

# Police Frisks<sup>†</sup>

By DAVID S. ABRAMS, HANMING FANG, AND PRIYANKA GOONETILLEKE\*

Police “stop-and-frisks” of pedestrians and motorists have become an increasingly controversial tactic, given low average rates of contraband discovery, incidents of abuse, and evidence of racial disparity. Study of the tactic by economists has been much influenced by Knowles, Persico, and Todd (2001; hereafter, KPT) who first suggested the use of a “hit rate” (contraband discovery rate per frisk) test to distinguish racial prejudice from statistical discrimination in highway searches by police officers. Models used by KPT and almost all subsequent literature (e.g., Anwar and Fang 2006) on the subject imply diminishing marginal returns to frisks. That is, if frisks decrease substantially, the rate of contraband discovery should rise, *ceteris paribus*.

This is the first paper to test this assumption empirically using arguably exogenous variations in frisk rates (cf. Feigenberg and Miller 2022).<sup>1</sup> We study the period around the nationwide protests that followed the killing of George Floyd on May 25, 2020, after which police frisks dropped tremendously and rapidly. Using extremely granular data from Chicago, we find that hit rates increased as police frisks plunged, in line with the predictions of KPT. We present evidence that suggests the impact was not due to changes in police effort, the composition of individuals on the street, police deployment, or crime rates. In addition to testing policing models, these results should help guide policy decisions about policing by providing an estimate of the elasticity of contraband yield with respect to frisks. Understanding the efficacy of police

frisks to changes in frisk rates is necessary to evaluate their utility.

## I. Data

Our main dataset comes from the Chicago Police Department and contains suspect-stop-level data including all pedestrian police stops within the city from January 1, 2016 to December 31, 2020, comprising 347,694 incidents.<sup>2</sup>

Figure 1 displays the number of police frisks (black) and the firearm discovery rate of these frisks (grey) in 2020 for Chicago. The first vertical line indicates the start of the week in which the Chicago Police Department appears to have changed their policy for nonviolent incidents due to the onset of the pandemic, while the second vertical line marks the start of the decline in police frisks following the protests in response to the George Floyd killing. The drop in frisks was large (49 percent) and long-lasting after the pandemic onset, only returning to similar levels just before the George Floyd killing. Frisks then again dropped sharply, this time by 39 percent. As frisks plunge, the hit rate (i.e., the firearm finding rate) rose sharply in June 2020. Given the plethora of confounding factors surrounding the pandemic onset, the changes around the protests are the focus of this paper.<sup>3</sup>

## I. Main Results

Our first analysis is straightforward. We estimate the impact of a large change in police frisks on the share of frisks that result in contraband discovery. If officers maximize the total expected contraband findings in deciding whom to frisk, then a large exogenous decline in the

\*Abrams: Law School and Wharton School, University of Pennsylvania (email: [dabrams@upenn.edu](mailto:dabrams@upenn.edu)); Fang: Department of Economics, University of Pennsylvania (email: [hanming.fang@econ.upenn.edu](mailto:hanming.fang@econ.upenn.edu)); Goonetilleke: Department of Economics, University of Pennsylvania (email: [goonep@sas.upenn.edu](mailto:goonep@sas.upenn.edu)).

<sup>†</sup>Go to <https://doi.org/10.1257/pandp.20221100> to visit the article page for additional materials and author disclosure statement(s).

<sup>1</sup>Abrams, Fang, and Goonetilleke (2022) contains a more extensive analysis of a similar topic.

<sup>2</sup>The dataset includes information on timing, location, ID of the police officer conducting the stop, demographic information on the individual stopped, whether a frisk, search or arrest occurred and whether any contraband was discovered.

<sup>3</sup>See Section IIA for further discussion.

