



Detroit Grand Jury Project: Final Project Report

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Executive Summary

In an effort to reduce the number of fatal and nonfatal shootings in Detroit, the Wayne County Prosecutor's Office (WCPO), working closely with the Detroit Police Department (DPD), developed an innovative approach to the investigation and prosecution of nonfatal shootings. The innovation involved the use of a One-Person Grand Jury focused specifically on nonfatal shootings. The One-Person Grand Jury was considered an investigatory resource that could increase the cooperation of shooting victims and witnesses. The grand jury provided victims and witnesses a safe environment in which to provide testimony they might otherwise be reluctant to provide. The short-term goals included the preservation of testimonial evidence that would result in identification, arrest, and conviction of perpetrators of nonfatal shooting incidents.

The mission of the WCPO's *Violent Crime Unit*:

The mission of The Violent Crime Unit is to ensure that Justice is served by utilizing a non-traditional approach to the reduction of violent crime. This collaborative effort utilizes a combination of special judicial proceedings, vertical prosecution, crime analysis, social media analysis, and witness protection to target violent gangs and offenders that drive violent crime.

The longer-term goal was to reduce shootings. The rationale was that building stronger cases would lead to an increase in arrests and better cases for court; future shootings would be prevented through two causal mechanisms. First, high risk individuals (shooters) would be more likely to be convicted and sentenced to a period of incarceration during which they would be unable to re-offend within the community (incapacitation effect). Second, the perceived risk of sanction among potential shooters would be increased (deterrence effect). Essentially, by holding shooters accountable at a higher rate than historically has been the case, there should be a reduction in shootings. Additionally, given that nonfatal shootings have historically had low levels of clearance by arrest and closure through prosecution, the focused attention of the One-Person Grand Jury might have an additional effect of increasing the perceived legitimacy of police and prosecution by residents of neighborhoods affected by shootings through the effort to hold shooters accountable.

Complementing the One-Person Grand Jury was increased cooperation and coordination among prosecutors and police investigators whereby designated prosecutors were available (via phone) to consult with police investigators at the scene of a nonfatal shooting. The intent was to provide prosecution resources to investigators, including the legal process of the One-Person Grand Jury, to enhance investigations and case preparation.

Finally, the project came with designated funding for temporary and permanent witness relocation, key to increasing assistance to witnesses in need.

The intervention was originally implemented as a pilot project in the 10th precinct. Given an observed decline in fatal and nonfatal shootings in the 10th precinct, WCPO sought to implement the One-Person Grand Jury in the 9th precinct, the precinct that historically has experienced the highest level of shootings in the city. WCPO was successful in competing for a grant from the Bureau of Justice Assistance (BJA) that allowed it to move the One-Person Grand Jury to the 9th precinct. The BJA award also supported an evaluation, summarized in this report.

This report includes findings from both the 10th precinct pilot and the 9th precinct projects. This included both information about the impact of the One-Person Grand Jury on case dispositions as well as the impact on fatal and nonfatal shootings. Given the support of the BJA-award for the 9th precinct project, we have more detail on the intervention in the 9th precinct.

As will be discussed in the report, the evaluation was complicated by several factors. First, the 9th precinct intervention occurred in a context of several complementary violence reduction strategies that were implemented at different times. This made it difficult to isolate the impact of the One-Person Grand Jury. Second, as is the situation nationally, the COVID-19 pandemic and the period of protest and unrest following the death of George Floyd in Minneapolis, significantly affected police and court operations and the city experienced large increases in shootings beginning in the spring and summer of 2020. The result is that the findings on the effect of the One-Person Grand Jury on shootings are not clear-cut.

Positive Findings

There was clear evidence that the One-Person Grand Jury had a positive impact on case dispositions in nonfatal shooting incidents.

- In the 10th precinct, the One-Person Grand Jury was associated with a prosecution closure rate in nonfatal shootings that increased from 12 percent prior to the Grand Jury to 43 percent by year two of full implementation.
- In the 9th precinct, although there was not an increase in clearance by arrest, there was a large increase in the number of defendants found guilty in nonfatal shooting incidents.
- In the 9th precinct, there were also significant increases in the sentence lengths for those convicted.

The basic trend in shootings in the 10th and 9th precincts were consistent with a modest reduction in shootings following the implementation of the One-Person Grand Jury.

- In the 10th precinct, the total number of fatal and nonfatal shootings declined from 124 per year from 2011-13 to 101.7 per year from 2015-17. This reflected an 18 percent decline and a 19 percent decline when considering the 2015-19 post implementation period.
- In the 9th precinct, the total number of shootings averaged 189.9 from 2011-17. In 2018-19 this declined by 8 percent to 174.5 per year.

- A more sophisticated time series analysis suggested that the 9th precinct experienced a statistically significant decrease of approximately 23 percent that lasted five months following implementation of the One-Person Grand Jury.

Perplexing Findings

Assessing the impact of the One-Person Grand Jury on fatal and nonfatal shootings became more difficult to interpret when more complex analyses were applied to the data. The first complication arose when comparing these trends to the remainder of the city that did not experience the One-Person Grand Jury. Specifically, in terms of both the 10th precinct pilot and the 9th precinct project, the trend in other parts of the city also reflected a decline in shootings during the intervention period and an increase in the period following the suspension of the grand jury project (due to court closures/interruptions associated with the pandemic). The second complication is that the reduction in the 10th precinct was not statistically significant, meaning that the observed reduction in shootings during the period that the Grand Jury was operational could have been due to random fluctuations in crime trends over time.

The trends are also difficult to interpret because of the timing of other interventions that were occurring in the 9th precinct. Specifically, the 9th precinct was the focus of Detroit Ceasefire as well as complementary strategies including Project Safe Neighborhoods, and the joint screening of firearms cases by DPD, the Bureau of Alcohol, Tobacco and Firearms, WCPO, and the U.S. Attorney's Office. Many of these interventions were eventually rolled out to remaining parts of the city that served as comparisons in our analyses. Then, the COVID-19 impact resulted in the closure of the courts, the suspension of the grand jury, as well as affecting staffing in DPD. This was followed by the period of unrest and protests in the summer of 2020. All these factors make it very difficult to provide a clear and unambiguous summary of the impact of the One-Person Grand Jury strategy on nonfatal and fatal shooting trends.

Recommendations

Given historically low levels of arrest and prosecution in nonfatal shooting cases, in Detroit and most urban cities in the U.S. (Cook et al., 2019), the goal of increasing accountability for those who choose to shoot other people appears to have promise. The evidence reviewed in this evaluation, suggests that the One-Person Grand Jury did result in enhanced accountability in terms of prosecution closures, guilty findings, and severity of sanctions. It is reasonable to hypothesize that this increased accountability would result in fewer shootings through the mechanisms of incapacitation of serious violent offenders, deterrence through a shift in the perceived likelihood of sanction for shootings, and/or increased system legitimacy due to the focus on nonfatal shootings.

The raw trend in shootings in the 10th and 9th precincts provides some support for this impact. However, when assessing the statistical significance of the trends and the trends in other parts of the city not affected by the One-Person Grand Jury, we cannot say with confidence that the One-Person Grand Jury demonstrated the desired impact on serious gun crime. As noted above, we caution that the impact of other violence reduction and prevention strategies implemented in Detroit and the impact of the 2020 pandemic and summer of protests, make interpretation of the trends very difficult.

There is, however, enough positive evidence to suggest the continued implementation of the One-Person Grand Jury. Indeed, coming out of the period of the pandemic and protests, the suspension of the Grand Jury and many court operations, and associated increases in fatal and nonfatal shootings, there is an opportunity for continued implementation and testing of the One-Person Grand Jury model to test the efficacy of this approach for reducing fatal and nonfatal shootings. The evidence suggests continued assessment and refinement before judging the ultimate violent crime reduction potential of the One-Person Grand Jury strategy.

