

Analysis of Black-White Differences in Traffic Stops and Searches in Wake Forest, 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	116,703
-2014	4,404
-Passengers	4,505
-Checkpoint stops	256
Total number of cases deleted	8,891
Stops for analysis	107,812
Searches	8,584
Percent of stops leading to search (search rate)	7.96%

Figure 1. Number of Traffic Stops per Year

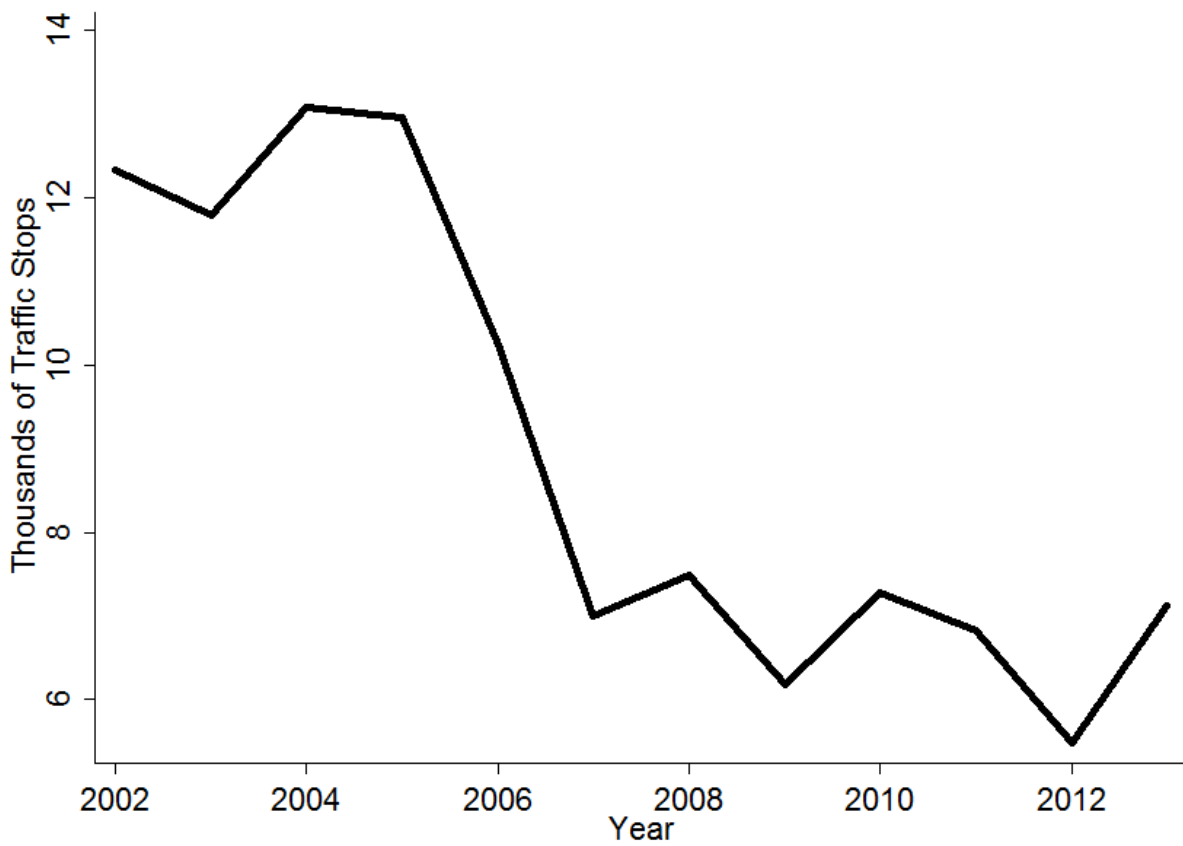


Figure 2. Racial Composition of Traffic Stops by Year

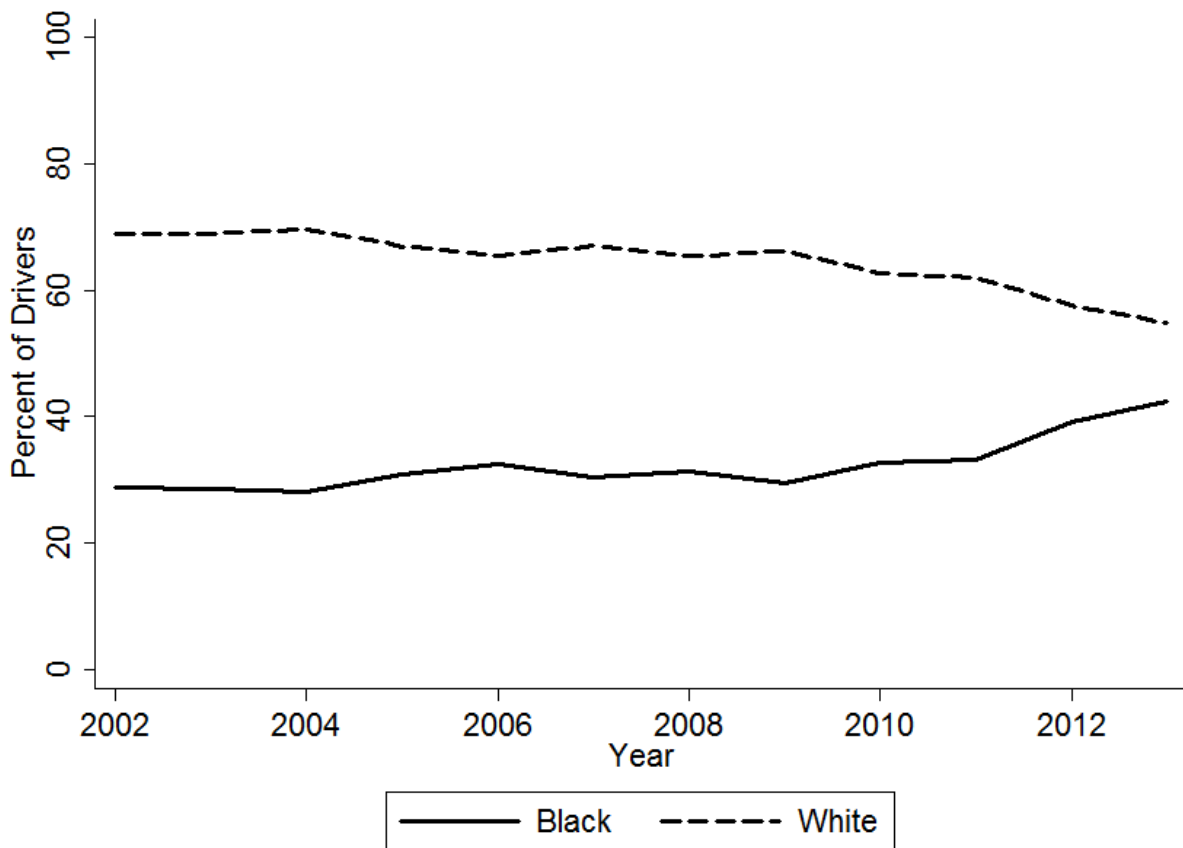


Table 2. Racial Composition of Traffic Stops by Purpose, Drivers-done

Purpose	Number	Percent	
		White	Black
Total Stops	107,812	65.59	31.57
Speed Limit	38,983	69.98	26.69
Stop Light/Sign	7,498	71.87	23.37
Driving Impaired	2,217	73.61	23.23
Safe Movement	9,852	64.24	32.34
Vehicle Equipment	10,455	56.51	41.26
Vehicle Regulatory	21,260	61.00	37.23
Seat Belt	3,111	65.03	32.95
Investigation	8,189	64.78	33.52
Other Vehicle	6,247	62.16	34.90