AQ1

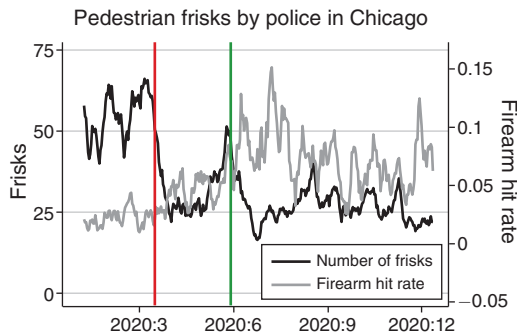


FIGURE 1

*Notes:* This figure shows the number of frisks of pedestrians (black) and the associated firearm hit rate (grey) in Chicago. The red vertical line indicates the onset of the pandemic while the green indicates the fall in frisks in response to the George Floyd protests.

AQ2

*Source:* Chicago Police Department

number of frisks should substantially increase the hit rate, *ceteris paribus*. To test this, we run a difference-in-difference analysis, comparing the change in hit rate around the June 2020 protests to the same period in prior years:

$$(1) C_i = \alpha + \beta_1 \text{after}_i \times \text{treat}_i + \beta_2 \text{after}_i \\ + \sum_{k=2016}^{2020} (\theta_k \times y_{ik}) + \sum_{j=1}^J (\delta_j \times s_{ij}) \\ + t_i + \epsilon_i,$$

where  $i$  indexes individual stops (multiple individuals may be detained in a single stop, and individuals may be stopped multiple times),  $C_i$  is an indicator that takes value 1 if some contraband is discovered,  $\text{after}_i$  is 1 if the frisk occurred after May 28 regardless of year, while  $\text{treat}_i$  is 1 if the frisk occurred in 2020.<sup>4</sup>  $y_{ik}$  is a year dummy and  $s_{ij}$  is a dummy for the police sector where the frisk occurred.  $t_i$  is a linear time trend.<sup>5</sup>

Columns 1–2 of Table 1 report the results from estimating equation (1) for pedestrian frisks. As the legal purpose of frisks is the detection

<sup>4</sup>This is the date in 2020 after which there is a rapid decline in police frisks.

<sup>5</sup>We do not include demographics of the suspect in our regressions as these are characteristics that police engaging in optimizing behavior would be expected to use to determine who to frisk.

of weapons, and firearms are the most common form of weapons found as contraband, this is our primary outcome. Since the bulk of contraband does not include weapons (drugs are the most common type), we also examine overall contraband hit rate as well. The estimated coefficients of  $\beta_1$  point in the expected direction—the vast decline in frisks corresponds to an increased hit rate. The magnitude is large, relative to the low mean hit rates. For example, the 2.6 percentage point increase post protests in gun hit rate is equivalent to 44.5 percent of the mean in the prior period of 2020 (5.8 percent). The main result is straightforward, as shown in Figure 1 and Table 1; the challenge that we address in the rest of the paper is to rule out alternative explanations for these findings.

#### A. Testing for Changes in Suspect Population

A greater number of people on the streets increases potential suspects, so if observable characteristics are informative, officers should have a larger pool of higher likelihood suspects and thus a greater hit rate. Figure 2 displays two indices from Google Community Mobility Reports as a measure of how many individuals were on the street.<sup>6</sup> Retail and recreation are reported in the solid blue line and transit in the red dashed line. These provide a measure of foot traffic, with a sharp, deep drop around the pandemic onset and then a slow rise beginning in April 2020.

This evidence reinforces that any attempt to draw inference about the decline in police frisks from the pandemic period would be impeded by this substantial simultaneous change. That concern does not apply to the period around the protests when there was a smooth but relatively modest increase in mobility measures. While there were certainly localized changes in the number of potential detainees as protests or looting occurred, overall mobility patterns changed smoothly. We further explore local variation around the time of the protests below.

<sup>6</sup>This data is generated from the mobile devices of individuals who have turned on Location History for their Google account. The daily data is aggregated to the county level and reported relative to a baseline period, adjusted for day of week.

