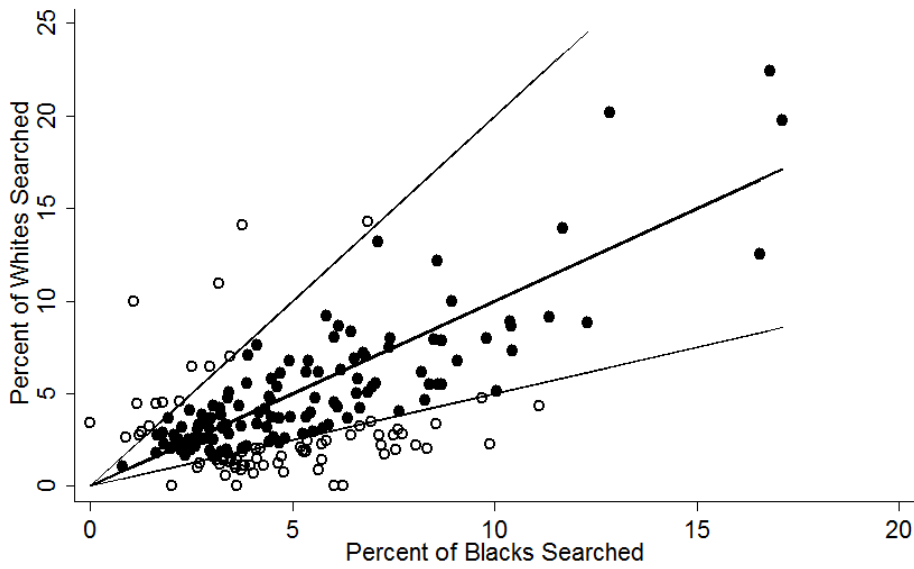


Figure 12. Percent of White and Black Drivers Searched, by Officer



Includes 191 officers with a minimum of 50 White stops, 50 Black stops, and a search rate above the department average of 1.97. The hollow circles indicate high disparity officers. 16 officers search Whites at more than twice the rate that they search Blacks. 54 officers search Blacks at more than twice the rate that they search Whites.

Table 6. Predicting the Occurrence of a Search, Male Drivers

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Demographics					
Race	1.64*(0.05)	1.61*(0.05)	1.56*(0.05)	1.54*(0.05)	1.42*(0.05)
Hispanic	1.96*(0.08)	1.76*(0.07)	1.30*(0.06)	1.28*(0.06)	1.24*(0.06)
Age	-	0.97*(0.00)	0.97*(0.00)	0.97*(0.00)	0.97*(0.00)
Stop Purpose					
Speed Limit	-	-	-	-	-
Stop Light	-	-	1.65*(0.11)	1.64*(0.11)	1.64*(0.12)
Impaired	-	-	64.17*(3.72)	62.00*(3.62)	44.66*(3.04)
Movement	-	-	5.72*(0.30)	5.60*(0.29)	5.29*(0.30)
Equipment	-	-	2.43*(0.12)	2.39*(0.12)	2.01*(0.11)
Regulatory	-	-	1.58*(0.07)	1.56*(0.07)	1.46*(0.08)
Seat Belt	-	-	2.05*(0.16)	2.04*(0.16)	2.76*(0.25)
Investigation	-	-	6.08*(0.35)	5.99*(0.35)	5.18*(0.32)
Other	-	-	2.67*(0.15)	2.67*(0.15)	2.14*(0.14)
Officer Type					
Black Disparity [†]	-	-	-	1.86*(0.08)	1.77*(0.09)
White Disparity [†]	-	-	-	1.65*(0.14)	1.61*(0.15)
Time					
Hour of Day	-	-	-	-	Included
Day of Week	-	-	-	-	Included
Constant	0.02*(0.00)	0.05*(0.00)	0.03*(0.00)	0.03*(0.00)	0.04*(0.00)
N	220,243	220,243	220,243	220,243	168,858
Pseudo R²	0.00	0.00	0.12	0.12	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.

* $p < 0.05$

† See Figure 12 for an explanation of the identification of high disparity officers.

