

Checkpoint 1: Quantitative analysis

Our group analyzed the following 6 questions. Each question may have subsections. We have listed the corresponding SQL script found in src/ as well as a brief analysis of the result. At the end of this document are figures containing charts related to the given SQL queries.

1. What proportion of officers get promoted each year?

Script: script1.sql

We ask this question to establish a baseline to understand how to think about promotions within the Chicago Police Department (CPD). After determining a baseline, we will move on to breaking down promotions by number of allegations in (3) and sustained allegations in (5). We find that the numbers vary year by year, but range from between 0.13% in 2011 to up to over 2% in 2016. 2017 saw over 12% promoted, but this number seems anomalous.

2. What proportion of officers get awards each year?

Script: script2.sql

We again ask the proportion for all officers by year to establish a baseline within CPD. We will break down this information later by the number of allegations in (4) and the number of sustained allegations in (6).

It appears that in most years, awards are extremely common. After 2003, awards ranged in frequency from over 38% in 2004 to over 99% in 2009. This suggests that in some years the police department believes nearly every officer should be rewarded for their performance. Most common awards vary by year. For example, in 2009, the “2009 Crime Reduction Award” was given out most frequently. Further analysis may lend additional insights into the nature of these awards.

3. What proportion of officers with 0, 1+, 2+, 3+, etc. allegations get promoted each year?

We next ask how receiving an allegation affects that officer’s likelihood of being promoted that year. Intuitively, an increase in the number of allegations should correlate with a decrease in the likelihood of being promoted, but there are likely other factors in play. It is important to keep in mind that some of these allegations were not sustained, indicating that the police department did not punish the officer for the allegation. However, we did not study the internal police investigatory process, so we cannot comment on the fairness and reliability of the final finding.

Promotion rates for officers with zero allegations are lower than promotion rates for those with more than one, generally speaking. However, there are exceptions in some years. In 2007, 2008, and 2012. Because the numbers of promotions in some years are small overall, there are higher chances for anomalous data. In 2017, one officer with four or more allegations was promoted. In most years, officers with 1 or more allegations were a bit less likely to be

promoted than officers with none. In some years officers with one allegation were actually more likely to be promoted, notably in 2013 and 2014. Having 2 or more allegations against an officer appears to be much more detrimental than 1 or more in most years. This effect is even more pronounced for officers with 3 or more or 4 or more allegations.

This question is broken down into five sub-problems varying by the number of allegations an officer has received in that year (0 allegations, 1+, 2+, 3+, 4+). There are five SQL scripts corresponding to each of these sub-problems named **script3a**, **script3b**, **script3c**, **script3d**, and **script3e**.

4. What proportion of officers with 0, 1+, 2+, 3+, etc. allegations get awards each year?

We have noted 45 different types of awards, each varying in degree of importance and number given out in a given year. Some awards are linked to individual performance, while others appear to be given out to many officers as a group. For example, the 2009 Crime Reduction Award was given to 13,375 officers. Additionally, some awards appear to have been given more than once to officers in a given year, for example Honorable Mention in 2009, which was given over 43,000 times. These factors complicate our analysis, meaning that some officers with allegations will still be awarded with his or her peers.

The distribution of awards appears to be highly problematic. The probability of an officer receiving an award seems to be directly correlated with the number of complaints received that year. For example, in 2006, 62% of officers with no complaints that year received an award. But for officers with 1 or more, 2 or more, 3 or more, or 4 or more complaints, they were awarded at increasingly frequent rates: 84%, 90%, 94%, and 96% respectively. On its face, this trend seems to actually incentivize complaints. It should be noted that there are many potentially confounding factors such as hours worked and the unit an officer was a member of, but the trend invites further research.

This question is broken down into five sub-problems varying by the number of allegations an officer has received in that year (0 allegations, 1+, 2+, 3+, 4+). There are five SQL scripts corresponding to each of these sub-problems named **script4a**, **script4b**, **script4c**, **script4d**, and **script4e**.

