

## **Summary Report**

**Hypothesis:** Our main hypothesis is that a disproportionate number of complaints against police are written by people of certain ethnicities (and hence that there exists racial bias in the treatment of different ethnicities by police officers). We look at this from a perspective of racial bias in certain residential districts and tendency to be subjected to specific kinds of abuse.

**Analysis:** Using the code that we wrote, we found that our hypothesis is mostly validated and that certain races had filed a larger number of police incident reports. For instance, complaints were concentrated amongst Hispanic and African-American victims. From our homophily calculations (seen further below), however, we found that while there was a significant tendency for racial concentration in complaints, such a concentration did not exist in kinds of complaints, likely implying that while there may be an increased possibility to be subjected to inappropriate police behavior while being of a certain race, race does not factor into what category of inappropriate behaviour one might be subjected to. Ultimately, from our data it can be said that Philadelphia-area police tend to have racial biases.

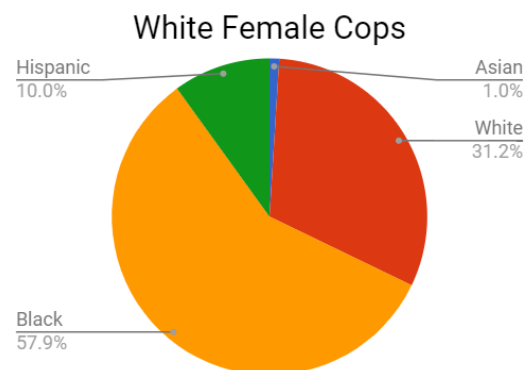
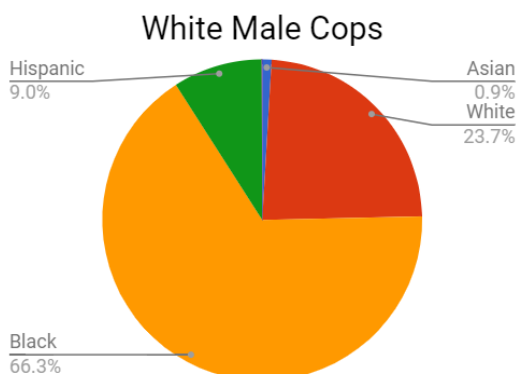
The analysis of homophily is as follows. Each node represents a person who submitted a complaint, and the types of nodes are separated based on either 1) the person's ethnicity or 2) the person's district. We are testing both racial and district bias, so we'll first define the type of a node as the person's ethnicity, and then afterwards we will re-define the type of node as the person's district. Edges exist between two people who made the same type of complaint. If the police received a disproportionate number of complaints from a certain district or race, we can

conclude that the police are racially biased (this is an assumption, but it's a necessary one to make for our project).

To calculate homophily with 5 different variables, where  $p, q, m, n, o$  are the proportions of races, we know that  $p + q + m + n + o = 1$ . When expanded (squared) to find the  $E[X]$  of edges across races, we get a 24-term formula which, when simplified, says the number of cross edges should be  $(1 - p^2 - q^2 - m^2 - n^2 - o^2)$ . The actual code simplifies this process and says  $E[X]$  for cross edges *should* be roughly 0.495; our code prints this value out. Our code also finds the *actual* ratios given the data. With regard to districts as the connecting factor in our graph, the actual ratio was 0.379, which indicates a significant (23.4%) difference from the expected proportion of cross edges. Thus, we can conclude that there exist districts where police are racially biased within the given district. With regard to categories of abuse, our program calculates that the actual ratio was 0.489, which is basically what the  $E[X]$  of cross edges is. Thus, we conclude that while the police are racially biased against victims, they are not biased in terms of their tendency to commit specific categories of abuse to a given race.

### Graphs:

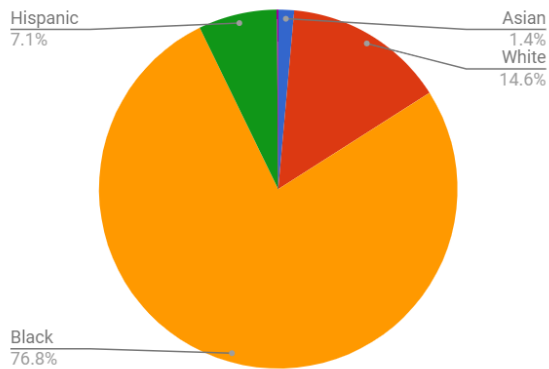
\*The title of the graph is the ethnicity of the police officer, while the shading in the pie charts represents the ethnicity of the person filing the complaint.