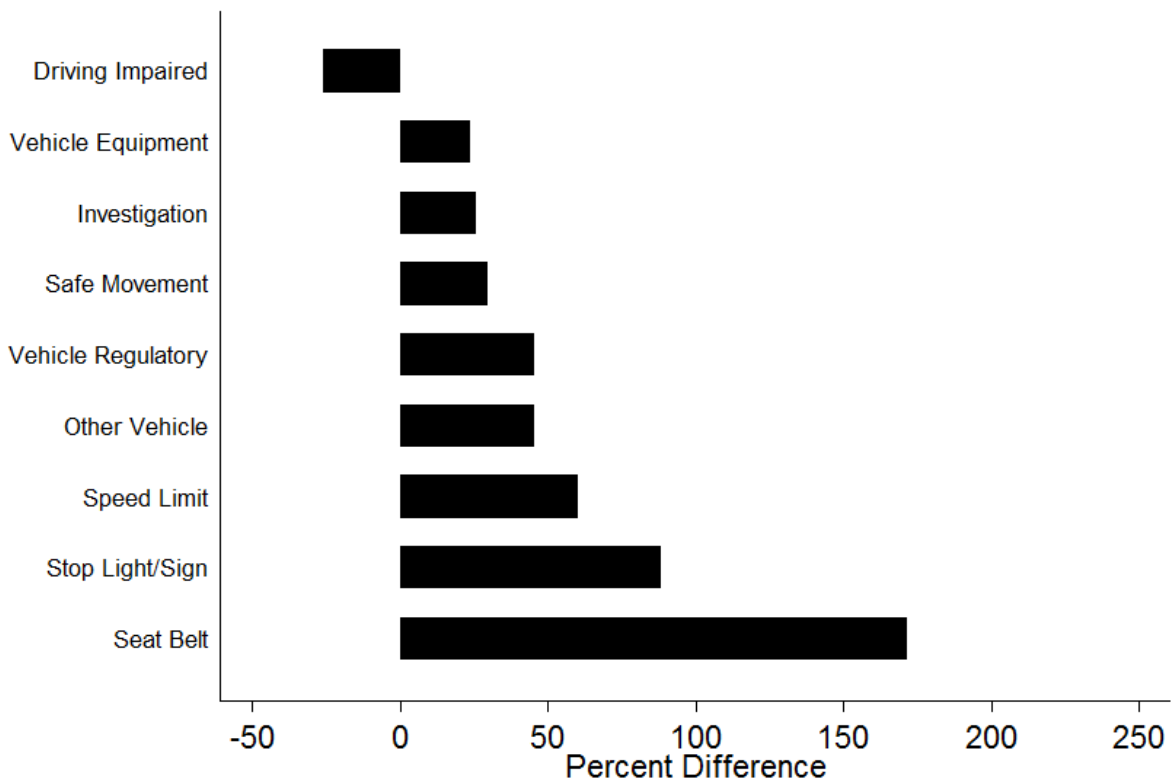
Note: Includes only drivers. Excludes 256 checkpoint stops. Excludes 4,505 passengers.

Table 3. Percent Searched by Race and Purpose of Stop

Purpose	Number	% Total	% White	% Black	Ratio
					Black:White
Total Stops	107,812	-	65.59	31.57	-
Total Searches	8,584	7.96	7.15	9.96	1.39
Speed Limit	38,983	3.60	3.13	5.03	1.61
Stop Light/Sign	7,498	3.60	3.06	5.76	1.88
Driving Impaired	2,217	46.10	49.39	36.50	0.74
Safe Movement	9,852	10.05	9.24	11.99	1.30
Vehicle Equipment	10,455	11.03	10.12	12.52	1.24
Vehicle Regulatory	21,260	7.68	6.59	9.58	1.45
Seat Belt	3,111	7.97	5.14	13.95	2.71
Investigation	8,189	16.22	15.00	18.83	1.26
Other Vehicle	6,247	8.63	7.47	10.87	1.46

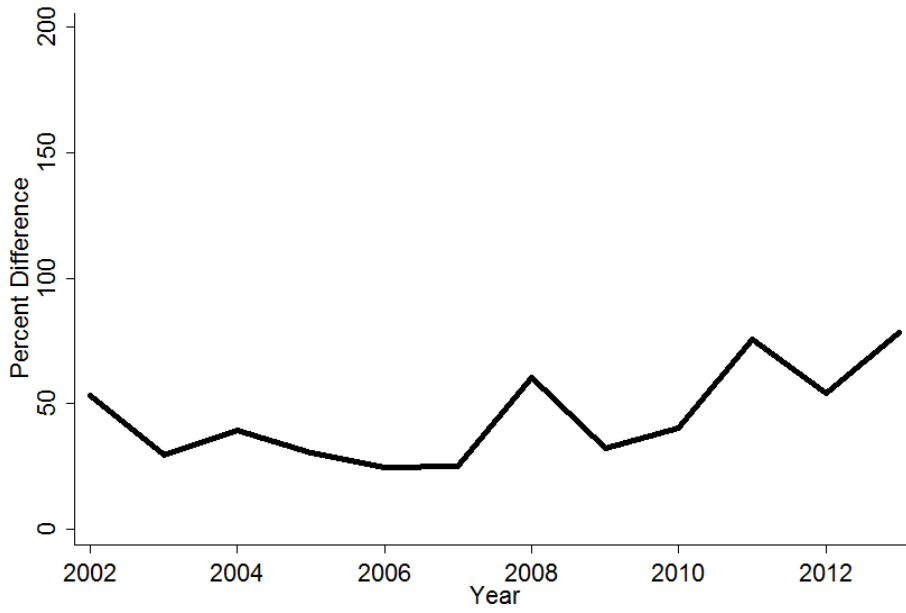
Note: See the appendix for this same table broken down for Men and Women.