TABLE 1—PEDESTRIAN FRISK HIT RATE

	All stops		Active officers	
	All contraband (1)	Guns only (2)	All contraband (3)	Guns only (4)
After $\times$ Treat	0.034 (0.018)	0.026 (0.012)	0.038 (0.031)	0.017 (0.02)
After	-0.003 (0.008)	-0.005 (0.004)	-0.025 (0.03)	-0.034 (0.016)
Observations	18,876	18,876	2,544	2,544
Adjusted $R^2$	0.011	0.015	0.027	0.010
Mean Y	0.107	0.027	0.136	0.045

*Notes:* This table reports the change in hit rate of pedestrian frisks using the difference-in-difference specification in equation (1). In columns 1 and 2, all pedestrian frisks during the relevant period are included. In columns 3 and 4, the data is restricted to frisks by officers who conducted at least one frisk in the three weeks before the George Floyd protests began. Hit rate is measured as the probability of finding either (1) any contraband (drugs or weapons) or (2) specifically firearms following a search/frisk. Data from 2016–2020 are used. Observations range from three weeks before the George Floyd protests to six weeks after. The same calendar dates are used for all years. “After” equals 1 beginning May 29 and 0 otherwise; “Treat” equals 1 for 2020 and 0 otherwise. All regressions include sector and year fixed effects as well as a time trend. Robust standard errors are clustered at the sector level.

*Source:* Chicago Police Department

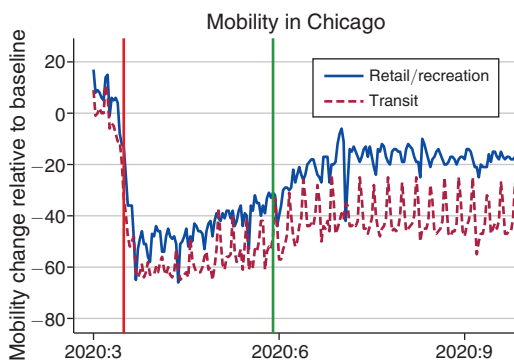


FIGURE 2

*Notes:* This figure shows the change in mobility in Chicago over 2020 relative to a baseline established Jan. 3–Feb. 6 2020. Mobility is reported for the Retail/recreation (blue solid line) and Transit (red dashed line) categories reported by the Google Community Mobility Reports. The red vertical line indicates the pandemic onset while the green indicates the fall in frisks in response to the George Floyd protests.

*Source:* Google (2020)

### B. Testing for Changes in Police Deployment

An important implication of the policing models is that as an officer decreases the number of frisks she makes, the hit rate on the marginal

frisk should increase. However, the decline in police frisks could result from a decline in the number of officers making frisks, a decline in frisks per officer, or both. These could have different theoretical implications. For example, if officers who are of lower ability in selecting suspects for frisks are the ones redeployed during the protests, the changing composition of officers conducting frisks could increase average hit rates across officers.

We can observe identifiers of officers making frisks. Thus, we are able to determine that there was a decline both on the intensive margin (frisks per officer) and the extensive margin (number of officers making frisks). While shifts in the extensive margin could have an ambiguous impact on hit rates, declines on the intensive margin should clearly increase hit rates, which is what we see during the protests. One way to isolate the impact of the change in the intensive margin is by focusing on a subset of active officers who conducted a frisk in the three weeks prior to the protests. Table 1 columns 3–4 report results from these regressions, which are similar to the main results.<sup>7</sup> Hit rates

<sup>7</sup>The results are robust when officer fixed effects are included in the regressions. This further differentiates our results from prior literature as we estimate the effects of within-officer variation specifically.

TABLE 2—CHANGE IN CRIME INCIDENTS

	log of daily incident reports			
	All of Chicago		Subset of Chicago	
	Shooting (1)	Gun crime (2)	Shooting (3)	Gun crime (4)
After × Treat	0.378 (0.147)	0.074 (0.081)	0.056 (0.162)	0.053 (0.081)
After	0.142 (0.086)	−0.051 (0.055)	0.22 (0.113)	−0.052 (0.059)
Observations	315	315	315	315
Adjusted $R^2$	0.213	0.144	0.159	0.176