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Description of Detroit Grand Jury Project

Context

Despite progress in recent years, the city of Detroit continues to suffer from high rates of violent crime. Its violent crime rate is more than five times the national average and the homicide rate is more than nine times the national average. Much of the city's violent crime involves guns and nonfatal shootings (NFS), which are a particularly vexing part of the gun violence problem. Research reveals that participants in nonfatal shootings are at particularly high risk for future involvement in shootings and homicides (Papachristos et al., 2012, 2015). And in contrast to homicides, nonfatal shootings suffer from low arrest and clearance rates (Cook et al., 2019), likely contributing to high rates of continued violence. Like other U.S. cities, the Detroit Police Department had a 21% clearance rate on NFS, compared to a national homicide clearance rate of approximately 60 percent (FBI, 2017).

Historically, much of the research focus on gun crime has been on homicides (Hipple et al., 2020). This is likely reflective of the greater availability of data on fatal shootings. In contrast to homicides, NFS have not traditionally been included in police crime reporting. Yet, NFS occur at a rate of 3-5 times as frequently as fatal shootings (Hipple & Magee, 2017), and as mentioned above, people involved in NFS are at high risk of being involved in future fatal and NFS (Papachristos et al., 2012, 2015). Researchers reporting low clearance rates in NFS have noted several factors including the greater investigatory resources devoted to homicide cases as well as the lack of cooperation among victims and witnesses involved in nonfatal shootings (Cook et al., 2019). Some of the reasons hypothesized for this lack of cooperation include fear of retaliation, so-called "no-snitch" culture, planning to retaliate, potential legal repercussions (e.g., probation/parole violation), and lack of trust or legitimacy in the system (Hipple, Thompson, Huebner, & Magee, 2019; White, Cook & Pollack, 2021).

Given the concern with the level of fatal and NFS, as well as the prevalence and problematic nature of uncooperative shooting victims and witnesses in Detroit (Wayne County); a Police-Prosecution Partnership, with the Wayne County Prosecutors Office (WCPO), the Detroit Police Department (DPD), the Michigan State Police (MSP), and the Michigan Department of Corrections (MDOC) was formed to begin an inter-agency pilot program to reduce gun violence in Detroit. The central component of the strategy involved focusing on the investigation and prosecution of nonfatal shooting cases. This innovative project leverages the state's grand jury system, whereby a special One-Person Grand Jury was convened to gather information and testimony from often noncooperative witnesses and victims. The innovation in the use of the grand jury is that the process offers benefits to both the investigators and witnesses. For witnesses, including NFS victims themselves, they are legally compelled to participate, and they are protected under the secrecy of the grand jury. For investigators, the process provides a vehicle for receiving valuable information surrounding the shooting events in hopes of arresting the responsible parties.

This report will outline the One-Person Grand Jury process in the state of Michigan and how prosecutors and police are leveraging this unique legal process to increase case clearances on nonfatal shooting cases, limit the number of retaliatory shootings, and therefore lower both fatal and nonfatal shootings in the select precincts of Wayne County (Detroit), Michigan. The following section will describe the history of the grand jury process, describe each step of the grand jury project, data collection, results, and conclude with future directions.

Detroit Grand Jury Project Model

Michigan state criminal courts have historically not utilized grand juries as part of routine proceedings. In 1951, however, the legislature enacted law that allowed Circuit Courts to appoint a circuit judge to sit as a One-Person Grand Jury to investigate felonies (Wayne County Prosecutor's Office, 2017). In the current project, Wayne County decided to utilize a grand jury to specifically focus on NFS. The grand jury project was conceptualized and coordinated by the Violent Crime Unit (VCU) in the WCPO and operated in cooperation with the DPD. The strategy was initially employed as a pilot project in Detroit's 10th precinct. Given promising results, the grand jury was then moved to the 9th precinct, the precinct that historically has experienced the highest levels of fatal and NFS in the city.

Structurally, the One-Person Grand Jury is based on three components: police, prosecutor's office, and the Circuit Court. The 10th precinct pilot included a NFS task force that included DPD investigators, Michigan State Police Investigators, and an investigator from the Michigan Department of Corrections. As the program moved to the 9th precinct, the law enforcement structure was similar with a 9th precinct shooting response team that responded to fatal and NFS.

The second component consisted of WCPO prosecutors who were part of the Violent Crime Unit being assigned to all shootings in the precinct and who would oversee prosecutions, including the One-Person Grand Jury. The 10th precinct pilot project benefitted from seven attorneys who were assigned to the project. The 9th precinct project did not have funding to support the same level of prosecutors assigned to the project but did provide for three prosecutors. In both the 10th and the 9th projects, a prosecutor was on-call to respond to all NFS occurring in the precinct. The response included phone consultation with the investigating officer and potentially appearing at the precinct to assist with necessary legal documents.

The role of the court includes the assignment of one judge to oversee the One-Person Grand Jury. The One-Person Grand Jury is presided over by the same circuit court judge who hears each nonfatal shooting case presented by the VCU. The judge has broad powers to investigate NFS including to require people to appear at the grand jury and answer questions about the investigation. Failure to appear, or to answer questions truthfully, can result in immediate negative consequences such as the issuance of witness detainers and the possibility of contempt sanctions for continued non-compliance. An important element of the grand jury is that the proceedings are conducted in secret and violations of the secrecy provisions are considered a felony. This was considered an important component in addressing concerns about fear of retaliation or violating "no-snitch" cultural norms.

As noted above, the prosecuting attorney plays an important role with the grand jury, coordinating with police investigators, and subpoenaing witnesses and developing evidence through grand jury testimony. The assigned prosecutor prepares log sheets and witness lists are also prepared for each case. Witnesses who are subpoenaed are given specific times to appear in court, however, these subpoenas are not always followed, and individuals are typically given multiple chances to appear before the One-Person Grand Jury before a detainer is issued by the Court.

Once a witness appears for the One-Person Grand Jury, he/she meets with a DPD officer, typically the investigating officer in charge of the nonfatal shooting case or the original officer on scene. Together, the DPD officer and VCU prosecutor conduct a pre-grand jury interview with the witness to deem if their testimony includes relevant information pertinent to potentially solving the case. In addition, the prosecutor is statutorily required, to advise the witness of his/her rights (particularly of the right to an attorney). If the witness requests an attorney to assist him/her, the proceedings are ceased until an attorney is obtained. The witness may hire an attorney, or the Circuit court can appoint the witness an attorney. Once the Officer has taken a written statement from the witness, that witness may be called before the grand juror for testimony under oath. Victims and witnesses who are uncooperative and do not wish to speak with prosecutors or police can be subpoenaed to appear and testify truthfully. Michigan state law includes a possible charge for perjury in a court hearing, but this charge was rarely, if ever, used by the *Violent Crime Unit*.

It is important to note, the One-Person Grand jury operates under a special order issued by the Third Circuit Court. In addition to the order empaneling the One-Person Grand Jury, another special order is also issued to allow Discovery for the defense of grand jury testimony, police files, evidence, and witness statements. Once a case is indicted and reaches the Arraignment on the Information at the Third Circuit Court, full legal Discovery is provided regardless of the secrecy provisions at the time the testimony was taken, however, personally identifiable information is redacted from the documents (other than the name of the witness).

If there is sufficient evidence presented during the One-Person Grand Jury, then an indictment is prepared. If an indictment was made then the judge signs the indictment form, the order to detain and issues a mittimus for the known suspect. If the Grand Jury testimony does not elicit an indictment, then the case remains open and inactive until another viable investigative lead surfaces. Indictments become “unsealed” at the Arraignment on the Information in Third Circuit Court. Then, and only then, with the issuance of a court order unsealing the case, Discovery is provided to defense.