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



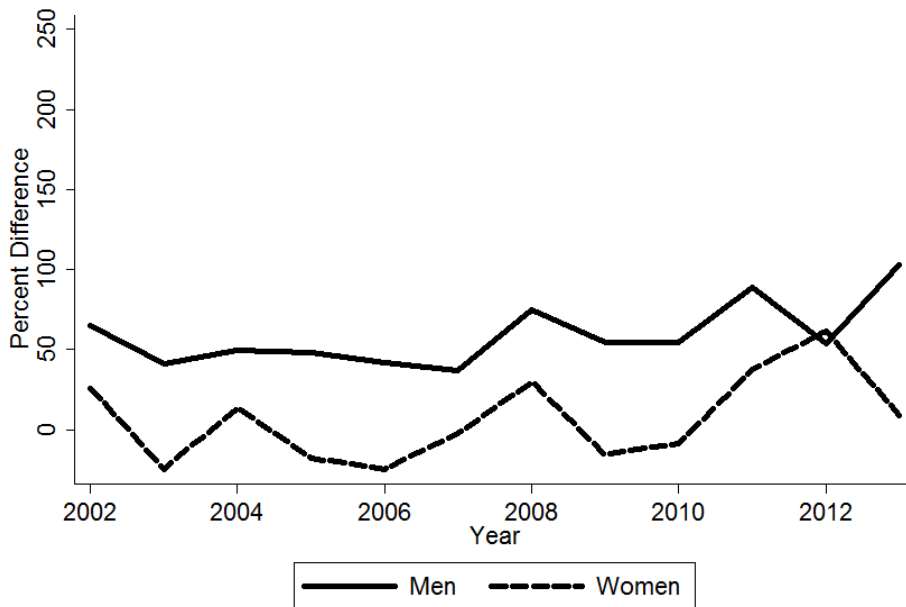
The figure shows the percentage difference in the likelihood of Blacks being searched as compared to Whites by purpose of stop.

Figure 4. Racial Differences in the Likelihood of Search



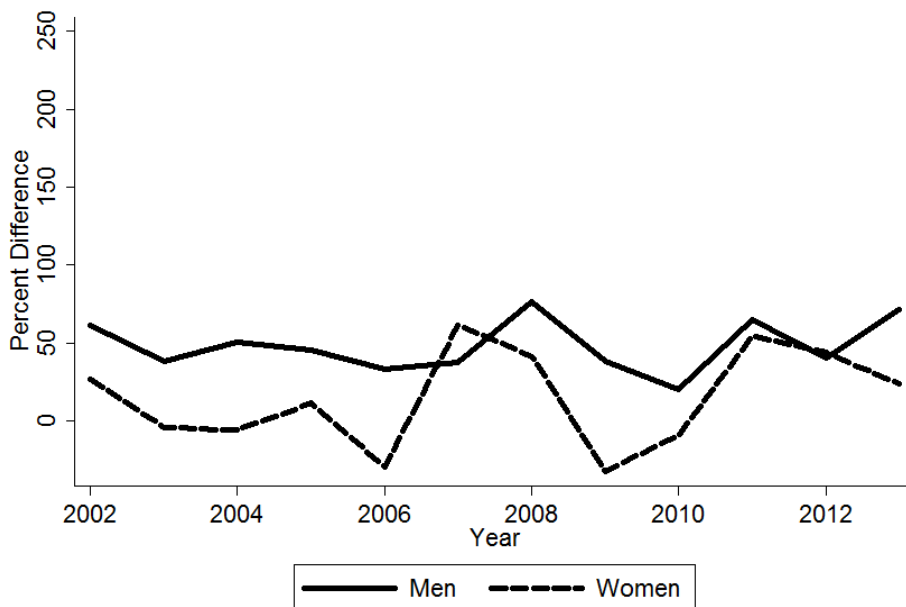
The figure shows the percentage difference in the likelihood of Blacks being searched as compared to Whites.

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



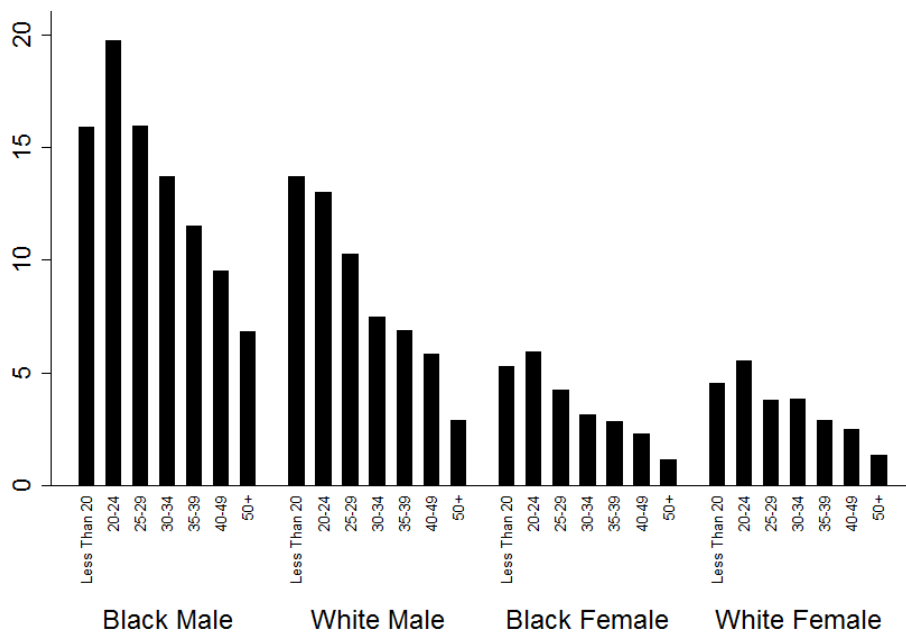
The figure shows the percentage difference in the likelihood of Blacks being searched as compared to Whites by gender.

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 107,812 traffic stops from 2002 through 2013, and 8,584 searches. Overall rate of search: 7.96 percent.

Black men under the age of 30 are searched at rates of about 15 percent whereas white men of that age see rates of about 13 percent, and women in general are typically below 4 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