Table 7. Predicting the Occurrence of a Search, Female Drivers

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Demographics					
Race	0.85*(0.05)	0.83*(0.05)	0.80*(0.05)	0.78*(0.05)	0.72*(0.05)
Hispanic	0.57*(0.09)	0.52*(0.08)	0.40*(0.06)	0.39*(0.06)	0.39*(0.07)
Age	-	0.97*(0.00)	0.97*(0.00)	0.97*(0.00)	0.98*(0.00)
Stop Purpose					
Speed Limit	-	-	-	-	-
Stop Light	-	-	2.01*(0.29)	2.02*(0.29)	1.95*(0.31)
Impaired	-	-	122.47*(14.18)	114.84*(13.38)	54.22*(7.40)
Movement	-	-	8.84*(0.96)	8.58*(0.93)	6.67*(0.79)
Equipment	-	-	3.63*(0.38)	3.57*(0.38)	2.13*(0.26)
Regulatory	-	-	1.76*(0.17)	1.72*(0.17)	1.52*(0.17)
Seat Belt	-	-	2.25*(0.46)	2.23*(0.46)	3.64*(0.89)
Investigation	-	-	10.36*(1.27)	10.23*(1.26)	7.20*(0.93)
Other	-	-	3.65*(0.46)	3.65*(0.46)	2.46*(0.36)
Officer Type					
Black Disparity [†]	-	-	-	1.96*(0.18)	1.91*(0.20)
White Disparity [†]	-	-	-	1.69*(0.31)	1.58*(0.34)
Time					
Hour of Day	-	-	-	-	Included
Day of Week	-	-	-	-	Included
Constant	0.01*(0.00)	0.03*(0.00)	0.01*(0.00)	0.01*(0.00)	0.02*(0.00)
N	153,635	153,635	153,635	153,635	117,192
Pseudo R²	0.00	0.01	0.01	0.13	0.16

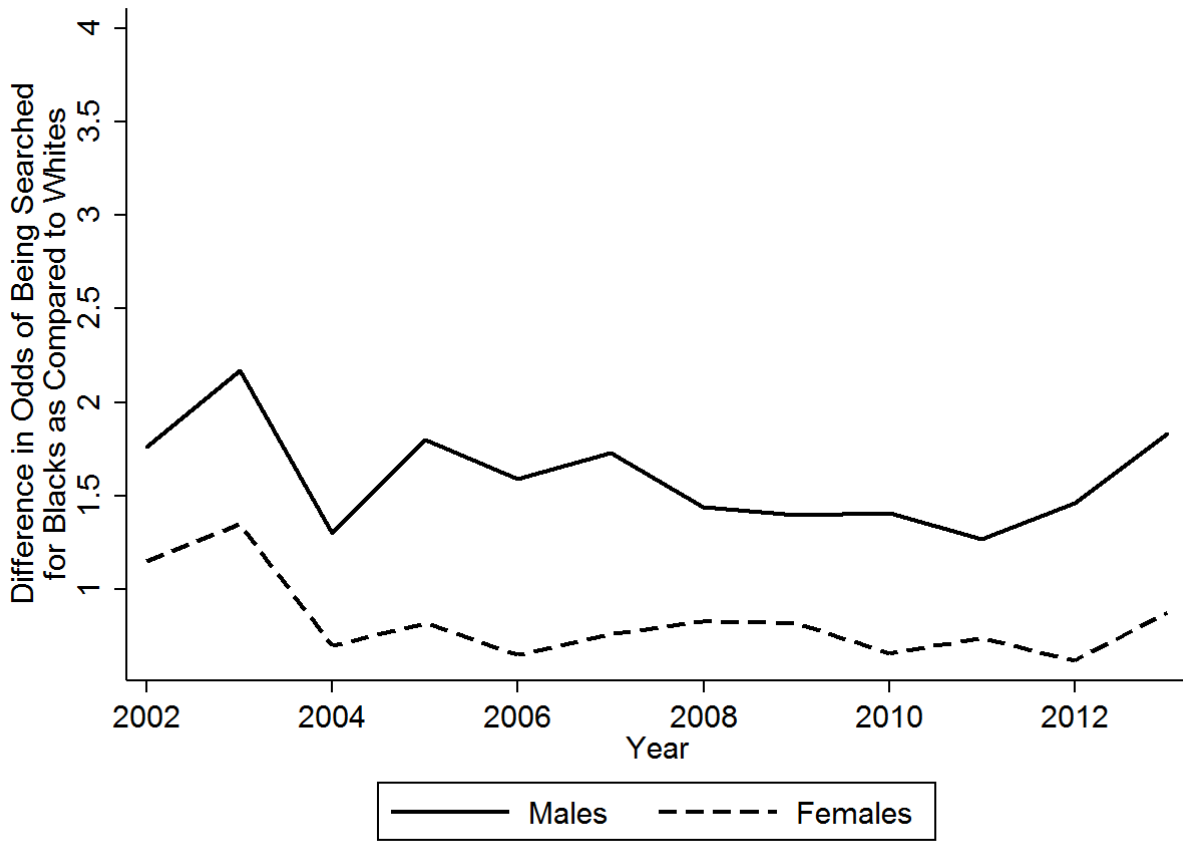
Note: Entries are odds-ratios, with standard errors in parenthesis.