Witness detainers are used for uncooperative witnesses that fail to appear before the One-Person Grand Jury. Detainers are court orders, issued with discretion by the court when a res gestae witness that is personally subpoenaed to the Grand Jury fails to appear. A witness detainer is only obtained after the prosecutor clearly indicates why a witness detainer is needed and provides sufficient evidence to the Grand Jury judge as required by case law and the rules regarding material witness detainer orders.

In summary, the One-Person Grand Jury provides a legal framework and process in the attempt to gain cooperation of shooting victims and other witnesses to provide information to prosecutors and investigators about the incident. The goal is to build reliable cases which leads to increases in arrests and prosecutions of NFS and to ultimately reduce the number of fatal and NFS by holding individuals accountable, increasing the deterrent threat for those who might become involved in shootings, and reduce the incentive for those who may otherwise be compelled to take retribution into their own hands. Some of the reasons for thinking the One-Person Grand Jury might have these effects include:

- Using the legal power of the Grand Jury statute to subpoena otherwise reluctant witnesses to appear.
- The legal requirement to attend provides witnesses with an excuse to participate (“I was subpoenaed”).
- The confidential nature of the grand jury provides a safe place to provide testimony.
- The grand jury proceeding demonstrates a commitment to investigating the case (hopefully reducing legal cynicism).
- The project includes designated funding for temporary and/or permanent witness relocation when necessary.
- The prosecution bears the legal burden of listing “all the witnesses known to the prosecuting attorney who might be called at trial and all res gestae witnesses known to the prosecuting attorney or investigation law enforcement officers.” *People v. Perez*, 469 Mich. 415, 419 (2003) and MCLA 767.40a. The grand jury process facilitates compliance with the law which gives crucial information to both the Prosecution and Defense.

Evaluation Context & Methods

This study was part of a broader project supported by an award from the Bureau of Justice Assistance (BJA) to Wayne County (MI) supporting an innovative response to gun crime and nonfatal shootings, specifically. The innovative strategy was the One-Person Grand Jury and the BJA award included support for an evaluation of the initiative. The key research questions included:

- Does the One-Person Grand Jury result in higher rates of clearance by arrest, prosecution closures, and convictions and sentences in nonfatal shooting incidents?
- Does the One-Person Grand Jury strategy result in reduction in fatal and nonfatal shootings?

To address these questions, the evaluation included a two-stage plan. The first involved analysis of existing data on the pilot One-Person Grand Jury that was originally implemented in the 10th precinct. One advantage of the 10th precinct project was that the One-Person Grand Jury was the primary violence reduction strategy operating within the precinct. As will be discussed subsequently, due to the high level of violence in the 9th precinct, several violence reduction strategies were operating prior to and in conjunction with the One-Person Grand Jury project.

The promising results in the 10th precinct were a factor in then moving the One-Person Grand Jury strategy to the 10th precinct.

The second stage of the evaluation involved a focus on the 9th precinct One-Person Grand Jury strategy. The evaluation included tracking nonfatal case outcomes in terms of clearance by arrest, prosecution case closure, and conviction and sentencing. We compared case outcomes with a random sample of nonfatal shooting incidents drawn from other parts of the city (excluding the 9th and 10th precincts). The key outcome measure was the trend in fatal and nonfatal shootings in the treatment precincts (9th and 10th) compared to the trend in shootings in other parts of the city.

The evaluation of the 10th precinct pilot project is limited in that data on arrest by clearance and prosecution status are only available for the 10th precinct. Thus, we cannot contrast these trends with similar nonfatal shooting case outcomes in other parts of the city. However, we can contrast the outcome measure of the trend in fatal and nonfatal shootings in the 10th precinct with the trend in other parts of the city not served by the One-Person Grand Jury.

Ideally, we would have liked to conduct interviews with participants in the One-Person Grand Jury. However, due to the strict legal rules on the secrecy of grand jury proceedings, as well as concerns about potential risks to victims and witnesses should their participation in the grand jury be revealed by the research, we were unable to learn of the perceptions of participants. We did, however, conduct a limited number of key actor interviews from police and prosecution officials involved in the One-Person Grand Jury project. The interviews focused on perceptions of the One-Person Grand Jury strategy as opposed to specific cases.

Like so many other aspects of society, the project was significantly affected by the COVID-19 pandemic. In March 2020 the state of Michigan issued a Stay-at-Home order due to the pandemic. This resulted in suspension of court proceedings, including the One-Person Grand Jury. As of this writing, the One-Person Grand Jury has not been convened since the pandemic began. Additionally, the pandemic had a significant effect on police staffing levels. DPD estimated a loss of 20,000 working hours due to illness or quarantine. Early in the pandemic the 9th precinct had significant personnel pulled off the streets due to illness or quarantine. Additionally, fatal and nonfatal shootings increased significantly throughout the city in summer 2020 coinciding with the period of social protests following the death of George Floyd in Minneapolis, consistent with trends in other U.S. cities (Rosenfeld & Lopez, 2021). The external factors complicated the evaluation plan. Below we describe how we attempted to address these confounding factors.

Data Collection Process

The One-Person Grand Jury Project began in the 10th Precinct in September 2014 and ran through October 2017. With additional funding through the BJA award, the initiative was moved to the 9th in February 2018 and ran until the COVID-19 pandemic began in March 2020. Given the context of the COVID-19 pandemic on the abrupt ending of the grand jury project in the 9th precinct, the closure of the entire court system, and increase in gun violence in Detroit and across

the many urban cities in the U.S. we have opted to include both the 10th and 9th precinct in this evaluation report.

We collected fatal and nonfatal shooting data from the Detroit Police Department (DPD) from 2011 through 2021. Additionally, prosecution data were collected. The WCPO maintains records on all fatal and nonfatal cases that a VCU Deputy Prosecutor screens to deem if the needed evidence is sufficient to file an arrest warrant. Under the Grand Jury Project, WCPO within the 10th precinct had seven additional deputy prosecutors and the 9th precinct had three additional deputy prosecutors to screen all nonfatal shooting cases. The deputy prosecutor was involved from the beginning of the case investigation and worked with partnership with the DPD detective. All nonfatal shooting cases that went through the grand jury project were included on a Master Log file maintained by the deputy prosecutors. This Master Log included all case disposition statuses from within the prosecutor's records. These data may be different than court records, as cases may take more time to work through the court system. Although the evaluation benefitted from the robust record keeping of the WCPO during the Grand Jury project, our comparison group sample of cases does not include data on records from the prosecutor's office. Such similar records are maintained in individual case files with each individual deputy prosecutor across the county. We were informed such record tracking would be equivalent to finding a needle in a haystack. These differences in record keep speaks to the uniqueness of the grand jury project and the need for such projects for better data collection and case processing of nonfatal shooting cases.

In order to collect data for the 9th precinct within the police department, prosecutors' office, and court records we conducted a multiple step process. We obtained access and queried updated police case records to determine case disposition of open, closed/exceptionally cleared, or unknown. A research assistant from within the WCPO searched each case on the VCU Master log to obtain the case disposition (open, closed, unknown) for each case. The closed cases were categorized into guilty or not guilty. Lastly, an analyst searched the Michigan state Odyssey Court record system for each case in the 9th precinct and the comparison group of incidents. We drew a random sample of cases from other (non 9th or 10th precincts) precincts to serve as a comparison group. Descriptive data on the case dispositions on the 9th precinct and the comparison group were collected January 1, 2018 – May 11, 2020. File court records were collected in summer of 2021 to allow time for cases to work through the court system.

