Quick Turkeys - Lucas Yuan, Jiren Li, Renzhi Hao
CS 396 Data Seminar
Checkpoint 1: Relational Analysis

For our project, we are investigating how neighborhood demographics play a part in what types of force police officers use, and in order to accomplish this we were looking at the Tactical Response Report (TRR) data. For example, is an officer more likely to use a weapon against people of different races? We were also looking into what types of officers commit TRRs the most. Furthermore, we also wanted to look into how TRRs and excessive force allegations tracked with one another.

For our first analysis, We felt the most crucial data for our project overall was which race is most commonly the subject of a TRR as compared to the racial composition of that area. We compare the predominant race of composition of every area that exists in data_racepopulation(which is 99 in total) as well as its predominant subject race of TRRs that happened inside of that area.
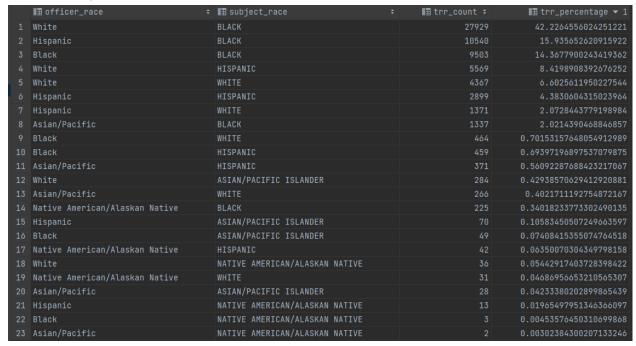
	area_name	trr_race_predominance	composition_race_predominance	trr_predominant_count	composition_predominant_count
1	10th	BLACK	Hispanic	13296	73441
2	11th	BLACK	Black	41430	59671
3	12th	BLACK	White	9450	51775
4	14th	HISPANIC	Hispanic	5562	54039
5	15th	BLACK	Black	24630	55468
6	16th	WHITE	White	4488	138045
7	17th	HISPANIC	Hispanic	3702	62232
8	18th	BLACK	White	11064	88418
9	19th	BLACK	White	7842	150551
10	1st	BLACK	White	8898	32952
11	20th	BLACK	White	3336	49420
12	22nd	BLACK	Black	8784	62094
13	24th	BLACK	White	8394	60488
14	25th	BLACK	Hispanic	10668	133005
15	2nd	BLACK	Black	10458	65993
16	3rd	BLACK	Black	19056	71010
17	4th	BLACK	Black	17682	76399
18	5th	BLACK	Black	17778	70064
19	6th	BLACK	Black	26454	88525
20	7th	BLACK	Black	26262	68787
21	8th	BLACK	Hispanic	12492	139854
22	9th	BLACK	Hispanic	12402	94610
23	Albany Park	HISPANIC	Hispanic	1340	25003
24	Archer Heights	HISPANIC	Hispanic	340	10126
25	Armour Square	BLACK	Asian	695	10347
26	Ashburn	BLACK	Black	1480	20817
27	Auburn Gresham	BLACK	Black	11780	44402
28	Austin	BLACK	Black	27465	81066
29	Avalon Park	BLACK	Black	1060	9553
30	Avondale	HISPANIC	Hispanic	1215	24563
31	Belmont Cragin	HISPANIC	Hispanic	3385	63377
32	Beverly	BLACK	White	330	11604
33	Bridgeport	HISPANIC	Asian	835	11726
34	Brighton Park	HISPANIC	Hispanic	1490	37620
35	Burnside	BLACK	Black	420	2601