*Notes:* This table shows the change in daily crime from the start of the protests using the difference-in-difference specification in equation (1) with crime reports as the dependent variable. For the shooting regressions, 0.5 is added to the daily number to account for days with zero incidents. “Gun crime” is an aggregation of crimes with UCR codes generally associated with firearms. Each column reports a separate regression. Data from 2016–2020. In columns 1 and 2, data for the entire city is used. In columns 3 and 4, data are used for the 8 police districts that had some of the lowest increases in shootings over this period (districts 3, 5, 6, 7, 8, 11, 15, and 22). Observations range from three weeks before the beginning of the George Floyd protests and six weeks after for each year. “After” equals 1 beginning May 29 and 0 otherwise; “Treat” equals 1 for 2020 and 0 otherwise. All regressions include year fixed effects. Robust standard errors are reported.

*Source:* Chicago Police Department

generally increase by a similar magnitude as in the main specifications. This is an essential result to be consistent with the policing models: as individual officers become more selective in frisks, their hit rates increase.

### C. Change in Crime

While we have examined potential changes in the size of the suspect population in Section IIA above, it is possible that there could be a change in criminal propensity. An increase in the share of potential criminals in the suspect population could drive an increase in hit rates. To investigate this, we estimate equation (1) using daily crime reports as the dependent variable (Table 2). This table includes two measures of crime related to gun carry: shootings, and a composite index of crimes generally involving firearms.<sup>8</sup>

In Chicago, there was an increase in most types of violent crime in the period after the protests. In particular, shootings increased by around 45 percent although gun-related crimes

rose by a more modest 7 percent. Given that an increase in shootings may correspond to an increase in the gun carrying rate, this change could drive the increased hit rates.

To investigate whether a change in gun carry rates drove the increase in hit rates, we estimate the change in hit rates for a subset of the city where shootings did not increase significantly. The eight police sectors chosen comprise an almost contiguous subset of the city representing roughly half of the police stops. The change in crime following the protests in this subset of Chicago can be seen in Table 2, columns 3–4. Here the changes in gun related crimes and shootings in particular were much smaller in magnitude (only ~5.5 percent for each) and statistically insignificant. Despite this, the increase in the hit rate for guns is larger than the city overall—a 48 percent increase relative to the pre-protest mean in this area (see column 2 of Table 3).

A related concern is that there was a lot of crime committed close to protests. This could allow for much higher hit rates for frisks conducted at protest sites. To test this, in columns 3–4 of Table 3 we exclude a period of two weeks after the first protest during which most of the protests occurred. We find similar results to the main specification confirming the results are not driven by high hit rates during the protest activities themselves.

<sup>8</sup>The crimes composing this index include Reckless Firearm Discharge and Battery–Aggravated: Handgun, etc. We additionally consider an index using Shotspotter gunshot detection data. We find a low correlation in our data between it and other measures of gun crime and so focus here on these other measures

TABLE 3—PEDESTRIAN FRISK HIT RATE ROBUSTNESS TESTS

	Subset of Chicago		Excluding first two weeks after protests began	
	All contraband (1)	Guns only (2)	All contraband (3)	Guns only (4)
After × Treat	0.064 (0.028)	0.039 (0.021)	0.043 (0.018)	0.028 (0.013)
After	-0.012 (0.012)	-0.006 (0.006)	-0.025 (0.011)	-0.0020 (0.006)
Observations	9,432	9,432	18,132	18,132
Adjusted $R^2$	0.016	0.026	0.015	0.016
Mean Y	0.120	0.034	0.110	0.028

*Notes:* This table reports the change in hit rate of pedestrian frisks using the specification in equation (1). In columns 1 and 2, the data is restricted to frisks occurring in districts 3, 5, 6, 7, 8, 11, 15, and 22. Columns 3 and 4 include frisks from all districts. Hit rate is measured as the probability of finding either (1) any contraband or (2) specifically firearms following a search/frisk. Data from 2016–2020 are used. In all specifications, observations start from three weeks before the start of the George Floyd protests on May 30. In columns 1 and 2, the six weeks after May 30 are used. In columns 3 and 4, the six weeks after June 11 are used with the days of protest in between excluded. The same calendar dates are used for all years. “After” equals 1 beginning on the calendar day of the first day of the relevant event and 0 otherwise; “Treat” equals 1 for 2020 and 0 otherwise. All regressions include sector and year fixed effects as well as a time trend. Robust standard errors are clustered at the sector level.