Given the multi-step data collection process that was implemented within the 9th precinct, we were unable to complete such an in-depth data collection process within the 10th precinct. However, the WCPO maintained records and statistics of case outcomes during the pilot program in the 10th precinct. These findings were reported in each of the annual reports. The annual reports provided the total number of cases reviewed by the VCU team, and status of each case (open, closed – guilty, non-guilty). Although the data collection process and results cannot be directly compared to the 9th precinct, these findings do provide context for the number of cases taken through the grand jury process and case outcome.

Case Disposition Results

As described above, data collection related to case dispositions in the 10th precinct was limited to descriptive review of annual reports produced by the WCPO. According to the WCPO annual reports, during the 10th precinct project there were 572 cases reviewed, 53% (n=305) remained open and 47% were closed (n=267). Of those cases that were closed, 90% (n=241) were guilty, 6% (n=16) were found not guilty, and 3.7% (n=10) were dismissed. These data were last updated in October 2017.

Two promising results emerged from the pilot project. First, the case closure rate in NFS, defined as closing the case through a trial or guilty plea, increased from 12 percent in the year prior to implementation of the One-Person Grand Jury, to 43 percent by 2016. As will be discussed in more detail in the section of trends in fatal and NFS, the 10th precinct also witnessed a decline in NFS as well as the total number of fatal and NFS since implementation of the One-Person Grand Jury in fall 2014. Whereas the precinct averaged a very consistent 124 (122, 123, 127) fatal and NFS incidents in the three years prior to the One-Person Grand Jury, this declined to an average 100 incidents in the six years since implementation. This represented a 19 percent decline (18% decline when comparing 2011-14 with 2015-17). It was this combination of an increase in case closures with a decline in fatal and NFS that led to the movement of the One-Person Grand Jury to the 9th precinct in 2018.

Table 1: Prosecution Closure Rate in Nonfatal Shooting Incidents, 10th Precinct

Year	Closure % (indictment)
2013	12%
2014 (partial year implementation)	20%
2015 (full implementation)	35%
2016 (continued implementation)	43%

Source: Wayne County Prosecutor's Office, 2017.

As described above, for the 9th precinct project we were able to examine the case processing of NFS in the 9th precinct compared to a random sample of NFS occurring in other parts of the city (excluding the 9th and 10th precincts). This allowed us to examine for differences in case outcomes that may be due to the One-Person Grand Jury.

In the 9th precinct there were 353 reported nonfatal shootings, with nine turning into fatal shootings. According to police data, 32% (n=113) of cases were closed/exceptionally cleared, with 68% (n=239) of cases remaining open. The prosecutor data recorded 27% (n=95) of cases were closed, 59% (n=207) were open or pending, and 14% (n=51) were unknown. The 27% prosecution closure rate would represent a significant improvement over the 12% reported in the 10th precinct prior to the One-Person Grand Jury but is less than the 35% and 43% reported in year two and three of the project in the 10th precinct.

Of these 9th precinct NFS incidents, 31% (n=110) were found in the state of Michigan Court Odyssey system. Of the cases located within the court system, 84% (n=93) of the offenders were found guilty, 8.2% (n=9) were deemed not guilty, and 6.4% (n=7) remained open. The mean

minimum sentence length was 307.4 months or 25.5 years, and the mean maximum sentence length was 459.3 months or 38.25 years.

In our comparison group of incidents in other parts of the city, there were 347 nonfatal shootings, 9 of which turned fatal for a total of 338 nonfatal shootings. According to police data, 34.6% (n=120) were closed or exceptionally cleared, 65% (n=226) remain open, and 1 is unknown. Thus, there was little evidence that the One-Person Grand Jury resulted in an increase in clearance by arrest. Of these incidents, 20% (n=69) of comparison cases were found in the court records, 46% (n=32) were guilty, 13% (n=9) were found not guilty, and 41% (n=28) remain open. Of those who were sentenced, the mean minimum sentence was 97.5 months or 8.5 years, and the mean maximum sentence length was 198.9 months or 16.6 years.

Although the data did not indicate an impact on clearance by arrest, they do suggest a significant impact on the likelihood of a guilty finding and on sentencing severity. That is, of cases recorded in the court system records, 84% of defendants in the 9th precinct were found guilty compared to 46% in the comparison. When viewed in the context of the total number of NFS, the comparison was 26% of NFS receiving a conviction in the 9th precinct compared to 9% in the comparison incidents. Finally, we see a significant increase in the severity of sanctions for cases initially handled through the 9th precinct One-Person Grand Jury.

Table 2: Case Dispositions for the 9th precinct and comparison group, 2018 – May 11, 2020

	9th precinct	Comparison precincts
Total Nonfatal Shootings	n = 353	n = 347
Police Records		
Closed/Exceptionally cleared	113 (32%)	120 (34.6%)
Open	239 (68%)	226 (65%)
Prosecutor Records		
Closed (indictment)	95 (27%)	n/a
Open/Pending	207 (59%)	n/a
Unknown	51 (14%)	n/a
Odyssey State Court System	n=110	n = 69
Guilty	93 (84%)	32 (46%)
Not Guilty	9 (8.2%)	9 (13%)
Open	7 (6.4%)	28 (41%)
Minimum sentence length (mean)	25.5 years	8.5 years
Maximum sentence length	38.3 years	16.6 years

Trends in Non-Fatal and Fatal Shooting Victimization

Table 3 presents the trend in fatal and nonfatal shootings in Detroit from 2011 to 2020. The positive news is that beginning in 2013 and particularly since 2016 the city experienced significant declines in fatal and nonfatal shootings. To illustrate, between 2015-2019 the city averaged 1,177 fatal and nonfatal shootings. That compared to an average of 1,653 in 2011-2012, or a 29 percent reduction when comparing these two periods. As reflected in Table 3 and Figure 1, this downward trend was reversed in 2020 consistent with trends in the U.S. and hypothesized as being due to the impact of the COVID-19 pandemic as well as the period of unrest following death of George Floyd in Minneapolis (Rosenfeld & Lopez, 2021).

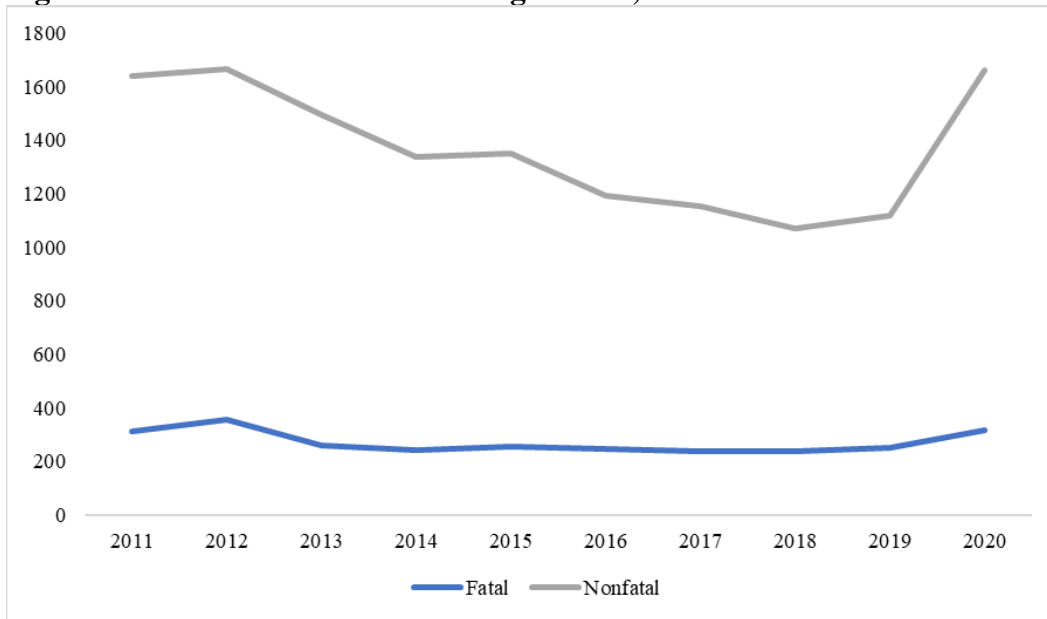
It is worth noting that 2015 reflected a period in which DPD and its partners in WCPO, U.S. Attorney’s Office, and Michigan Department of Corrections implemented Detroit Ceasefire based on the focused deterrence model. Detroit Ceasefire originally focused on the 5th and 9th precincts, later expanded to additional precincts and now a citywide strategy.¹ Although the One-Person Grand Jury was developed separately from the Ceasefire intervention, in principle it should reinforce the focused deterrence strategy by increasing the perceived risk of sanction for shootings.