#	Name				
36	Calumet Heights	BLACK	Black	1525	12835
37	Chatham	BLACK	Black	5845	30297
38	Chicago Lawn	BLACK	Hispanic	7065	26377
39	Clearing	WHITE	Hispanic	400	12361
40	Douglas	BLACK	Black	2170	14365
41	Dunning	WHITE	White	645	28340
42	East Garfield Park	BLACK	Black	11275	18862
43	East Side	HISPANIC	Hispanic	815	18992
44	Edgewater	BLACK	White	2010	29912
45	Edison Park	WHITE	White	165	9926
46	Englewood	BLACK	Black	9130	24810
47	Forest Glen	WHITE	White	165	13242
48	Fuller Park	BLACK	Black	2195	2268
49	Gage Park	HISPANIC	Hispanic	1225	38009
50	Garfield Ridge	WHITE	White	685	16852
51	Grand Boulevard	BLACK	Black	3040	20624
52	Greater Grand Crossing	BLACK	Black	8830	31077
53	Hegewisch	HISPANIC	Hispanic	140	4243
54	Hermosa	HISPANIC	Hispanic	1240	22491
55	Humboldt Park	BLACK	Hispanic	10810	28612
56	Hyde Park	BLACK	White	640	12584
57	Irving Park	HISPANIC	Hispanic	1115	26359
58	Jefferson Park	WHITE	White	905	17761
59	Kenwood	BLACK	Black	855	11916
60	Lake View	BLACK	White	3165	78186
61	Lincoln Park	BLACK	White	1235	53676
62	Lincoln Square	WHITE	White	610	26405
63	Logan Square	HISPANIC	Hispanic	2705	34677
64	Loop	BLACK	White	3095	20378
65	Lower West Side	HISPANIC	Hispanic	1735	27693
66	McKinley Park	HISPANIC	Hispanic	580	9612
67	Montclare	HISPANIC	Hispanic	205	8092
68	Morgan Park	BLACK	Black	2175	15125
69	Mount Greenwood	WHITE	White	330	16289
70	Near North Side	BLACK	White	8385	61334
71	Near South Side	BLACK	White	3030	10404
72	Near West Side	BLACK	White	7145	25876
73	New City	BLACK	Hispanic	6200	24990
74	North Center	BLACK	White	625	26322
75	North Lawndale	BLACK	Black	12325	31397
76	North Park	HISPANIC	White	280	9358
77	Norwood Park	WHITE	White	415	29164
78	Oakland	BLACK	Black	370	5946
79	O'Hare	WHITE	White	365	10130
80	Portage Park	HISPANIC	White	1325	32643
81	Pullman	BLACK	Black	2565	5380
82	Riverdale	BLACK	Black	1245	6676
83	Rogers Park	BLACK	White	4535	22769
84	Roseland	BLACK	Black	8485	40846
85	South Chicago	BLACK	Black	5080	20818
86	South Deering	BLACK	Black	2135	9971
87	South Lawndale	HISPANIC	Hispanic	3750	62928
88	South Shore	BLACK	Black	9450	45990
89	Uptown	BLACK	White	3425	30371
90	Washington Heights	BLACK	Black	3080	25968
91	Washington Park	BLACK	Black	2935	11595
92	West Elsdon	HISPANIC	Hispanic	525	15385
93	West Englewood	BLACK	Black	11735	29955
94	West Garfield Park	BLACK	Black	10100	16954
95	West Lawn	HISPANIC	Hispanic	665	26395
96	West Pullman	BLACK	Black	4805	26123
97	West Ridge	BLACK	White	1640	31978
98	West Town	BLACK	White	2790	49892
99	Woodlawn	BLACK	Black	5890	22555

As shown in the table, most of the TRRs have the predominant race of "Black" while most of the predominant race of the related areas vary from "Black, White and Hispanic" with few "Asian". For TRRs has "Black", there is not a race of areas that has a critical amount ahead between "Black, White and Hispanic" related to them. For TRRs has "Hispanic", the areas are with high possibility to have "Hispanic" as the predominant race. For TRR has "White", the areas are most likely also have "White" as the predominant race. There is no TRR that has "Asian" as

the predominant race. In all, the Hispanic and White people gathered areas are usually to have the most TRR of the same predominant race while the likelihood of Black people as the subject of TRRs doesn't relate to the predominant race of areas.