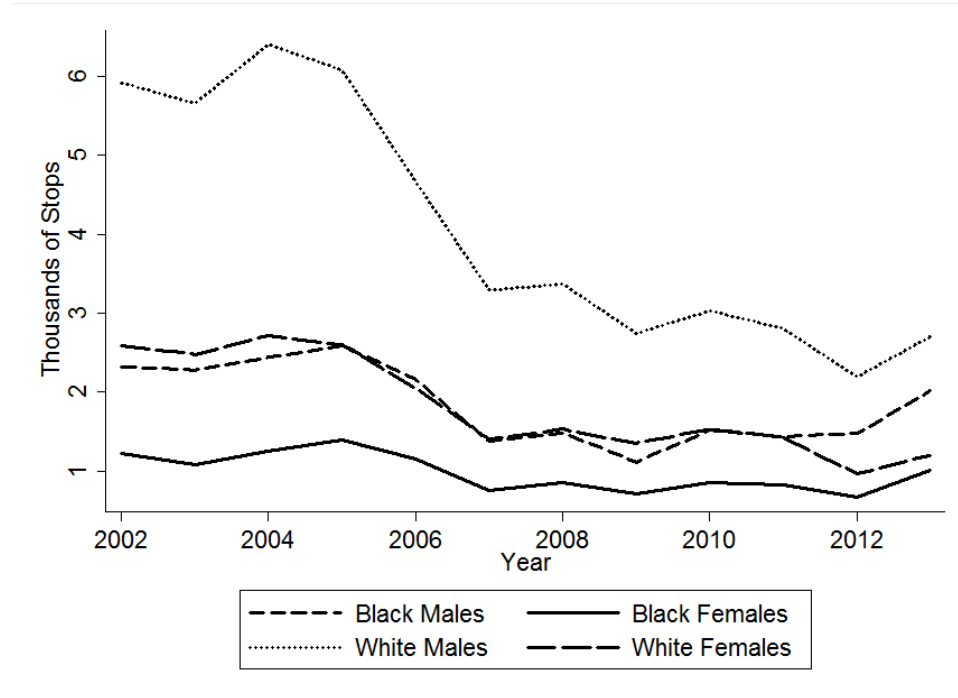


Figure 9. Percent of Stops Resulting in a Search, by Race and Gender

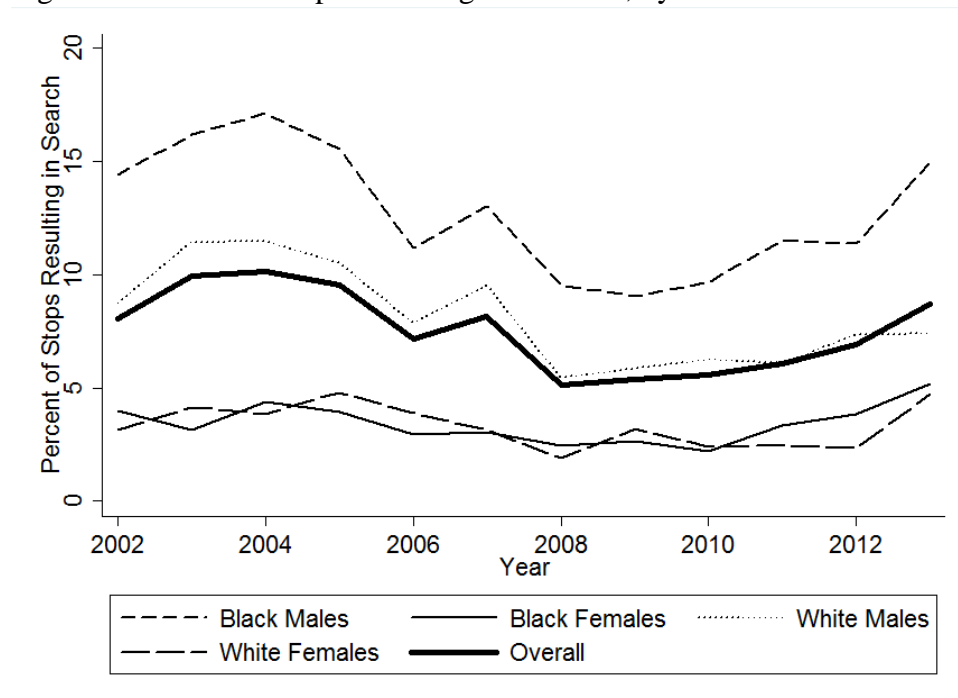


Table 4. Type of Search by Race-finish ratios

Search Type	Number	Total	Ratio		
			White	Black	Black:White
Total Stops	107,812	-	65.59	31.57	-
Total Searches	8,584	7.96	7.15	9.96	1.40
Consent	4,376	4.06	3.70	4.97	1.34
Search Warrant	21	.02	.02	.02	-
Probable Cause	1,397	1.30	.88	2.23	2.53
Incident to Arrest	2,579	2.39	2.38	2.50	1.05
Protective Frisk	211	.20	.17	.24	1.41

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	549	35.47	35.47	0.51	0.51
2 – 10	414	26.74	62.21	1.57	2.08
11 - 100	341	22.03	84.24	12.58	14.66
101 – 1,000	235	15.18	99.42	72.59	87.25
1,001 +	9	0.58	100.00	12.75	100.00
Total	1,548	100	-	100	-