Table 3: Fatal and Nonfatal Shooting Trends, Detroit

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Fatal	312	356	260	241	256	248	240	237	253	317
Nonfatal	1,327	1,311	1,234	1,096	1,096	945	913	833	866	1,344
Total	1,639	1,667	1,494	1,337	1,352	1,193	1,153	1,070	1,119	1,661

¹ Detroit Ceasefire was originally implemented in 2013. In 2015, a project management team was installed to coordinate Ceasefire. The evaluation team found evidence that implementation of the focused deterrence strategy was associated with this project management approach in 2015. The evaluators found evidence of reduced gun violence consistent with the trends reported in Table 3 as well as reduced re-offending among Ceasefire participants (Circo et al., 2018; 2020; 2021).

Figure 1: Fatal and Nonfatal Shooting Trends, Detroit



The shooting trend in the 10th precinct is displayed in Table 4. Recall that the One-Person Grand Jury was implemented late in 2014 (September) and continued until October 2017. The average number of fatal and nonfatal shootings during this implementation period of 2015-2017 was 101.7.3 per year. This compared to an average of 124 from 2011-2013 (we exclude 2014 due to implementation in the last quarter of the year) and reflects an 18 percent decline in fatal and nonfatal shootings (19 percent reduction during the 2015-19 period).

Table 4: Fatal and Nonfatal Shooting Trends, 10th Precinct

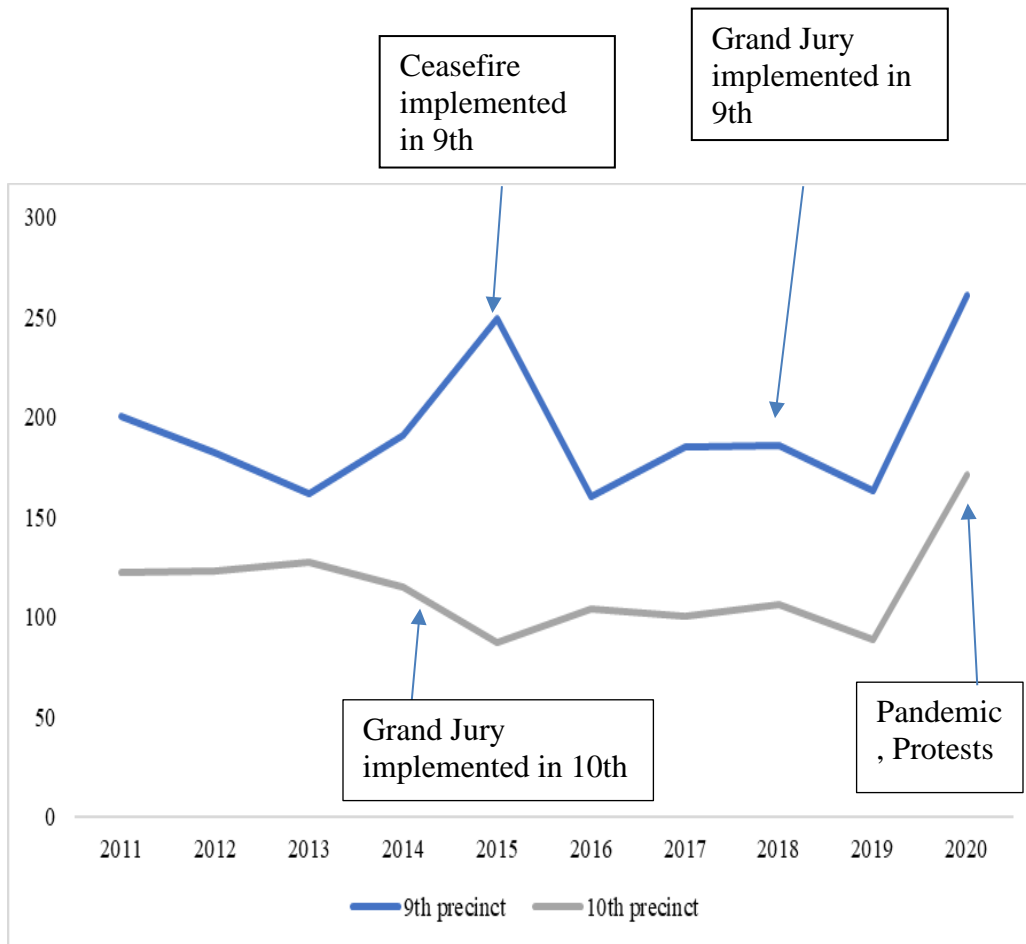
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Fatal	15	35	19	24	14	24	18	24	23	40
Nonfatal	107	88	108	115	87	80	82	82	66	131
Total	122	123	127	139	101	104	100	106	89	171

The trend in the 9th precinct is presented in Table 5. The One-Person Grand Jury was implemented in early 2018 (February). The annual trends do not indicate a reduction in 2018 though there was a decline in 2019. The longer-term trend is complicated by the large number of fatal and nonfatal shootings experienced in 2015 as well as the dramatic increase in 2020. With these qualifications in mind, from 2011-2017, the 9th precinct averaged 189.9 fatal and nonfatal shootings per year. In 2018-19 following the implementation of the One-Person Grand Jury the average was 174.5, a decline of approximately eight percent. We return to a more fine-grained analysis of these trends subsequently.

Table 5: Fatal and Nonfatal Shooting Trends, 9th Precinct

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Fatal	38	39	28	34	41	37	25	35	38	51
Nonfatal	162	143	134	157	208	123	160	151	125	210
Total	200	182	162	191	249	160	185	186	163	261

Figure 2: Fatal and Nonfatal Shooting Trends, 9th and 10th Precinct



Analytic Strategy

We employed an interrupted time series analysis to investigate whether the introduction of the One-Person Grand Jury project was associated with reductions in fatal and non-fatal shootings across two police precincts in Detroit, Michigan. The design of our analysis is three-fold. First, we conduct a preliminary visual assessment of shootings over the course of the study period and outline the potential exogenous influence of the Grand Jury intervention program had on shootings. This assessment will be supplemented with one-way ANOVAs and Tukey tests to determine whether there were significant differences in the average number of monthly shootings before, during, and after the intervention was implemented. This assessment will provide an initial understanding of the potential influence of the intervention program.

In the second step of the analysis, we estimate whether changes in shootings were significantly associated with the One-Person Grand Jury program in precincts 9 and 10 using auto-regressive moving-average models (ARIMA). The observation period for this part of the analysis includes the entire study period (January 2011 to April 2021). In the final step of our analysis, we restrict the study period to January 2011 to December 2019 due to the magnitude of this unnatural and unprecedented rise in violence experienced in 2020. Like other U.S. cities, Detroit experienced this significant increase in violent crime that is believed to be due to a combination of the COVID-19 pandemic as well as the period of protest and unrest following the death of George Floyd in Minneapolis (Rosenfeld & Lopez, 2021). Restricting the analysis to before 2020 will prevent analyzing artificially inflated post-intervention shootings due to this nationally historic threat to validity.