For our second analysis, we felt it was important to understand how TRRs broke down at the intersection between the racial demographics of officers and the racial demographics of the subjects of the TRRs. Therefore, we analyzed the percentage of TRRs looking at both officer race and subject race.

	officer_race	subject_race	trr_count	trr_percentage ▾ 1
1	White	BLACK	27929	42.2264556024251221
2	Hispanic	BLACK	10540	15.935652620915922
3	Black	BLACK	9503	14.3677900243419362
4	White	HISPANIC	5569	8.4198908392676252
5	White	WHITE	4367	6.6025611950227544
6	Hispanic	HISPANIC	2899	4.3830604315023964
7	Hispanic	WHITE	1371	2.0728443779198984
8	Asian/Pacific	BLACK	1337	2.0214390468846857
9	Black	WHITE	464	0.70153157648054912989
10	Black	HISPANIC	459	0.69397196897537079875
11	Asian/Pacific	HISPANIC	371	0.56092287688423217067
12	White	ASIAN/PACIFIC ISLANDER	284	0.42938570629412920881
13	Asian/Pacific	WHITE	266	0.4021711192754872167
14	Native American/Alaskan Native	BLACK	225	0.34018233773302490135
15	Hispanic	ASIAN/PACIFIC ISLANDER	70	0.10583450507249663597
16	Black	ASIAN/PACIFIC ISLANDER	49	0.07408415355074764518
17	Native American/Alaskan Native	HISPANIC	42	0.06350070304349798158
18	White	NATIVE AMERICAN/ALASKAN NATIVE	36	0.05442917403728398422
19	Native American/Alaskan Native	WHITE	31	0.04686956653210565307
20	Asian/Pacific	ASIAN/PACIFIC ISLANDER	28	0.04233380202899865439
21	Hispanic	NATIVE AMERICAN/ALASKAN NATIVE	13	0.01965497951346366097
22	Black	NATIVE AMERICAN/ALASKAN NATIVE	3	0.00453576450310699868
23	Asian/Pacific	NATIVE AMERICAN/ALASKAN NATIVE	2	0.00302384300207133246

As we can see from this graph white officers against black subjects are the most likely to have a TRR with the next 2 also being hispanic officers against black subjects and black officers against black subjects. However, this seems to be the most likely no matter what since black subjects make up the vast majority of TRRs. Many of these intersections do not account for very many TRRs and thus any results using these can likely be discounted since there are so few.

For our third analysis we were interested in what types of force officers were likely to use against people of different races, and thus we got the percentage of TRRs involving an officer firearm or taser depending on race.

	subject_race	total_count	firearm_count	firearm_percent
1	ASIAN/PACIFIC ISLANDER	431	12	2.7842227378190255
2	BLACK	49747	1134	2.2795344442880978
3	HISPANIC	9369	225	2.4015369836695485
4	NATIVE AMERICAN/ALASKAN NATIVE	54	0	0
5	WHITE	6540	93	1.4220183486238532

As we can see in this table, the rate of officer firearm usage is pretty low, but there is a noticeable difference between the rate firearms are used against people of color (Asians/Pacific Islander, Black, Hispanic) as opposed to white people. There is about a 60% increase in how

often a police firearm is used against a black person than a white person. By percentage it seems as if Asians/Pacific Islanders have the highest percentage that a firearm is used against them. However, the sample size is quite low as there were only 431 total TRRs with them as the subject, so we were not sure if this was a verifiable phenomenon or simply a small sample size skewing our results. However, it is also possible that this amount of trrs for Asians/Pacific Islanders could be a result from the increase in hate crimes against Asian Americans due to the pandemic. Also, for Native American/Alaskan Native the total TRRs was 54 so I wasn't sure what data we could glean from that.

subject_race	total_count	taser_count	taser_percent
1 BLACK	49747	3513	7.0617323657708002
2 ASIAN/PACIFIC ISLANDER	431	31	7.1925754060324826
3 WHITE	6540	395	6.0397553516819572
4 NATIVE AMERICAN/ALASKAN NATIVE	54	1	1.8518518518518519
5 HISPANIC	9369	617	6.5855480841071619

As we can see in the second table, once again, people of color are more likely to have a taser used against them, although this time the difference is smaller. Once again, in this analysis we see that people of color are more likely to have a taser used against them. However, in this case the number is relatively close between whites, and other people of color with only a 16% increase in how often a taser is used against a white person then a black person. Once again, the Asian/Pacific Islander has the highest percentage for a taser being used against them but with 431 TRRs sample size might just be low. Same deal with Native American/Alaskan Natives as their sample size was once again 54 TRRs.

For our fourth analysis we wanted to take a look at how many TRRs there are in comparison to the number of excessive force allegations in order to try and get some more information on how often excessive force is used.