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

* $p < 0.05$

† See Figure 12 for an explanation of the identification of high disparity officers.

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	3,099	38.30	58.70
Speed Limit	392	38.52	58.67
Stop Light/Sign	129	28.68	65.89
Driving Impaired	146	58.22	28.08
Safe Movement	334	49.10	46.11
Vehicle Equipment	549	35.52	61.57
Vehicle Regulatory	687	34.93	63.61
Seat Belt	164	40.24	59.15
Investigation	370	37.57	61.89
Other Vehicle	328	33.54	63.41

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

Purpose	Number	% Total	% White	% Black	Ratio
					Black:White
Total Stops	232,053	-	53.77	41.14	-
Total Searches	6,384	2.75	2.32	3.26	1.41
Speed Limit	75,633	1.19	0.89	1.73	1.94
Stop Light/Sign	17,018	1.96	1.51	2.51	1.66
Driving Impaired	2,320	42.20	45.30	35.72	0.79
Safe Movement	12,497	6.39	3.25	6.52	2.01
Vehicle Equipment	29,681	3.05	2.77	3.40	1.23
Vehicle Regulatory	61,005	1.85	1.34	2.43	1.81
Seat Belt	9,302	2.46	1.88	3.20	1.70
Investigation	7,238	7.23	5.82	8.70	1.49
Other Vehicle	17,359	3.39	2.67	4.18	1.57

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

Purpose	Number	% Total	% White	% Black	Ratio
					Black:White
Total Stops	157,232	-	50.42	47.29	-
Total Searches	1,294	0.82	0.88	0.78	0.89
Speed Limit	55,138	0.32	0.33	0.32	0.97
Stop Light/Sign	11,634	0.58	0.55	0.67	1.22
Driving Impaired	707	26.87	33.11	17.37	0.52
Safe Movement	6,732	2.54	3.44	1.60	0.47
Vehicle Equipment	17,230	1.11	1.16	1.11	0.96
Vehicle Regulatory	48,394	0.52	0.47	0.57	1.21
Seat Belt	4,039	0.72	0.77	0.68	0.88
Investigation	3,871	2.97	2.97	2.95	0.99
Other Vehicle	9,487	1.05	0.94	1.19	1.27

Table A4. Type of Search by Race: Men

Search Type	Number	% Total	% White	% Black	Ratio
					Black:White
Total Stops	232,053	-	53.77	41.14	-
Total Searches	6,384	2.75	2.32	3.26	1.41
Consent	1,747	0.75	0.61	0.97	1.59
Search Warrant	3	-	-	-	-
Probable Cause	1,250	0.54	0.33	0.87	2.64
Incident to Arrest	3,323	1.43	1.36	1.39	1.02
Protective Frisk	61	0.03	0.02	0.03	1.50