To further enhance the robustness of our study design, a non-equivalent no-treatment control group series comprised of shootings in all precincts (except the two treatment precincts) will be compared (Shadish, Cook, & Campbell, 2003). The control group serves as a counterfactual for testing treatment effects in each step of the design and additionally allows the researcher to account for potential historical threats to validity at the city level.

To reach these ends, we follow the estimation procedure outlined by McDowall, McCleary, and Bartos (2019). The first step in the interrupted time series analysis involved identifying the structure of the intervention (I_t) for each of the precincts. In both instances the structure (i.e., step function) of the intervention was binary, and the impact of that intervention (i.e., transfer function) was reflected through an abrupt, permanent influence or temporary influence on shootings—referred to as zero-order and first-order transfer functions, respectively (McDowall et al., 2019).

To model an abrupt permanent effect, the intervention dummy variable was coded ($I_t = 1$) for month (t) when the project was active, whereas all months before and after the intervention were coded ($I_t = 0$). This allows the impact of the intervention to be reflected through an abrupt permanent effect on shootings. Temporary effects were modeled as well when applicable and are labeled in the resulting tables.²

In Precinct 10, the pilot precinct for the project, the intervention started in September of 2014 (month 45) and is represented through the following dummy variable:

$$\begin{aligned} I_t &= 0 \text{ for } 0 < t \leq 44 \\ &= 1 \text{ for } 45 \leq t \leq 82 \\ &= 0 \text{ for } t \geq 83 \end{aligned}$$

² To learn more about how intervention effects were specifically estimated in the time series models, including temporary effects, see Appendix A of this report.

In Precinct 9, the primary study site, the planning of the intervention began in November of 2017 (month 83), but the One-Person Grand Jury was operational in February of 2018 (month 86) and is represented by the following dummy variable:

$$\begin{aligned} I_t &= 0 \text{ for } 0 < t \leq 85 \\ &= 1 \text{ for } 86 \leq t \leq 111 \\ &= 0 \text{ for } t \geq 112 \end{aligned}$$

Upon identifying the intervention model, we used the residualized time series for each precinct to identify and subsequently estimate a noise model using the Box-Jenkins (1970) procedure to capture all relevant temporal dynamics in each of the police precincts.

Results

Time series plots of the data are represented in Figure 3. None of the plots revealed glaring changes in the structure of shootings over the intervention period, in both precincts. However, Figure 4 provides a closer look at these changes by depicting the average number of shootings in each precinct and control group. Results here indicate a potential association between the intervention and shootings. Specifically, in Precinct 10 the average number of shootings declined from 10 per month in the pre-intervention period to 8.9 during the intervention. In Precinct 9, the decline was from 15 per month to 14 per month. Confounding interpretation of these findings, however, is that the control group consisting of other precincts in the city also experienced similar declines during these periods.

Figure 3

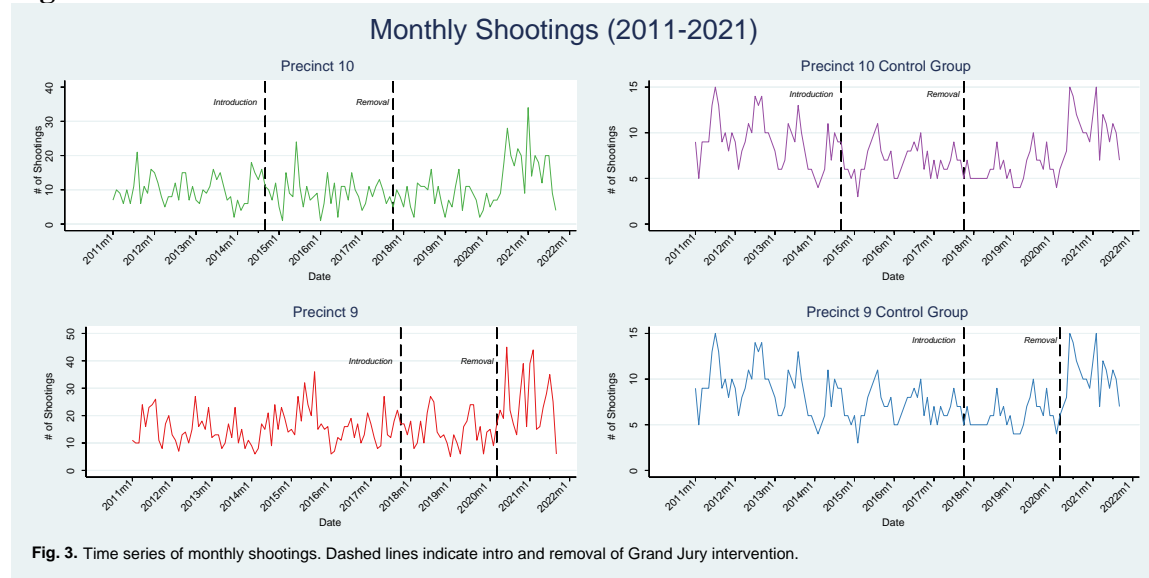


Fig. 3. Time series of monthly shootings. Dashed lines indicate intro and removal of Grand Jury intervention.

Figure 4

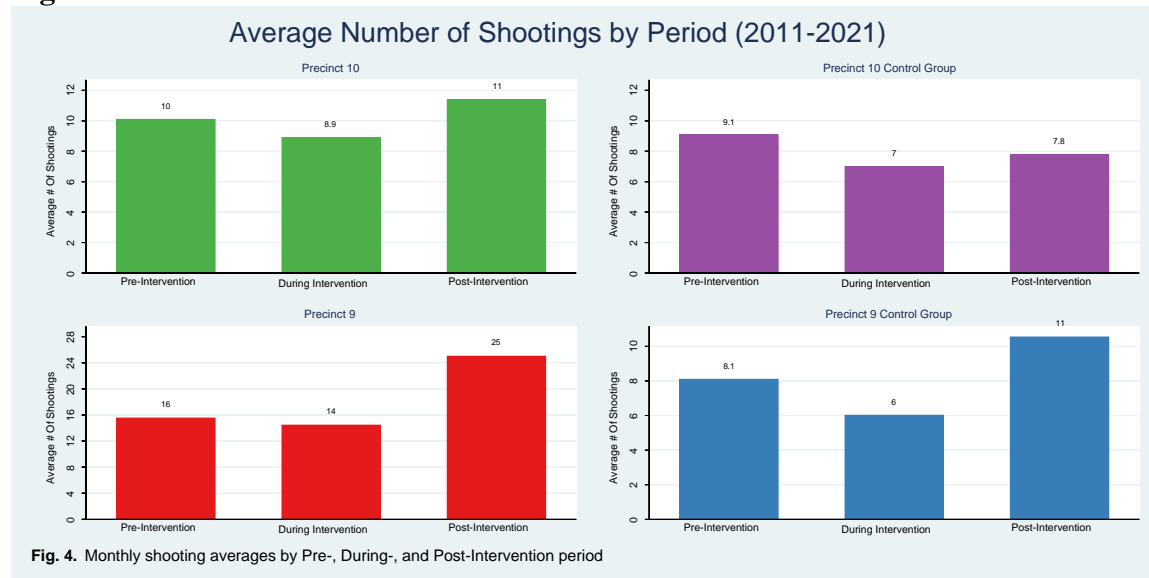


Fig. 4. Monthly shooting averages by Pre-, During-, and Post-Intervention period

Table 6 provides results from one-way ANOVAs and Tukey Honest Significant Difference tests to determine if the average number of shootings differ significantly between the pre-, during, and post-intervention periods in treatment and control locations. In Precinct 10 the average number of shootings dropped by 27% after the Grand Jury project was introduced and then rose by 24% following the removal of the program. None of these values appear to be statistically significantly different from one another and thus we cannot rule out the possibility that the trend reflects random variation over time. In contrast, there appears to be a significant difference in the average number of shootings across all other precincts before and during the intervention period for the Precinct 10 comparison precincts ($F(2, 126) = 7.00, p < 0.05$). These results run counter to our expectations given these precincts did not receive the treatment and will therefore be discussed in greater detail towards the end of the results.