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

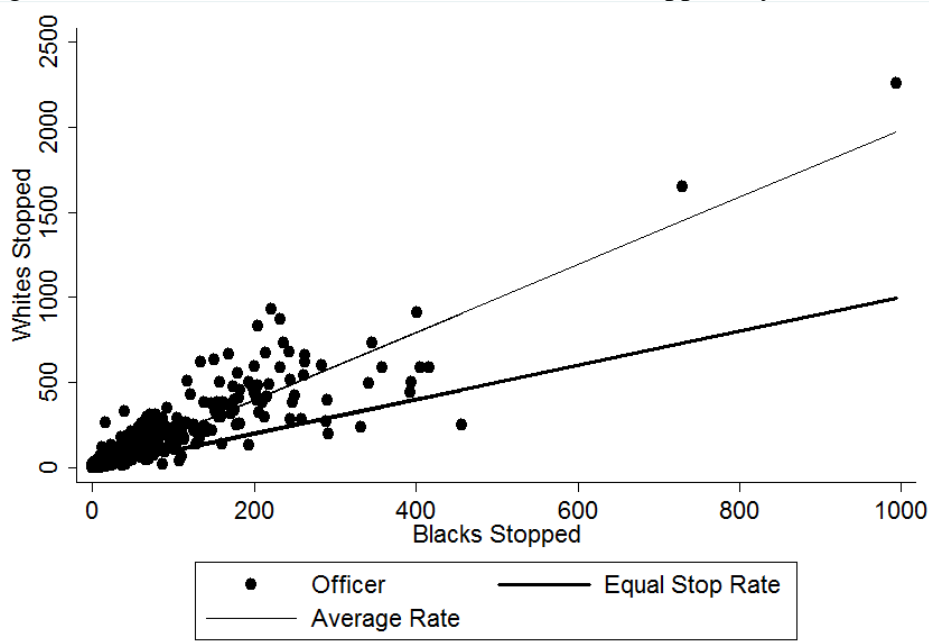


Figure 11. Number of Black and White Motorists Searched, by Officer

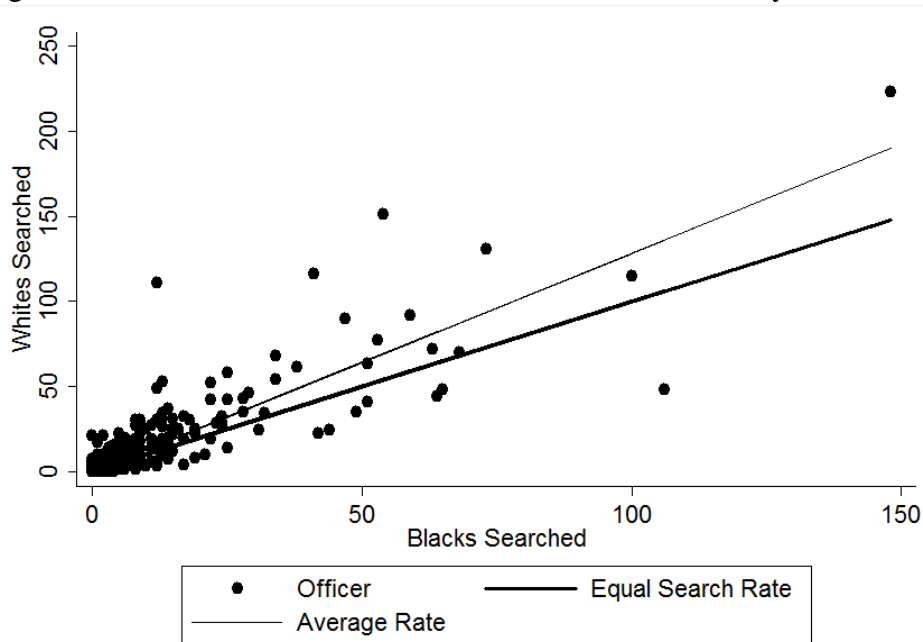
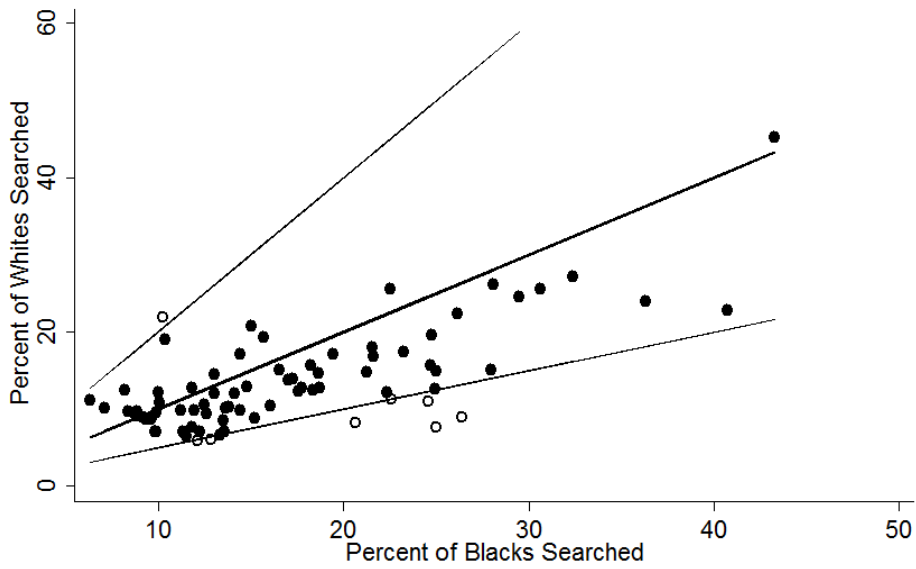


Figure 12. Percent of White and Black Drivers Searched, by Officer



Includes 77 officers with a minimum of 50 White stops, 50 Black stops, and a search rate above the department average of 7.96. The hollow circles indicate high disparity officers. 1 officers search Whites at more than twice the rate that they search Blacks. 7 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	1.82*(.05)	1.87*(.05)	1.74*(.05)	1.74*(.05)	1.68*(.05)
Hispanic	1.61*(.06)	1.43*(.05)	1.08*(.04)	1.08*(.04)	1.10*(.04)
Age	-	.96*(.00)	.96*(.00)	.96*(.00)	.96*(.00)
Stop Purpose					
Speed Limit	-	-	-	-	-
Stop Light	-	-	1.08(.08)	1.09(.08)	1.07(.08)
Impaired	-	-	21.18*(1.26)	20.73*(1.24)	17.18*(1.07)
Movement	-	-	2.88*(.14)	2.88*(.14)	2.75*(.13)
Equipment	-	-	2.77*(.13)	2.79*(.13)	2.52*(.12)
Regulatory	-	-	2.26*(.09)	2.27*(.09)	2.23*(.09)
Seat Belt	-	-	2.05*(.16)	2.07*(.16)	2.12*(.17)
Investigation	-	-	4.15*(.19)	4.15*(.19)	3.75*(.18)
Other	-	-	2.27*(.13)	2.25*(.13)	2.15*(.13)
Officer Type					
Black Disparity [†]	-	-	-	1.36*(.12)	1.36*(.12)
White Disparity [†]	-	-	-	2.08*(.28)	2.03*(.28)
Time					
Hour of Day	-	-	-	-	Included
Day of Week	-	-	-	-	Included
Constant	.08*(.00)	.27*(.01)	.15*(.01)	.14*(.01)	.16*(.01)
N	71,104	71,104	71,104	71,104	69,335
Pseudo R²	.01	.03	.10	.10	.11

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	.97(.06)	.97(.06)	.90(.06)	.92(.06)	.88(.06)
Hispanic	.66*(.09)	.60*(.09)	.42*(.06)	.43*(.06)	.43*(.06)
Age	-	.96*(.00)	.96*(.00)	.97*(.00)	.97*(.00)
Stop Purpose					
Speed Limit	-	-	-	-	-
Stop Light	-	-	1.44*(.24)	1.49*(.25)	1.41*(.24)
Impaired	-	-	46.09*(5.67)	41.04*(5.19)	26.02*(3.53)
Movement	-	-	2.83*(.37)	2.88*(.38)	2.59*(.35)
Equipment	-	-	4.48*(.51)	4.60*(.52)	3.80*(.45)
Regulatory	-	-	2.56(.26)	2.62*(.27)	2.49*(.26)
Seat Belt	-	-	2.30*(.54)	2.42*(.57)	2.53(.60)
Investigation	-	-	9.41*(1.01)	9.55*(1.03)	7.56*(.85)
Other	-	-	3.25*(.47)	3.18*(.46)	2.92*(.43)
Officer Type					
Black Disparity [†]	-	-	-	1.59*(.31)	1.48(.30)
White Disparity [†]	-	-	-	5.95*(1.33)	5.27*(1.21)
Time					
Hour of Day	-	-	-	-	Included
Day of Week	-	-	-	-	Included
Constant	.04*(.00)	.12*(.01)	.04*(.01)	.04*(.01)	.06*(.01)
N	33,648	33,648	33,648	33,648	32,808
Pseudo R²	.00	.02	.13	.13	.14