5. What proportion of officers with 1 or more allegations and 0, 1+, 2+ sustained allegations get promoted each year?

This analysis takes a closer look at allegations and promotions in (3). We predicted that sustained allegations would be more detrimental to an officer's likelihood of being promoted, and it appears this trend holds in some years. Interestingly, however, in 2005, 2006, 2010, 2011, 2012, officers with one or more allegations were actually more likely to be promoted than both officers who had one or more unsustained allegations and those with no allegations at all! In other words, the category of officers most likely to be promoted in these years was officers with one or more sustained allegations against them. Officers with two or more sustained allegations in a given year are far more rare than officers with one or more sustained allegations. In most years, none of them are promoted. However, we did find three instances of

officers with two or more allegations in a year being promoted in that same year: two officers in 2006 and one in 2017.

This question is broken down into three sub-problems varying by the number of allegations an officer has received in that year (0 allegations, 1+, 2+). There are three SQL scripts corresponding to each of these sub-problems named **script5a**, **script5b**, **script5c**.

6. What proportion of officers with 1 or more allegations and 0, 1+, 2+ sustained allegations get awards each year?

Finally, we looked a bit more closely at the analysis from (4), how the number of allegations affect an officer's likelihood of being awarded that year. In our initial analysis, we found that the more allegations an officer had in a given year, the more likely they were to be awarded that year. By breaking down the information to include only sustained complaints, we still find that officers with one or more sustained allegations are more likely to be awarded than those with no sustained allegations. Officers with one or more allegations but no sustained allegations were the most likely to be awarded, but officers with one sustained allegation were still more likely to be awarded than officers with no sustained allegations that year. Because we have removed all officers' first years with the CPD, this relationship cannot be explained by the date an officer joined the force. Instead, it may be possible that this can be explained by a third factor such as the type of work an officer was doing: perhaps an officer with more public interaction is both more likely to be complained about and awarded for a task during a shift.

This question is broken down into five sub-problems varying by the number of allegations an officer has received in that year (0 allegations, 1+, 2+, 3+, 4+). There are five SQL scripts corresponding to each of these sub-problems named **script6a**, **script6b**, **script4c**, **script4d**, and **script4e**.

Further Research

We believe that our analysis can be improved by taking additional variables into account. We would like to analyze the characteristics of an officer to try to eliminate some likely confounding variables such as hours worked and type of officer. We can do this by identifying and following "doppelgangers" during their careers with similar characteristics.

We would also like to specifically analyze an officer's last 12 months before receiving a promotion or an award to get a more accurate picture of the work an officer was doing in the time leading up to the positive feedback he or she received from the department. Currently, we are looking strictly at calendar years, so it is possible that multiple allegations may have occurred in a 12-month period which our analysis would detect as multiple calendar years.

Finally, we would like to take a closer look at the types of awards officers are receiving. It appears that since many of the awards are of a very common type (e.g. the 2009 Crime Reduction Award given to over 13,000 officers), officers with many allegations will tend to receive this award simply by being a member of the force. In future analysis, we would like to remove this award and focus specifically on instances where an officer was given individualized praise.