On a similar note, in Precinct 9 the average number of shootings dropped by about 8% following the introduction of the program and then increased by 75% following its removal. However, results only indicate a significant difference in the average number of monthly shootings when comparing shootings during and after the intervention was lifted in Precinct 9 ($F(2, 126) = 15.44, p < 0.05$). Further, results indicate significant differences in the mean number of shootings per month between all three periods in the control group as well ($F(2, 126) = 19.39, p < 0.05$). These findings remain preliminary, however, given that they fail to isolate the treatment effect from the temporal dynamics in the data and potential threats to historical validity. Thus, this initial analysis reflects a decline in the hypothesized direction in the two Grand Jury precincts, but the findings were not statistically significant in the 10th precinct and there were similar declines in the control precincts thus suggesting some factor other than the One-Person Grand Jury intervention may be driving the trends. `

Table 6: Anova results with Tukey HSD pairwise comparisons						
Location	Period ₁	Period ₂	Mean ₁	Mean ₂	Difference	F-statistic
Precinct 9						15.44**
	Pre-Int	During	15.59	14.31	1.28	
	Pre-Int	Post-Int	15.59	25.06	9.47**	
	During	Post-Int	14.31	25.06	10.75**	
Control Group						19.39**
	Pre-Int	During	8.02	6.08	1.95**	
	Pre-Int	Post-Int	8.02	10.56	2.53**	
	During	Post-Int	6.08	10.56	4.47**	
Precinct 10						2.21
	Pre-Int	During	10.11	8.92	1.19	
	Pre-Int	Post-Int	10.11	11.38	1.27	
	During	Post-Int	8.92	11.38	2.46	
Control Group						7.00*
	Pre-Int	During	9.07	7.00	2.07**	
	Pre-Int	Post-Int	9.07	7.77	1.30	
	During	Post-Int	7.00	7.77	0.77	
<p><i>Notes: * $p < .01$, ** $p < .001$</i> Results are derived from One-way Anova tests using the Tukey-HSD pairwise comparison method. Pre-Int = Pre-Intervention period; Post-Int = Post-Intervention period. Control group is derived from the average number of shootings in the remaining 11 precincts.</p>						

Table 7 presents the results from further investigation through step two of our interrupted time series design in Precinct 10 and 9, respectively. Results from this step yielded largely mixed findings. In Precinct 10, shootings did not change significantly after the One-Person Grand Jury project was implemented. In contrast, the control group series experienced a small significant uptick in shootings following the Grand Jury project in Precinct 10, which lasted for the remainder of the study period ($b = 0.02$, $SE = 0.01$, $p < .05$).

Results differed when examining the intervention that took place in Precinct 9. Shootings decreased temporarily in Precinct 9 following the rollout of the intervention and stayed down for 6 months following its implementation ($b = -0.70$, $SE = 0.04$, $p < .001$). In contrast, shootings were expected to increase by slightly by 2% following the Grand Jury project in the control series ($b = 0.02$, $SE = 0.01$, $p < .05$).

Table 7: Interrupted Time Series Analysis (2011-2021)						
Group	Impact	ARIMA Noise Model	Parameter	<i>b</i>	SE	<i>z</i>
Precinct 10						
<i>Treatment</i> ₁	Temp.	(0,0,1)	AR (3)	0.26	0.08	3.12**
			Constant	2.20	0.27	8.06***
			Intervention	-0.27	0.19	-1.43
			δ	0.29	0.08	3.54***
			<i>Q</i> (40)	39.48		
Precinct 9						
<i>Treatment</i> ₃	Temp.	(0,0,0)	Constant	1.78	0.22	8.20***
			Intervention	-0.70	0.04	-17.38***
			δ	0.35	0.08	4.34***
			<i>Q</i> (40)	37.02		
Precinct 10						
<i>Control</i> ₂₃	Perm.	(2,1,2)	AR (12)	0.33	0.11	3.01**
			AR (13)	0.32	0.07	4.38***
			MA (1)	-0.68	0.07	-10.25***
			MA (5)	-0.31	0.07	-5.50***
			Constant	-0.01	0.01	-2.19*
			Intervention	0.02	0.01	2.10*
			<i>Q</i> (40)	28.96		
Precinct 9						
<i>Control</i> ₂₃	Perm.	(2,1,2)	AR (12)	0.32	0.11	2.90**
			AR (13)	0.31	0.08	3.93***
			MA (1)	-0.70	0.07	-10.68***
			MA (5)	-0.30	0.06	-4.88***
			Constant	-0.02	0.01	-2.13*
			Intervention	0.02	0.01	2.56*
			<i>Q</i> (40)	30.62		
Notes: * $p < .05$, ** $p < .01$, *** $p < .001$						
¹ Series was transformed using root transformation						
² Series was measured in first differences.						
³ Series was transformed using natural logarithmic transformation.						

Due to the sheer increase in magnitude and intensity of shootings during the pandemic, results from Table 8 present findings from the subsample of shootings that occurred between January 2011 to December 2019. Results from Table 8 indicate that introducing the program had no significant association with changes in monthly shootings in the 10th Precinct nor its corresponding control group series. However, results indicate that the grand jury program had a significant impact on monthly shootings in Precinct 9 by indicating a slight drop in monthly

shootings after its implementation, which would remain down for roughly 5 months ($b = -0.46$, $SE = 0.17$, $p < .01$). In contrast, shootings did not change significantly following the Precinct 9 intervention for the control group series when restricting the analysis to before the pandemic. In short, these results remain substantively similar to the findings that emerged from the prior analysis.

Table 8: Interrupted Time Series Analysis Pre-Pandemic (2011-2019)						
Group	Impact	ARIMA Noise Model	Parameter	b	SE	z
Precinct 10						
<i>Treatment</i>	Temp.	(0,0,1)	MA (1)	0.19	0.10	1.89
			MA (3)	0.23	0.10	2.36*
			Constant	3.11	0.13	23.29***
			Intervention	-0.29	0.18	-1.61
			Q (40)	40.05		
<i>Control</i>	Perm.	(2,0,2)	AR (12)	0.51	0.9	5.86***
			AR (13)	0.33	0.09	3.57***
			MA (1)	-0.79	0.06	-12.81***
			Constant	-0.01	0.03	-0.38
			Intervention	0.02	0.02	1.14
			Q (40)	49.76		
Precinct 9						
<i>Treatment</i>		(1,0,0) ¹	AR (17)	-0.30	0.09	-3.26**
			Constant	2.00	0.23	8.61***
			Intervention	-0.46	0.17	-2.66**
			δ	0.25	0.08	2.95**
			Q (40)	23.43		
<i>Control</i>	Perm.	(2,1,2)	AR (12)	0.43	0.10	4.48***
			AR (13)	0.30	0.10	3.09**
			MA (1)	-0.75	0.25	-2.96**
			MA (5)	-0.25	0.13	-1.85
			Constant	-0.01	0.01	-2.16*
			Intervention	0.01	0.01	1.78
			Q (40)	36.23		
Notes: * $p < .05$, ** $p < .01$, *** $p < .001$						
¹ Series was transformed using root transformation						
² Series was measured in first differences.						
³ Series was transformed using natural logarithmic transformation.						