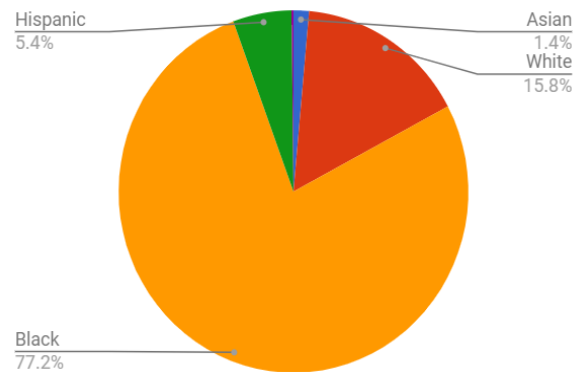
# NETS 150 Homework 5

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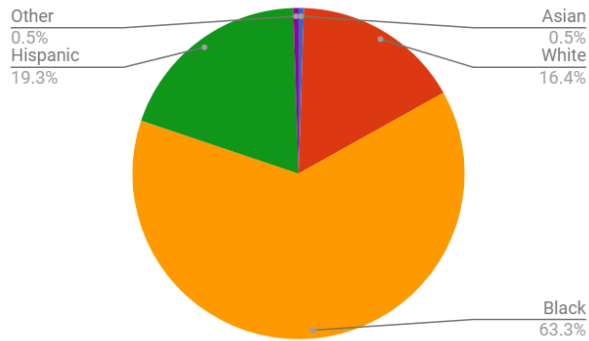
### Black Male Cops



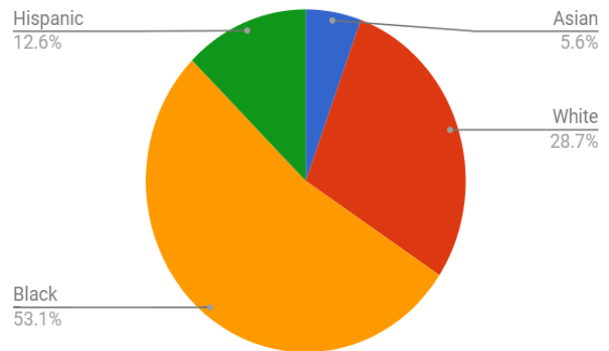
### Black Female Cops



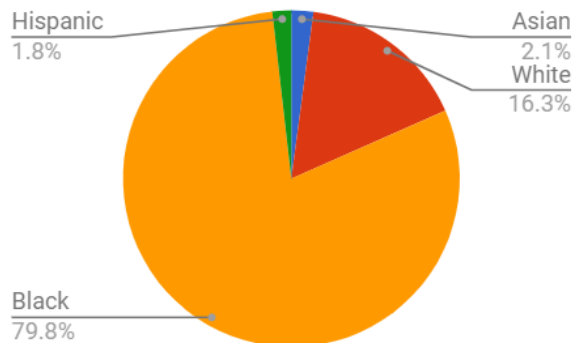
### Hispanic Male Cops



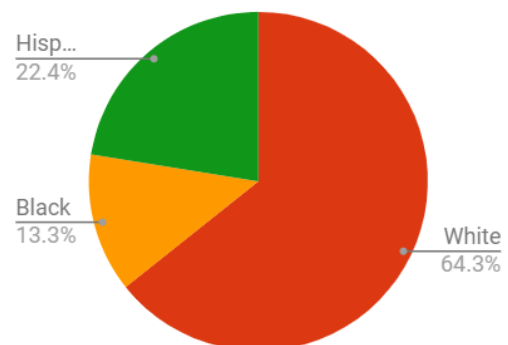
### Hispanic Female Cops



### Asian Male Cops



### Asian Female Cops



**Graph Analysis:**

As can be seen in the screenshots on the previous pages, police officers of most races and genders tend to be biased towards African American individuals within the population. However, even when factoring in the absolute number of these incidents and hence looking solely at proportions of who cops tend to abuse, we notice that Black police officers (either male or female) tend to be the most biased towards people of their race. An intuitive explanation of why this might be is that they tend to be hard on people within their community as they feel the need to set the right example. This also explains why the Hispanic male and female cops tend to be the most biased towards Hispanics within their community. However, we see no such interpretation amongst White or Asian police officers. In fact, Asian male police officers are the hardest on African Americans and tend to have fewer complaints filed by White individuals indicating the kind of bias in treatment of the population we set out to analyze.

Finally, Asian female police officers received very few complaints from Black individuals within the community and had several more complaints (64.3%) of their complaints come from White individuals. However, this might just be an anomaly due to the low sample size of Asian police officers as indicated by the small absolute number of complaints filed against them. Overall, between 53.1% and 79.8% of all complaints filed against police officers of different ethnicities tended to be from African Americans - a disproportionate amount given the population breakdown in society.