*Source:* Chicago Police Department

### III. Discussion

Perhaps the biggest outstanding concern is that gun carry rates may have increased sharply after the protests and this is responsible for the increased hit rates. In Section IIC, we presented results of additional tests we ran to attempt to rule out this possibility. In the absence of a direct measure of gun carry rates, one cannot fully rule out a sharp change, but all the evidence assembled indicates this is unlikely to be the sole reason for the abrupt growth in hit rates.

It is worth emphasizing the magnitude of the hit rate response to the large decline in frisks. In Chicago, a 39 percent decline in frisks corresponded to a 44.5 percent increase in the pedestrian firearm hit rate, an elasticity of  $-1.2$ . This translates to only a 0.30 percent increase in the number of guns recovered for a 1 percent increase in frisks. The change in hit rate with respect to frisks is directly related to the second derivative of the gun detection–frisks relationship. To make optimal policy decisions with respect to police frisks, one needs to know not only the hit rate, which is easy to compute, but information about the second derivative, which has not been previously explored.

AQ3

### IV. Conclusion

The role of race in policing is a topic that recurs with increasing force and urgency, and we attempt to add to our understanding of it. We take advantage of the drastic reductions in pedestrian frisks following the nationwide protests. We provide empirical corroboration of the salient predictions of economic models of police behavior: the contraband hit rate should rise when the number of frisks per officer falls, *ceteris paribus*.

Importantly, we rule out a number of alternative explanations. While an increase in the hit rate is implied by both the KPT and Anwar and Fang models, given the short time frame, we believe it is unlikely to be driven purely by a change in pedestrian behavior in response to the lower detection probability. Hence our results appear to favor the model of Anwar and Fang (2006).

Our findings have important implications for potential reforms to improve policing. First, policing is a very noisy process, where the vast majority of the frisks do not result in contraband findings. Second, despite the noisy policing process, the findings in our paper also suggest that police behavior is broadly consistent with models where they aim to at least partly maximize the contraband-finding rates, using the noisy and

imperfect signals they have at the time of making their decisions.

#### REFERENCES

- Abrams, David S., Hanming Fang, and Priyanka Goonetilleke.** 2021. "Do Cops Know Who to Stop? Assessing Optimizing Models of Police Behavior with a Natural Experiment." Unpublished.
- Anwar, Shamena, and Hanming Fang.** 2006. "An Alternative Test of Racial Prejudice in Motor Vehicle Searches: Theory and Evidence." *The American Economic Review* 96 (1): 127–51.
- City of Chicago.** 2020. "Crimes - 2001 to Present." Chicago Data Portal. <https://data.cityofchicago.org/Public-Safety/Crimes-2001-to-Present/ijzp-q8t2> (accessed January 4, 2021).
- Chicago Police Department.** 2020. "Chicago Shootings-2015-2020." <sup>AQ4</sup>
- Chicago Police Department.** 2021. "ISR Data". <https://home.chicagopolice.org/statistics-data/isr-data/> (accessed January 4, 2021).
- Feigenberg, Benjamin, and Conrad Miller.** 2022. "Would Eliminating Racial Disparities in Motor Vehicle Searches Have Efficiency Costs?" *Quarterly Journal of Economics* 137 (1): 49–113
- Google.** 2020. "COVID-19 Community Mobility Reports." <https://www.google.com/covid19/mobility/index.html?hl=en> (accessed November 11, 2021).
- Knowles, John, Nicola Persico, and Petra Todd.** 2001. "Racial Bias in Motor Vehicle Searches: Theory and Evidence." *Journal of Political Economy* 109 (1) 203–29.