FIGURE 1

Percent of officers promoted by year

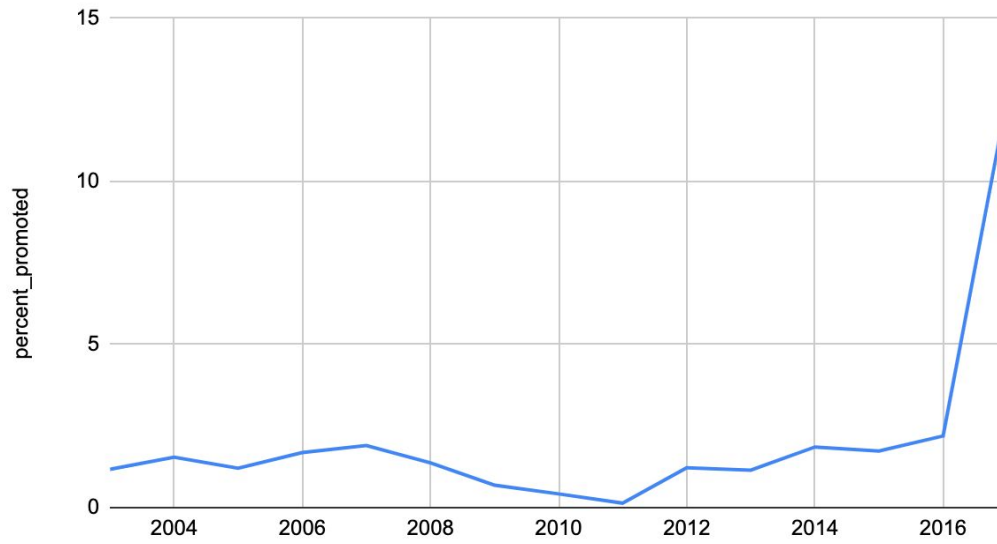


FIGURE 2

Percent of officers promoted by year

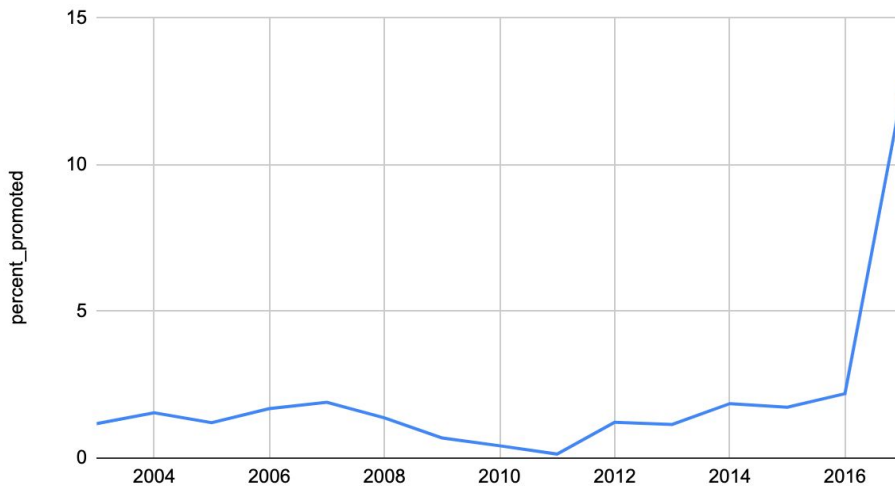


FIGURE 3

Percent of officers promoted by number of allegations by year

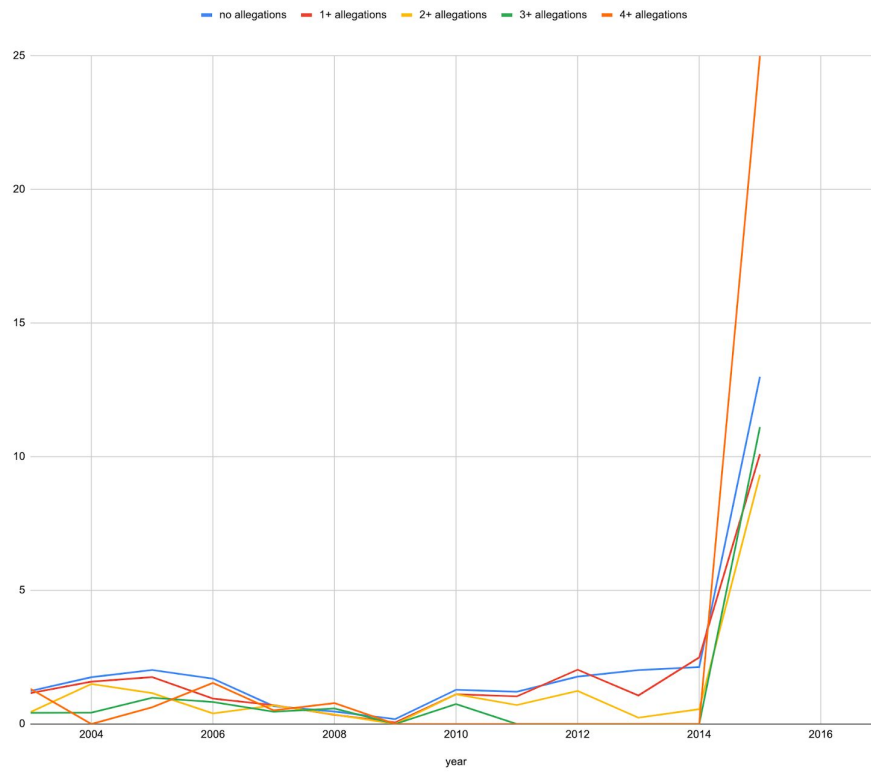


FIGURE 4