Table A5. Type of Search by Race: Women

Search Type	Number	% Total	% White	% Black	Ratio Black:White
Total Stops	157,232	-	50.42	47.29	-
Total Searches	1,294	0.82	0.88	0.78	0.89
Consent	334	0.21	0.22	0.22	1.00
Search Warrant	0	-	-	-	-
Probable Cause	259	0.16	0.12	0.22	1.83
Incident to Arrest	692	0.44	0.54	0.34	0.63
Protective Frisk	9	0.01	0.01	0.01	1.00

Figure A6. Stops by Day of the Week

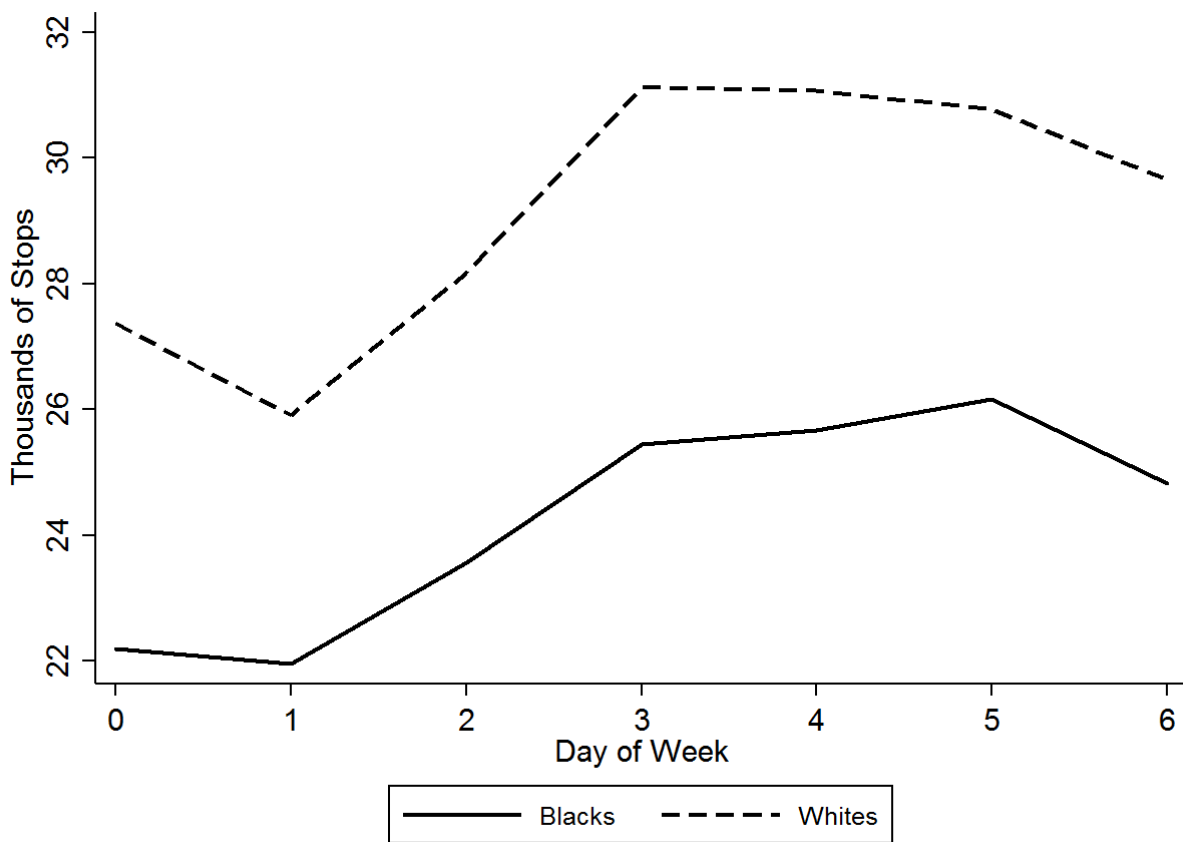


Figure A7. Searches by Day of the Week

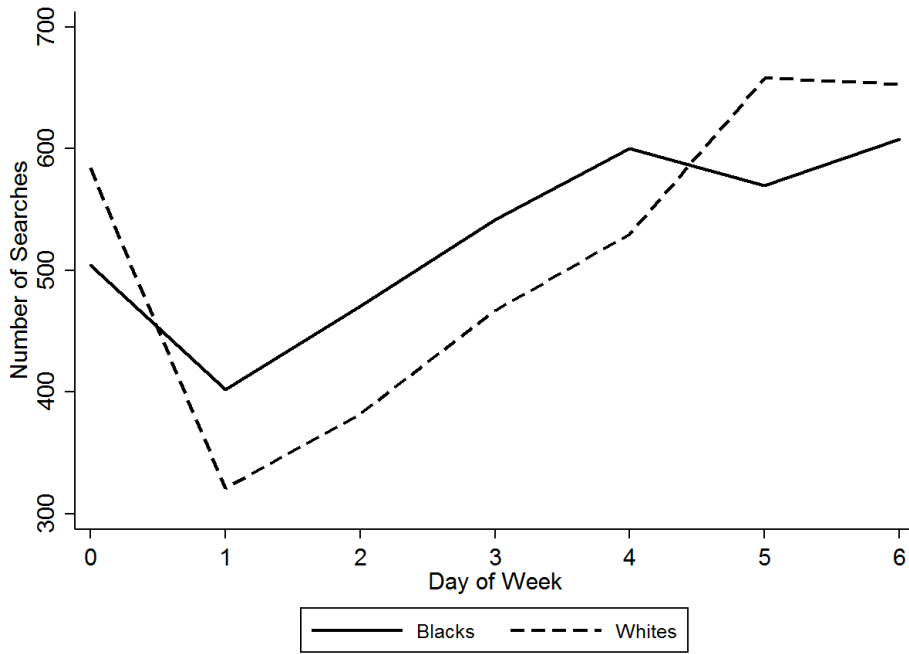
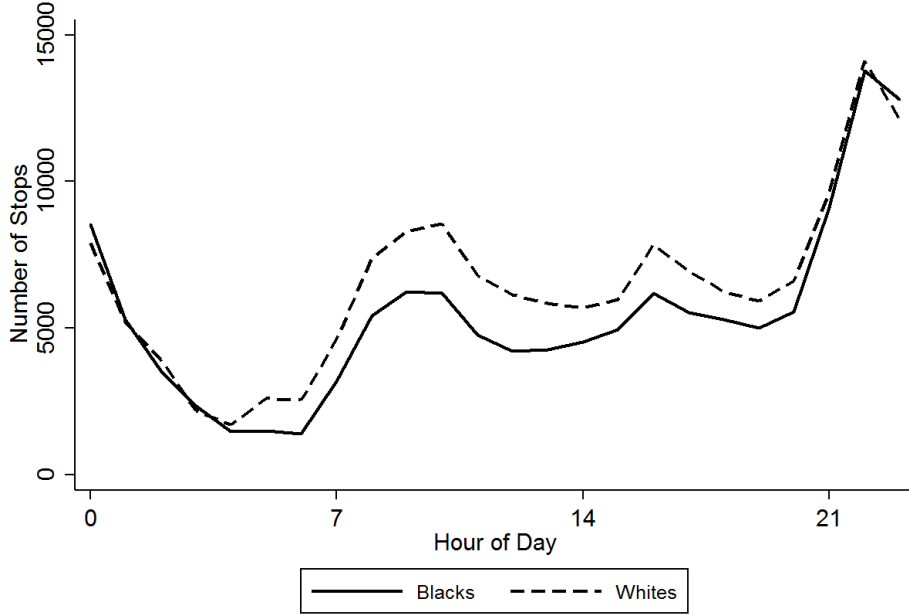
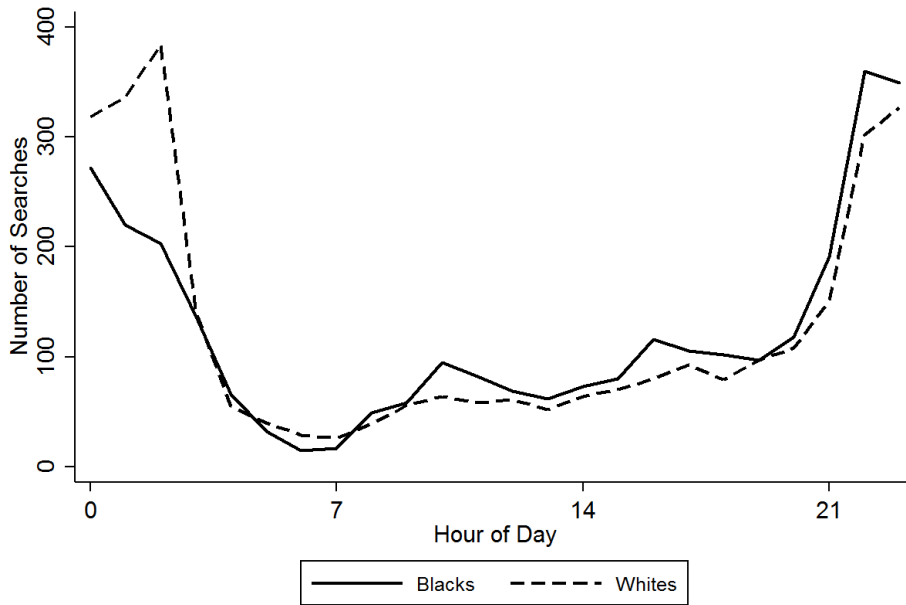