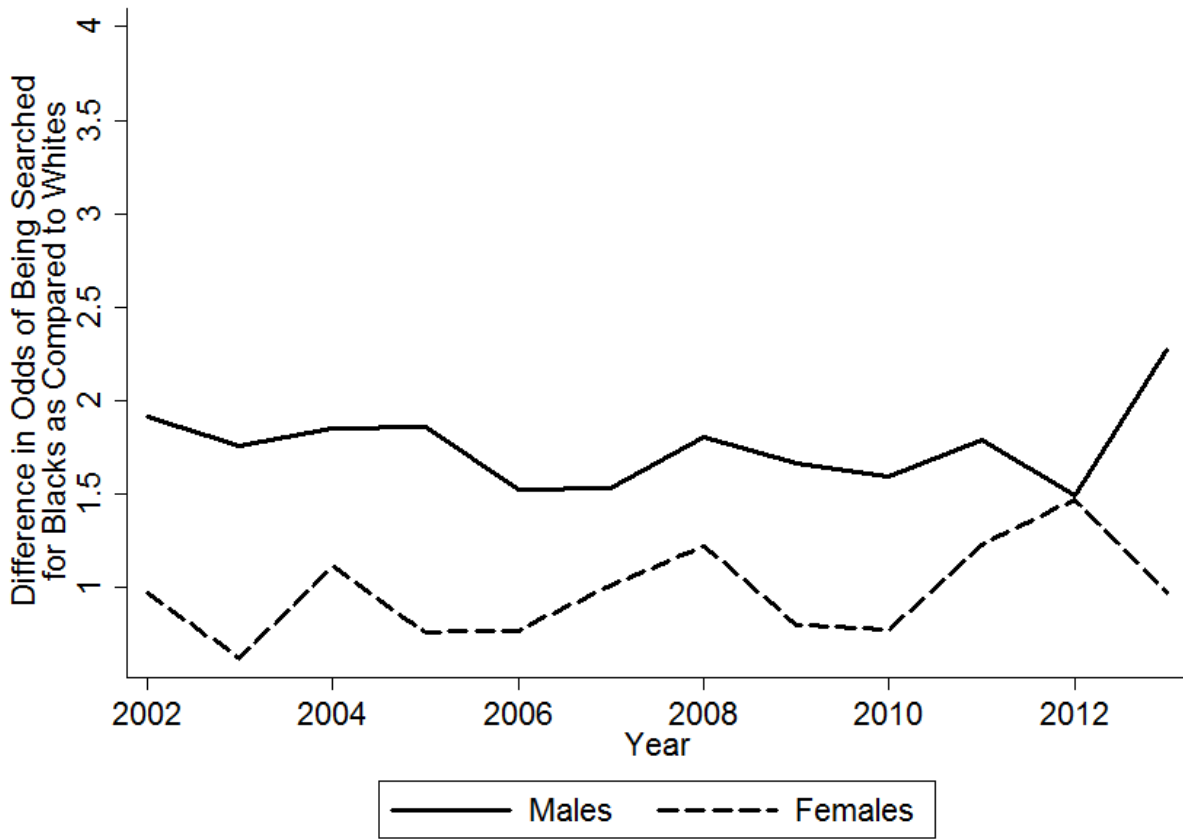
Note: Entries are odds-ratios, with standard errors in parenthesis.

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	4,505	53.92	44.77
Speed Limit	643	56.14	42.15
Stop Light/Sign	125	50.40	48.80
Driving Impaired	282	70.92	27.66
Safe Movement	570	54.21	44.39
Vehicle Equipment	684	47.22	52.05
Vehicle Regulatory	792	51.01	47.73
Seat Belt	139	38.13	61.87
Investigation	967	57.91	41.87
Other Vehicle	278	54.32	42.45

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

Purpose	Number	Total	% White	% Black	Ratio
					Black:White
Total Stops	73,279	-	66.68	30.35	-
Total Searches	7,389	10.08	8.78	13.37	
Speed Limit	25,585	4.80	4.12	7.02	
Stop Light/Sign	4,726	4.74	4.05	7.66	
Driving Impaired	1,700	49.00	51.83	41.12	
Safe Movement	7,036	12.75	11.46	15.90	
Vehicle Equipment	7,538	13.19	11.65	15.76	
Vehicle Regulatory	13,693	10.23	8.45	13.51	
Seat Belt	2,391	9.49	5.83	17.52	
Investigation	6,205	18.02	15.78	22.97	
Other Vehicle	4,405	10.62	8.98	14.16	

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

Purpose	Number	Total	% White	% Black	Ratio
					Black:White
Total Stops	34,533	-	63.27	34.16	-
Total Searches	1,195	3.46	3.49	3.52	
Speed Limit	13,398	1.31	1.17	1.66	
Stop Light/Sign	2,772	1.66	1.33	2.88	
Driving Impaired	517	36.56	41.27	21.49	
Safe Movement	2,816	3.30	3.35	3.41	
Vehicle Equipment	2,917	5.45	5.78	5.21	
Vehicle Regulatory	7,567	3.05	3.01	3.18	
Seat Belt	720	2.92	2.69	3.46	
Investigation	1,984	10.58	12.32	8.03	
Other Vehicle	1,842	3.85	3.29	4.73	

Table A4. Type of Search by Race: Men

Search Type	Number	Total	White	Black	Ratio
					Black:White
Total Stops	73,279	-	66.68	30.35	-
Total Searches	7,389	10.08	8.78	13.37	
Consent	3,802	5.19	4.56	6.78	
Search Warrant	17	0.02	0.02	0.04	-
Probable Cause	1,186	1.62	1.06	2.93	
Incident to Arrest	2,189	2.99	2.90	3.30	
Protective Frisk	195	0.27	0.24	0.33	

Table A5. Type of Search by Race: Women

Search Type	Number	Total	White	Black	Ratio Black:White
Total Stops	34,533	-	63.27	34.16	-
Total Searches	1,195	3.46	3.49	3.52	
Consent	574	1.66	1.76	1.56	
Search Warrant	4	0.01	0.02	0.00	-
Probable Cause	211	0.61	0.47	0.91	
Incident to Arrest	390	1.13	1.21	0.99	
Protective Frisk	16	0.05	0.03	0.06	