The number of excessive force allegations:

number_of_force_allegation
1   31920

The number of trrs:

number_of_trr
1   67019

The number of trrs/The number of excessive force allegations=2.1, which means one complaint is made for every 2.1 trrs. In fact, considering that some police officers may conceal their use of excessive force, the real number of TRRs may be larger than 67,019. However, according to the survey results of Invisible Institute, many subjects do not decide to make a

complaint even if they are treated with excessive force. Therefore, the real ratio is probably smaller than 2, which means more than a half of used force is inappropriate and excessive.

Lastly, we wanted to look at which demographics of officers proportionally have the most TRRs, and for this we looked at race, gender, and officer rank in order to find which types of officers have more TRRs than their population would indicate.

There are two results in each classification rule of police officers. The first result shows the numbers and proportions of trrs raised by different kinds of police officers. The second result shows the numbers and proportions of different kinds of officers.
The analysis needs to be based on both results because even if some kinds of officers raise more trrs than others, it does not mean they are more aggressive. It is probable that there are more of these kinds of officers than others.

Race classification:

	race	number_of_trr	proportion
1	White	38731	0.5779
2	Native American/Alaskan Native	310	0.0046
3	Black	10599	0.1581
4	Asian/Pacific	2028	0.0303
5	Hispanic	15064	0.2248

	race	number_of_officer	proportion
1	White	21297	0.5992
2	Unknown	292	0.0082
3	Native American/Alaskan Native	71	0.002
4	Black	8055	0.2266
5	Asian/Pacific	614	0.0173
6	Hispanic	5216	0.1467

White police officers have a similar proportion in all officers compared with the trrs raised by them. Asain/Pacific, Native American/Alaskan Native and Hispanic police officers raised a larger proportion of trrs than the proportions of their population. Black police officers seem to use less force than other officers.

Gender classification:

	gender	number_of_trr	proportion
1	M	59376	0.886
2	F	7356	0.1098

	gender	number_of_officer	proportion
1		23	0.0006
2	M	29150	0.8201
3	F	6372	0.1793

82% of police officers are male, and they account for 88.6% trrs, which indicates that male officers tend to use more force than female officers.

Rank classification:

	rank	number_of_trr	proportion
1	Police Officer	41353	0.617
2	Sergeant of Police	12328	0.1839
3	Police Officer as Detective	7383	0.1102
4	Police Officer / Field Training Officer	1754	0.0262
5	Lieutenant of Police	1656	0.0247
6	Police Officer Assigned Evidence Technician	415	0.0062
7	Police Officer Assigned Canine Handler	282	0.0042
8	Police Officer / Explosives Detective Canine Handler	237	0.0035
9	Evidence Tech	209	0.0031
10	Commander	194	0.0029
11	Captain of Police	187	0.0028
12	Police Officer / Marine Officer	132	0.002
13	Police Officer Assigned Traffic Specialist	120	0.0018
14	Police Officer / Mounted Patrol Officer	114	0.0017
15	Police Officer Assigned Security Specialist	95	0.0014

	rank	number_of_officer	proportion
1	Police Officer	23504	0.6612
2	Sergeant of Police	3820	0.1075
3	Police Officer as Detective	3223	0.0907
4		1141	0.0321
5	Lieutenant of Police	1038	0.0292
6	Police Officer / Field Training Officer	404	0.0114
7	Captain of Police	363	0.0102
8	Police Officer / Mounted Patrol Officer	288	0.0081
9	Police Officer Assigned Evidence Technician	255	0.0072
10	Police Officer Assign Youth Off	194	0.0055
11	Commander	148	0.0042
12	Unknown	95	0.0027
13	Police Forensic Investigator I	91	0.0026
14	Police Officer Assigned Traffic Specialist	82	0.0023
15	Police Agent	74	0.0021
16	Gang Crimes	66	0.0019
17	Deputy Chief	64	0.0018

Because there are more than 100 ranks in CPDP and data of ranks consisting of few officers does not have much statistical significance, we only choose 15 officer ranks with greatest numbers of trrs and population to analyze.

Police officers of most ranks raised a similar or smaller number of trrs compared with their population. However, the proportion of trrs raised by sergeants of police is nearly twice of the proportion of their population. It is possible that police officers with higher rank than sergeants seldom do field work, so maybe senior officers tend to use more force than junior officers.