Percent of officers receiving awards by number of allegations per year

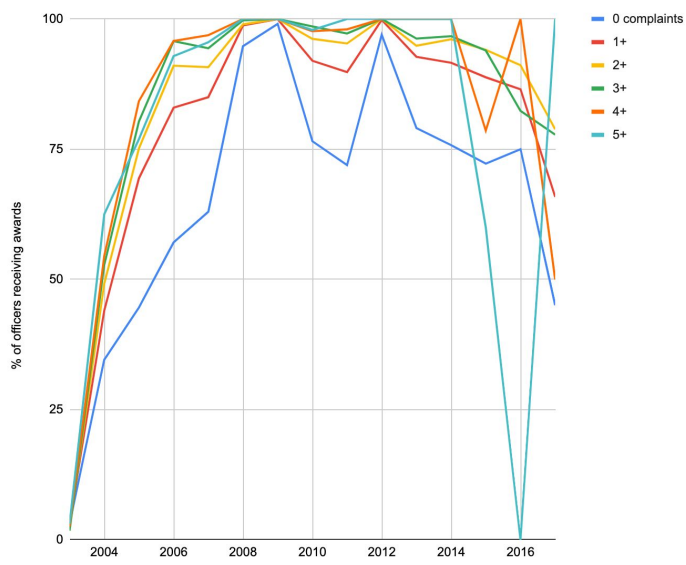


FIGURE 5

Percent of officers promoted by number of sustained allegations by year

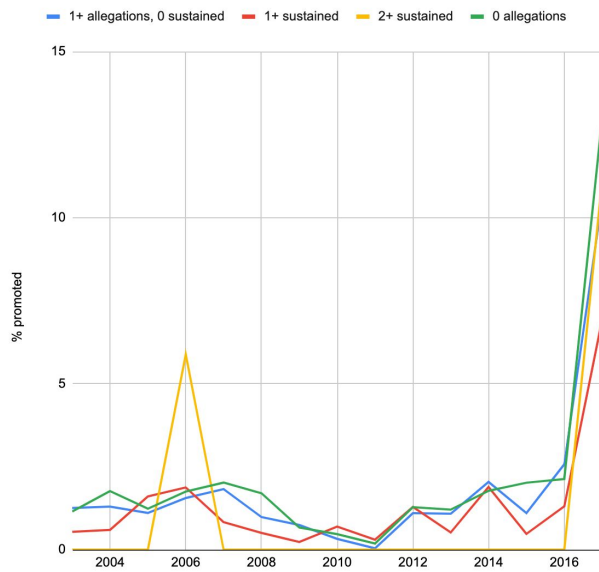


FIGURE 6

Percent of officers receiving awards by number of allegations sustained by year