Figure A6. Stops by Day of the Week

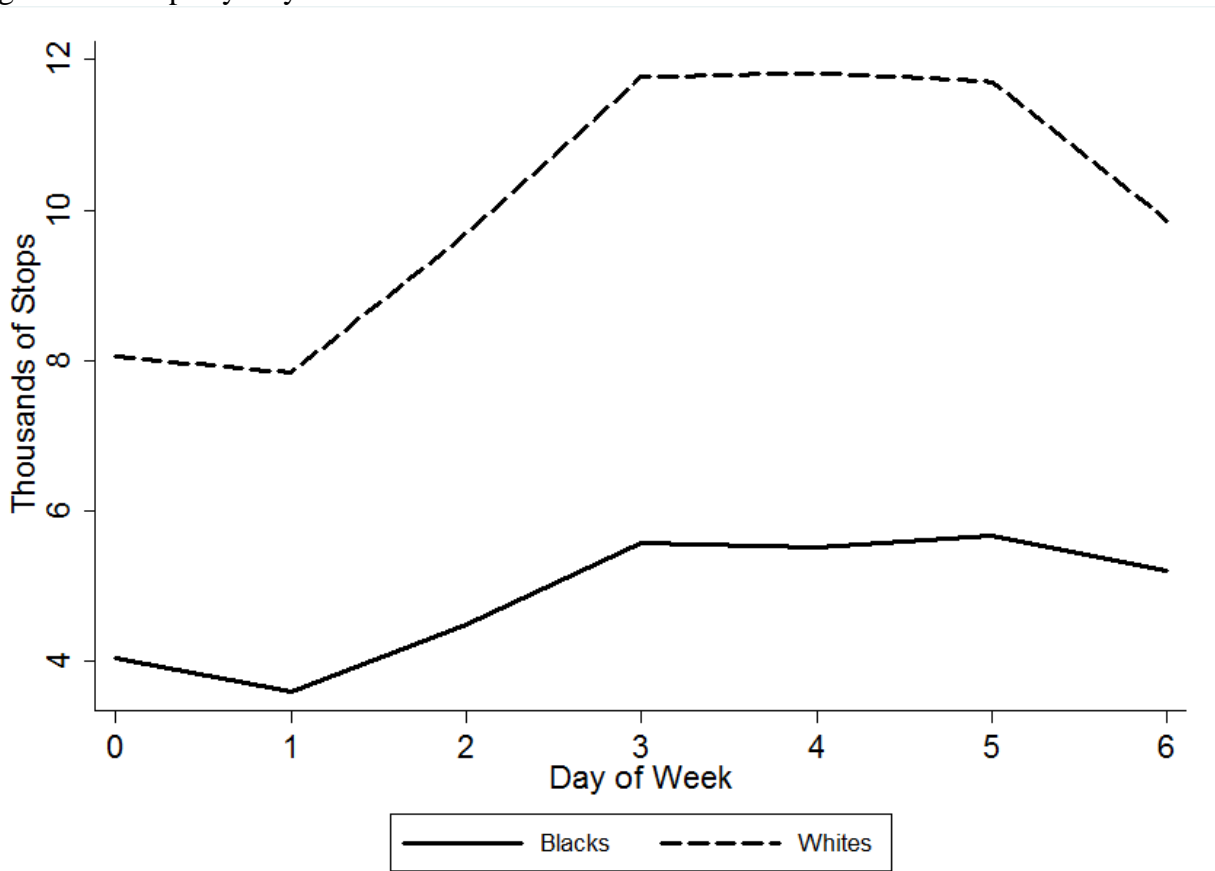


Figure A7. Searches by Day of the Week

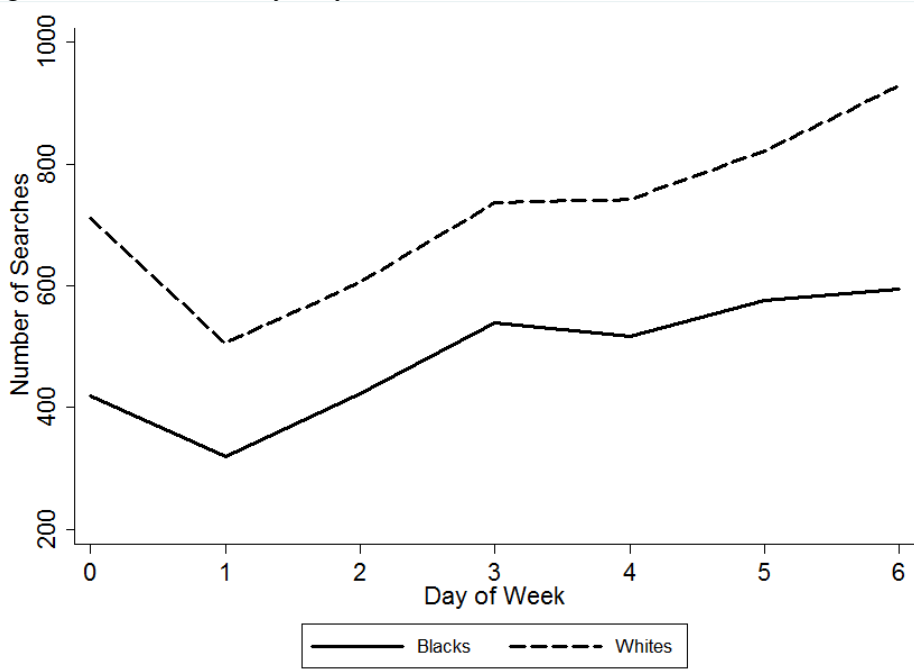
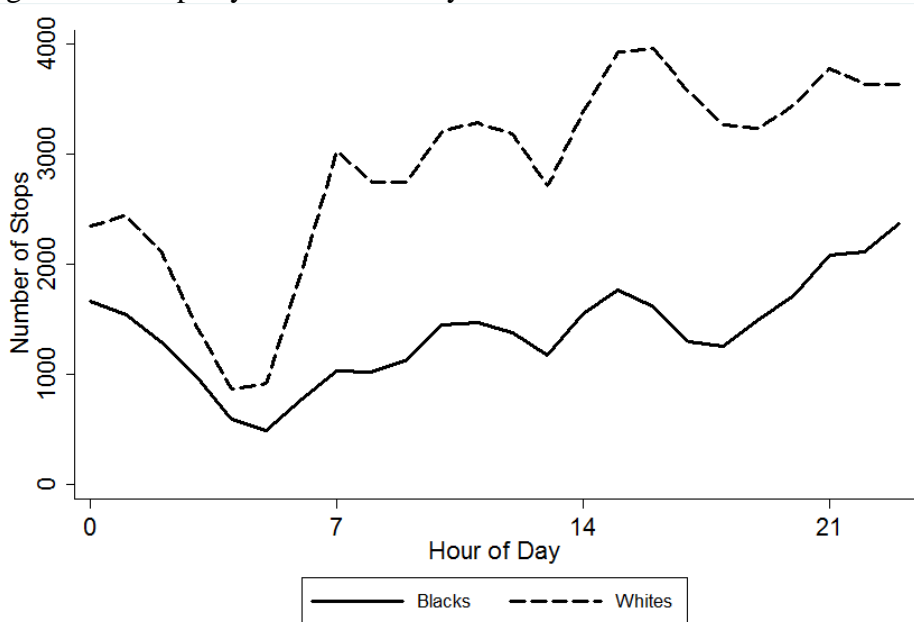
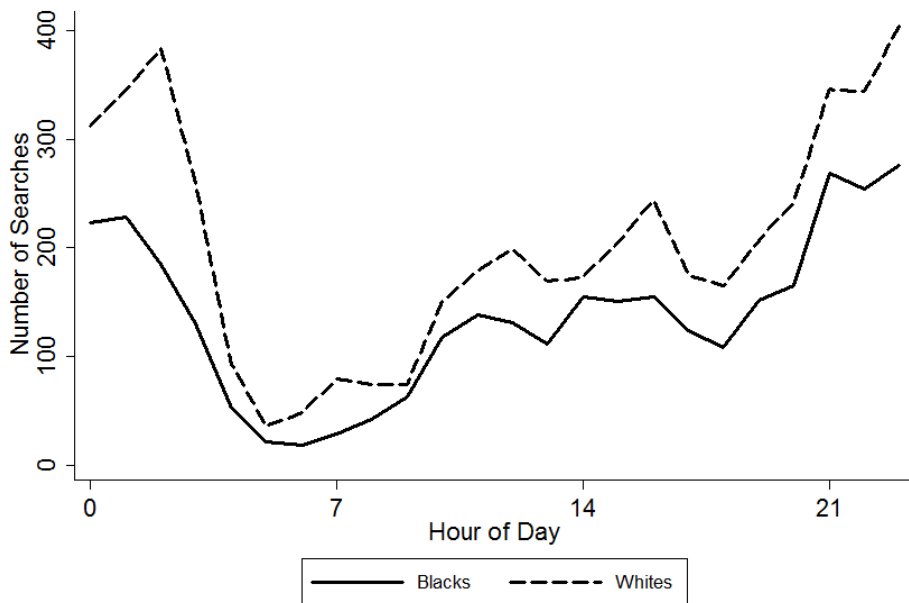