Taken together, our results reveal several findings. First, many of the anticipated intervention effects on shootings were found to be insignificant upon isolating their unique impact from the broader temporal dynamics that underly shootings in Detroit. Second, support for our hypotheses that the Grand Jury project had an influence on shootings remain exclusive to Precinct 9. Lastly, restricting our analysis to before the pandemic yields no substantive changes in our results; thus, based on shooting trends, support for the intervention exists when it was employed in Precinct 9 but not Precinct 10.

Conclusion

Summary of Findings

The 10th precinct was selected as a pilot target area for the One-Person Grand Jury project due to high levels of gun violence and low levels of cooperation and case clearance. Given the observed decline in fatal and nonfatal shootings in the 10th, the project was moved to the 9th precinct which historically experiences the highest levels of gun violence in the city. Overall, the project suggests promising results with modest reductions in shootings following the implementation of the One-Person Grand Jury. There was a 19 percent decline in fatal and nonfatal shootings in the 10th precinct from 2011-2013 to 2015-17 and an 8 percent decrease in the 9th precinct from 2011-2017 to 2018-2019. Furthermore, the 9th precinct experienced a statistically significant decrease of nearly 23 percent that lasted five months post implementation of the One-Person Grand Jury.

In addition to the modest reduction in fatal and nonfatal shootings, the One-Person Grand Jury project also had a positive impact on the case dispositions of nonfatal shooting cases. The prosecution closure rate for nonfatal shootings increased from 12 percent the year prior to the Grand Jury project to 43 percent by year two of full implementation of the project. The 9th precinct did not experience an increase in clearance by arrest, however there was an increase in the number of defendants found guilty in nonfatal shooting cases. Of the defendants convicted in nonfatal shooting cases, the sentence lengths were significantly longer than the comparison group.

Despite the overall promising results, there were also a few perplexing findings that made interpretation difficult. First, when more sophisticated the analyses were applied to the overall trends of fatal and nonfatal shootings, declines in shootings were observed in the 9th precinct, whereas a slight increase was observed in the rest of the city that did not utilize the One-Person Grand Jury. Importantly, the raw decline in fatal and nonfatal shootings in the 10th precinct was not statistically significant when observed in the time series analysis. Therefore, the observed raw reduction in shootings comparing 2011-13 with 2015-17 during the intervention period may be due to random fluctuations in crime trends.

An additional confounding issue in the analysis is that the 9th precinct witnessed the implementation of several violence reduction strategies along with the One-Person Grand Jury. Given the 9th precinct historically experiences the highest rates of gun violence, other violence prevention efforts, such as Detroit Ceasefire and Project Safe Neighborhoods were implemented simultaneously. Both involve joint screening of firearm cases by DPD, the Bureau of Alcohol,

Tobacco, and Firearms, WCPO, and the U.S. Attorney's Office. Many of these interventions were also operating in our comparison group during our study period.

Lastly, in 2020 the COVID-19 pandemic closed the court system, affected DPD staffing level, and resulted in a permanent suspension of the One-Person Grand Jury project. The beginning of the COVID-19 pandemic was also followed by a period of social unrest and protests following the death of George Floyd. All these factors make it difficult to provide a clear and unambiguous summary of the impact of the One-Person Grand Jury on levels of fatal and nonfatal shootings.

Implications & Lessons Learned

The One-Person Grand Jury Project reflects the benefits of establishing strategic partnerships between the local police department and prosecutor's office to focus on increasing case coordination in clearance in nonfatal shooting cases. Overall, our analysis suggest that the One-Person Grand Jury Project was associated with a reduction in fatal and nonfatal shootings (though recognizing these were not statistically significant in the 10th precinct and not clearly attributable to the One-Person Grand Jury in the case of the 9th precinct) and an increase in guilty pleas and sentence length. Interviews with key stakeholders noted the importance of the prosecutor being immediately involved in nonfatal shooting cases and the collaboration between the police and prosecutor during the case investigation and court process. It was observed that the early use of the immediacy of the subpoena potentially alleviated risks of immediate retaliatory shootings.

The COVID-19 pandemic made it extremely difficult to fully assess the long-term impact on shootings, as much of the country has experienced high rates of gun violence comparable to the those in the early 1990s. However, prior to the pandemic the One-Person Grand Jury demonstrated promising findings in three ways; one - the initiative improved the communication and coordination between the police and prosecutor's office. The initiative involved the prosecutor immediately in the investigation, which allowed for subpoenas and other resources to be available to the detectives throughout the investigation. Two – there was an increase in case clearance in the 10th precinct, a higher number of defendants in the 9th precinct were found guilty, and guilty defendants received longer sentence lengths compared to defendants in shooting occurring in other parts of the city. Third – there was a raw decline in shootings in the 10th precinct and a statistically significant decline in shootings in the 9th precinct. The combination of these findings demonstrates the utility and promise of the One-Person Grand Jury to improve case outcomes and potentially decrease shootings.

Given these positive trends yet recognizing the lack of clear findings on shooting incidents, we recommend continued experimentation and testing of the One-Person Grand Jury. As court operations return to more of a "normal" post-pandemic level, the opportunity arises to continue to test the One-Person Grand Jury in select precincts and to assess the impact more fully on levels of shootings.

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APPENDIX A: Details on the Time Series Analyses

Estimating temporary intervention effects

Intervention effects in the interrupted time series models were determined to be either temporary or permanent. To model a temporary effect on shootings, the step-function was measured in first differences (∇I_t), which equates to a pulse function (McDowall et al., 2019). The pulse function captures an immediate, temporary impact on the shootings series such that only the month during which the intervention was initially implemented was coded ($I_t = 1$). This effect decays at a diminishing rate (δ) that is estimated through a variable of the lagged outcome series by one time point (y_{t-1}).³ To determine whether a permanent or temporary effect exists, a simple t-test is used whereby the null hypothesis assumes a permanent effect ($\delta = 1$) and rejecting the null indicates a temporary effect better fits the model (McDowall et al., 2019).

Robustness checks of final models

Several diagnostic checks were employed throughout the analytic procedure to ensure the robustness of our findings. Before identifying the intervention models, we used Box-Cox (1964) transformation functions to normalize the skewed time series for each precinct and city control before model identification and estimation (*see also*, McDowall et al., 2019 p.67-77).⁴ Results from the final models were therefore reported as square roots and natural logs of their original values. During initial model selection, we tested for constant long-run mean and variance (i.e., stationarity) in each of the shootings time series using the augmented Dickey-Fuller (1979, 1981) and Phillips-Perron (1988) tests. Results indicated that (only) the control group series had a unit-root and was therefore measured in first-differences to induce stationarity. The final models were verified based on their residuals exhibiting a stochastic “white noise” process, which means the residuals exhibited a constant mean, variance, and independence over time (no residual autocorrelation) (Gujarati & Porter, 2009).⁵

³ Rate parameter values range in stability between 0 and 1, with smaller values indicating a faster rate of decay whereas larger values indicating a slower rate of decay (McDowall et al., 2019). When ($\delta = 1$) the transfer function is statistically equivalent to the zero-order transfer function and thereby indicates a permanent effect on the outcome series.

⁴ Box-Cox model results indicated that the square-root transformation was most appropriate for the precinct 10 outcome series whereas the precinct 9 series warranted a natural logarithmic transformation. City control outcome series was also transformed using the natural logarithmic transformation function.

⁵ Model residuals were tested for white noise using the Portmanteau (Q) test refined by Ljung and Box (1978).