Figure A8. Stops by Hour of the Day



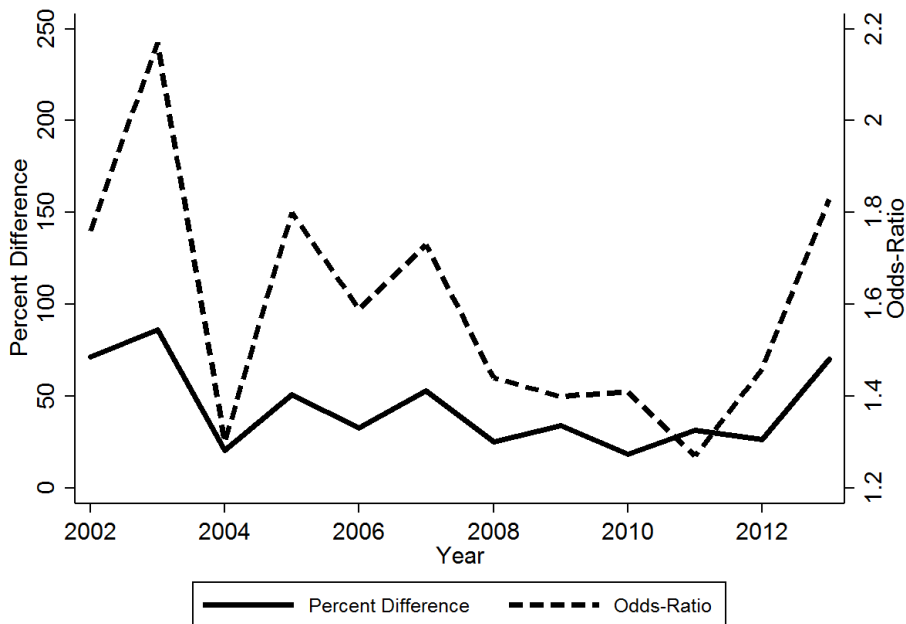
The figure excludes cases where the hour and minute was exactly 0:00. These cases were presumed to be missing data.

