COVID Information Commons (CIC) Research Lightning Talk

Transcript of a Presentation by Mikaela Meyer (Carnegie-Mellon University), May 5, 2022

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Transcript

Mikaela Meyer:

*Slide 1*

Great. Hi everyone, my name is Mikaela Meyer and I'm a Ph.D. student at Carnegie Mellon University in the Statistics and Public Policy program. And today I'm going to be presenting on work that I did with three now masters alumni from CMU as well as Dr. Amelia Haviland and Dr. Daniel Nagin on how crime rates changed during the COVID-19 pandemic and during 2020 as a whole.

*Slide 2*

So we hypothesized for our project that the events of 2020 were associated with changes in crime rates. So when we think about when the pandemic started and lockdowns began across the country, people's mobility was restricted. So people were sometimes not going to their workplaces, people weren't out and about as much socializing. And so we hypothesized that potentially this could have been associated with a change in crime rates. And similarly, then once these pandemic lockdowns lifted in places, perhaps that also then was associated with a potentially different association in crime rates. And not only was there the pandemic to contend with in 2020, but also coincidentally, as a lot of these pandemic lockdowns were being lifted, this was around the same time that George Floyd was murdered in Minneapolis at the hands of police. And so as a result of George Floyd's murder there were a number of protests that were held across the country and we were curious about whether or not these events could have also been associated with changes in crime rates.

*Slide 3*

In terms of what we're contributing to the literature, there have been a number of papers that were written about COVID-19, and the pandemic, and changes in crime rates. But besides Rosenfeld et al in

2021, which was using more time series methods and change point analyses, we're the first people to analyze crime trends following the killing of George Floyd. And so we look at 2020 as a whole, whereas a lot of studies were looking at the months just following the beginning of the lockdowns. We also analyzed trends from multiple crime types across multiple cities while most of the previous literature and articles were examining fewer crime types so maybe just one or two at a time, and also looking at, say, three or four cities. We also introduce an openness index that measures the restrictiveness of lockdowns in a given city. So we were using information from the counties themselves and we had various industries. We rated these industries as either being open, semi-open, or totally closed. And then using this openness index, we tried to see if there were changes in crime rates. I won't have time to talk about those analyses during my presentation today, just for the sake of being within the 10 minutes, but I'd be happy to talk about this more during the question and answer session.

*Slide 4*

So for our study, we were looking at crime data from 28 of the 70 largest U.S. cities. These 28 cities were the cities that made daily or weekly level data publicly available for all of 2018 and 2019, and this is actually a mistake, it's actually all of 2020 as well. We were using population data from the U.S. Census Bureau's sub-county resident population estimates to be able to scale our crime rates to these population numbers. The five crime types that we were studying were: homicides, auto thefts, burglaries, robberies, and larcenies. And these are five different FBI part one prime types. There are two other part one crime types, aggravated assault and rape, that we weren't able to study in our analyses. And this is because the data quality for both of these crime types was quite poor for many cities across the country. Again, I'd be happy to talk about this more at the end of the presentation.

*Slide 5*

So for our analyses we were using a Poisson regression model. And so because we were dealing with prime counts we believed that it was easiest to just model that as a Poisson regression model where we're trying to measure this lambda parameter as a regression model. And so the different subscripts here refer to the city where we had 28 cities again. The different weeks and the year: 2018, 2019, and 2020. And for each crime type we had a separate model. So the covariates that we're including in this model are an offset term for the population, which allows us to take into account a city's population when looking at its crime rates, A city fixed effect, a fixed effect for the year, and a fixed effect for the month as well. But the four coefficients that were most important for our analyses - and we were most interested in learning more about - were these four different periods of 2020. So we grouped the months of 2020 into these four different groups. And these are: the pre-pandemic period, which was January and February, the lockdown period of March to May, the summer protests of June to August, and the end of the year, which was September to December. So on the next few slides I'm going to be focusing on just these coefficient estimates that are highlighted in blue on this slide.

*Slide 6*

So beginning with homicide rates. These plots on the next few slides are all going to be set up quite similarly. So I might eventually start to breeze through the next few slides, but the y-axis is reflecting a multiplicative change in the crime rate. So in this case it's a multiplicative change in homicide rates.

There's a dashed line at one because if there was a multiplicative change of one, that would mean that for that time period there wasn't a statistically significant change in the crime rates compared to the previous years. The dots on these plots refer to the point estimates from our models and then we're also including 95% confidence intervals which are the ends of these plots. And so what we find for homicide is that throughout the entire year, so not just during the lockdown and afterwards but for the entire year, there was an increase in homicides in 2020, which is relevant to point out because some of the literature has suggested that homicide rates rose in 2020 purely because of lockdown-related events or things that happened later on in 2020. But we also saw that homicide rates were elevated pre-pandemic.

Slide 7
In terms of robbery rates, we see the pre-pandemic robbery rates were really not statistically significantly different from what they were in previous years. But during the lockdown summer protests and end of the year periods, we saw the robbery rates decreased.

*Slide 8*
For auto theft rates, we find that during the pre-pandemic and lockdown periods there wasn't a statistically significant change compared to previous years. But for the summer protests and end of the year, there was an increase in auto theft rates.

*Slide 9*
Larceny rates, once the pandemic began, decreased compared to previous trends.

*Slide 10*
And finally, burglary rates did not change in comparison to prior trends except during this pre-pandemic period. So at the beginning of 2020, burglary rates were statistically statistically significantly lower than they had been in previous years. But once the lockdowns began, we didn't notice a change in burglary rates.

*Slide 11*
So based on our results what do we want to conclude? Well we first of all want to caution against advancing policy at this time based on the lessons that we're learning from the pandemic. One of the reasons for this is that typically crime types would be moving in tandem in terms of either all of their rates would be increasing or all of their rates would be decreasing. But what we find here is that crime rates by type did not move in tandem. So homicides increased, robberies decreased, etc. And so because of this, there's not necessarily a good theoretical reasoning for why we saw the results that we saw.

*Slide 12*
We also examined in analyses that I'm not presenting here the rate changes in relation to lockdown policies - that openness index that I was talking about earlier. However, we find that most of the crime rates changes we're not very sensitive to the strictness of the lockdown policies, though robbery and larceny rates were. Again, happy to talk about this in the Q&A afterwards.

*Slide 13*

We can only speculate on the causes of the changes and the lack of changes for various crime types. It's possible that opportunity is a partial explanation, though it's admittedly a post-hoc explanation. So we can think about the idea that because people were in their homes more often that there was less chance for certain types - certain crime types to occur, but an increased chance for other crime types to occur. But again, this really is just a post-hoc and only partial explanation. It doesn't explain all of the results that we're seeing.

*Slide 14*

In terms of what we recommend for future work, we think that future work should focus on looking at more complete crime data than what we had access to. Though we want to mention that we really struggled to find any more data than the data that we were able to find, and even the data that we were able to find had some issues in terms of, say, aggravated assault and rape which were pretty inconsistently reported. We also believe that future work could examine crime rates in non-urban areas. So we were just mostly looking at large cities but it'd be interesting to find out what was happening in suburban and rural areas as well at this time. And also look at later stages of the pandemic. So now that we're done with 2021, what happened in 2021 in comparison to 2020 and in the previous years?

*Slide 15*

Thank you for attending this webinar and thank you to everyone who put on this webinar and made it possible. We have a paper that is going to be appearing in Statistics and Public Policy soon. We also have an old version of our paper available on arXiv but my email address is given on the slide. It's just my first name at stat.cmu.edu [mikaela@stat.cmu.edu] and I'd be interested in hearing any feedback or questions you have after this talk as well. Thank you.