Figure A8. Stops by Hour of the Day



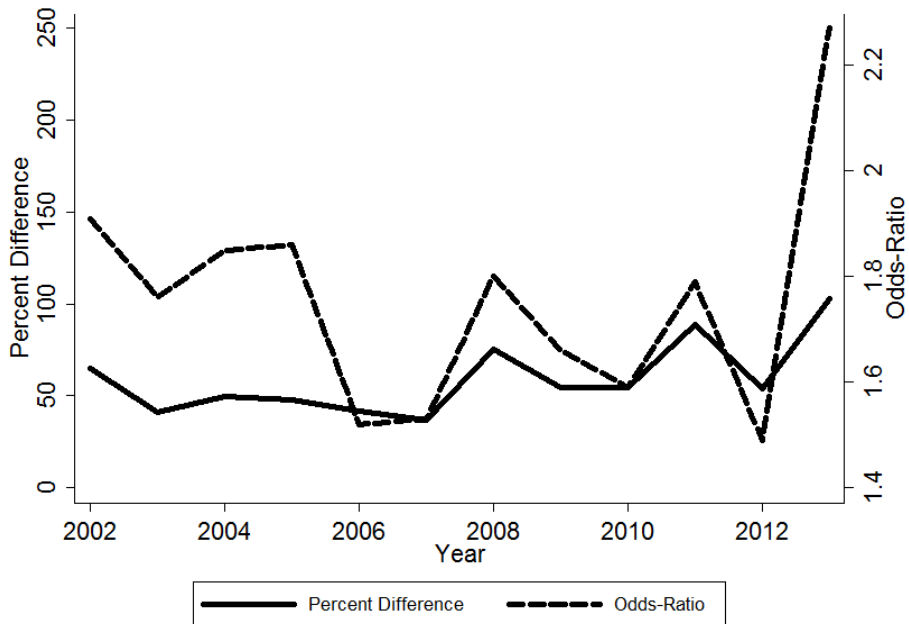
The figure excludes cases where the hour and minute was exactly 0:00. These cases were presumed to be missing data.

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: 0.712

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

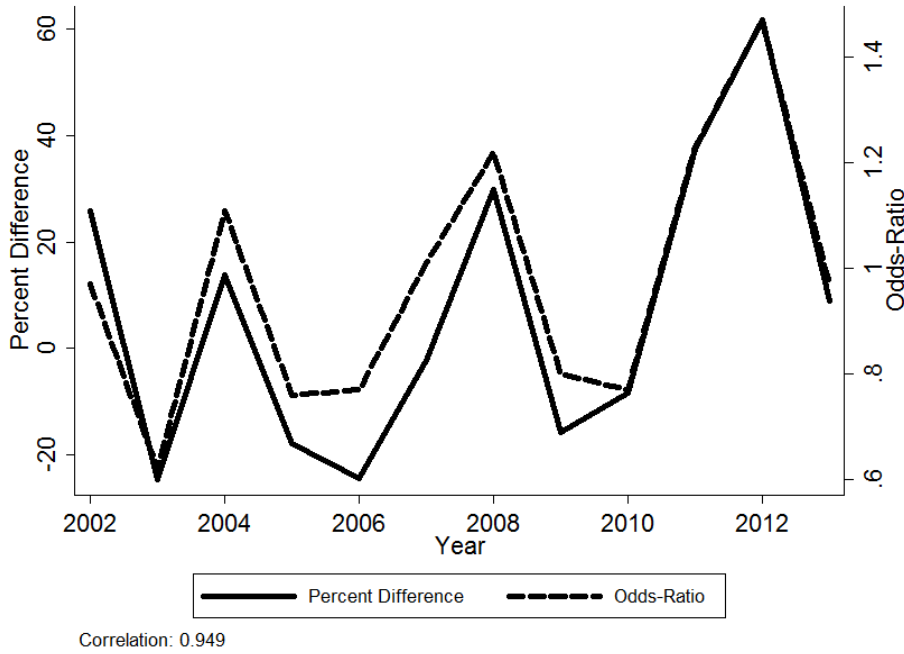


Figure A12. Racial Differences in the Likelihood of Search: Consent Searches Only

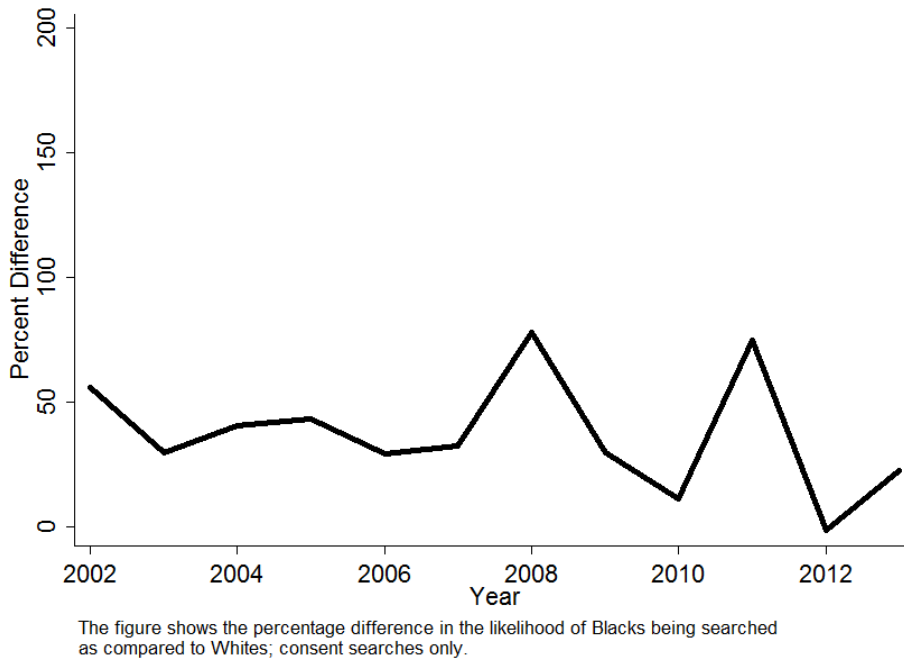


Table A6. Likelihood of Finding Contraband Given a Search, by Race

Contraband	Number	% Total	% White	% Black
Yes	2,448	28.52	247.25	30.66
No	6,136	71.48	72.75	69.34
Total	8,584	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	65,663	2.10	27.90	7.76	61.36	0.89	100.0
Black	No	30,647	2.71	35.35	6.59	54.57	0.77	100.0
Total	No	99,228	2.28	30.23	7.36	59.30	0.84	100.0
White	Yes	5,053	0.91	14.01	5.56	42.75	36.77	100.0
Black	Yes	3,389	1.06	19.03	4.72	44.94	30.24	100.0
Total	Yes	8,584	0.96	16.03	5.20	43.64	34.18	100.0