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: 0.918

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

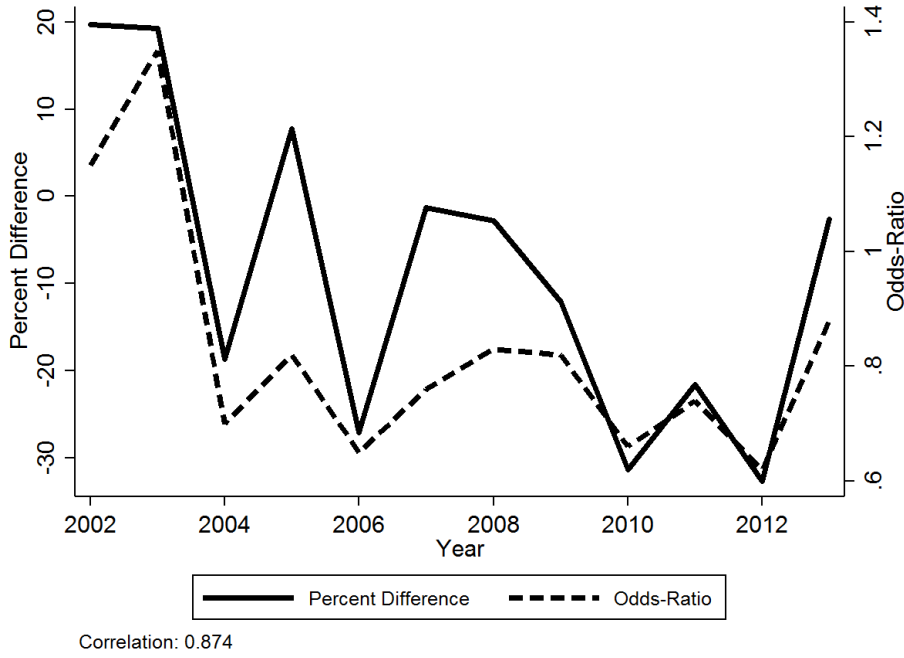


Figure A12. Racial Differences in the Likelihood of Search: Consent Searches Only

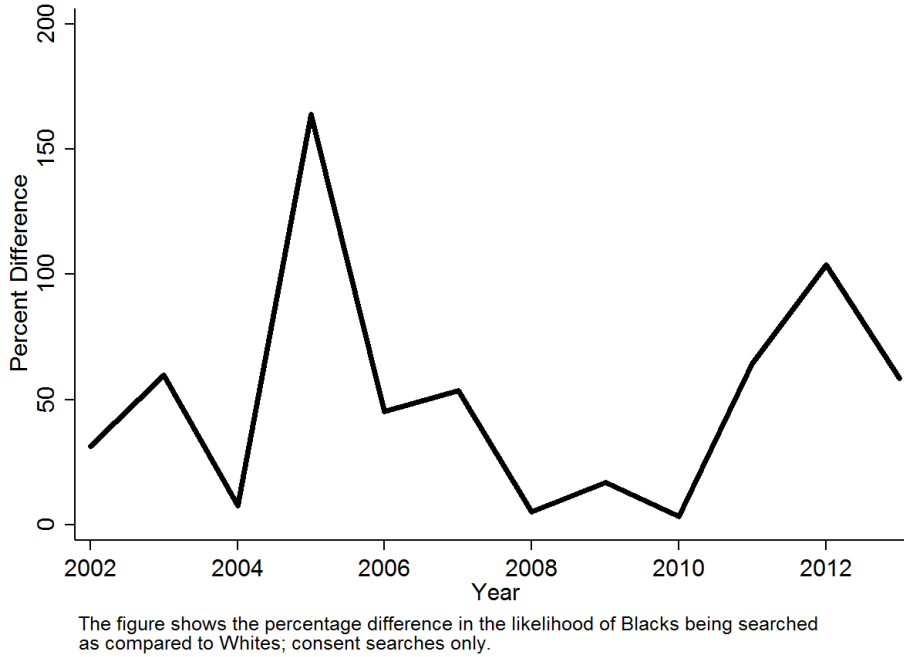


Table A6. Likelihood of Finding Contraband Given a Search, by Race

Contraband	Number	% Total	% White	% Black
Yes	2,130	27.74	25.37	31.78
No	5,548	72.26	74.63	68.22
Total	7,578	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	200,455	1.79	19.00	5.49	73.18	0.54	100.0
Black	No	166,131	2.39	22.68	5.01	69.39	0.53	100.0
Total	No	381,607	2.03	20.28	5.44	71.72	0.54	100.0
White	Yes	3,595	0.81	4.53	3.76	32.02	58.89	100.0
Black	Yes	3,697	1.22	5.71	3.00	47.09	42.98	100.0
Total	Yes	7,678	1.00	5.11	3.27	38.85	51.77	100.0