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Article

Impact of the *Alto al Fuego* program on intentional homicides in México City

Impacto del programa Alto al Fuego *en los homicidios dolosos en la Ciudad de México*

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Abstract

This article analyses the impact of the Alto al Fuego *program in México City on intentional homicides. I used interrupted time series analysis with control groups and synthetic control methods to analyze its impact. Results show that, despite a reduction in level and trend of homicides in Álvaro Obregón district after the implementation of the program, similar changes in other districts in México City indicate that reductions could be caused by factors other than the program. Despite inconclusive results, the premises of focused deterrence interventions seem to hold for Latin American contexts like the Plateros area in México City.*

Keywords*: focused deterrence; intentional homicides; Alto al Fuego; violence; México.*

Resumen

Este artículo analiza el impacto del programa *Alto al Fuego* sobre homicidios dolosos en Ciudad de México. Se utilizaron series de tiempo interrumpidas con grupos de control y métodos de control sintético para analizar el impacto. Los resultados muestran que, a pesar de la reducción en nivel y tendencia de los homicidios dolosos en la Alcaldía Álvaro Obregón después de implementar el programa, cambios similares en otras alcaldías pudieran indicar reducciones causadas por factores ajenos al programa. Así, las premisas de los programas de disuasión focalizada parecen mantenerse en contextos latinoamericanos como la zona de Plateros en Ciudad de México.

Palabras clave: disuasión focalizada; homicidios dolosos; Alto al Fuego; violencia; México.

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Introduction

This paper analyses the impact of the *Alto al Fuego* program on intentional homicides in the Alvaro Obregon district of México City. The objective was to study the efficacy of focused deterrence strategies for reducing violence in a Mexican context. Therefore, the main research question which the paper addressed was: Can focused deterrence programs reduce violence in Latin American contexts like the ones found in urban Mexican cities? Two methodologies were applied for assessing the impact of the *Alto al Fuego* program on homicides in the Alvaro Obregon district: 1) interrupted time series with control groups and 2) synthetic control methods. Interrupted time series is a method that allows for analyzing the impact of an intervention on the level and tendency of a variable, in this case intentional homicides, as well as evaluating the statistical significance of the results (Penfold and Zhang, 2013). Synthetic control methods estimate the impact of an intervention by estimating the behavior in the outcome variable in the treatment group, had the intervention not occurred, and comparing it to the observed behavior (Circo *et al*., 2021).

For the interrupted time series, three control cases were selected: Magdalena Contreras, Coyoacan, and Benito Juarez districts; due to their geographic, socioeconomic, and political similarities with the treatment case, the Alvaro Obregon district. Parallel tendencies and other requiered conditions were evaluated. The interrupted time series design allowed for establishing whether the implementation of the *Alto al Fuego* program resulted in significant changes in level and tendency of intentional homicides in the Alvaro Obregon district.

For the synthetic control, the donor pool was composed of the following districts: Tlalpan, Magdalena Contreras, Cuauhtémoc, Cuajimalpa, Azcapotzalco, Coyoacán, and Benito Juárez. The variables considered in the construction of the synthetic control were: human development index, perception of insecurity, prevalence of conflicts, Gini coefficient, confidence in police, population density, population in extreme poverty, prevalence of shootings, and prevalence of illegal drugs. The objective of the method is to estimate a hypothetical comparison group from a weighted average of

untreated units that allows for an estimation of what would have happened in the absence of the treatment.

This research adds to the knowledge regarding the efficacy of focused deterrence strategies for reducing violence in Latin American contexts, specifically in México. The paper starts with a theoretical discussion regarding focused deterrence and its effects on violence. This is followed by a revision of cases of successful implementation of focused deterrence programs in other contexts. Subsequently, the paper describes the methodologies applied and the obtained results in depth. Finally, the conclusions are presented regarding the effect of the *Alto al Fuego* program on intentional homicides in the Alvaro Obregon district.

It is important to mention that the *Alto al Fuego* program is the first effort to implement a focused deterrence strategy in México which has been sustained long enough to allow for an assessment of its impact, has ensured fidelity to the focused deterrence methodologies by relying on a partnership with Yale University and Innovation for Poverty Action, and has implemented a pilot which favors the impact evaluation of the intervention. In the Plateros sector of the Alvaro Obregon district, authorities found a favorable context for the implementation of focused deterrence programs (high violence associated to groups rivalries) similar to places were these types of programs had success in other countries. Also, the context found in the Plateros sector of the Alvaro Obregon district can also be found in areas of other Mexican cities like Monterrey or Guadalajara. If the *Alto al Fuego* program proves to be successful in reducing violence in the Alvaro Obregon district, similar strategies could be implemented with high chances of success in other Mexican cities.

Focused deterrence and violence reduction

Literature on focused deterrence and its impact on violence reduction is abundant in Anglo-Saxon contexts. However, literature regarding its implementation in Latin American contexts is scarce. A revision of the theoretical framework behind the replication of this type of strategies in many cities of the United States of America and other contexts is essential to understanding the attempt of using these techniques in a Latin American context. This research picks up on the criminology literature regarding focused

deterrence and its intersection with public policy literature regarding policy impact evaluation.

One of the main strengths of focused deterrence strategies is that their designers have been able to clearly explain the theory of change and assumptions behind these interventions. This facilitates the understanding of the causal chain behind these programs and their replication. Two main assumptions sustain most of the focused deterrence programs: 1) the law of violence concentration: few people and places concentrate most crime and violence (Abt, 2019) and 2) the idea that certainty and celerity (reducing uncertainty) are key elements for reducing violence (Kleiman, 2010). Despite the variations that exist between the different programs under the focused deterrence framework, these two premises appear in all of them. It is important to consider that the main mechanism by which focused deterrence attempts to reduce violence is by increasing the perceived costs and risks of violent behavior on individuals most at risk. This is complemented with outreach and legitimacy building actions, which "provide the carrot" in the mechanism by which these programs attempt to change behaviors (Braga and Weisburd, 2015).

Most crime and violence prevention can be attributed to what academics denominate *informal social controls* (affections, beliefs, etc.) (Weisburd *et al*., 2021). Due to these, most people will never commit a violent act or crime. Therefore, generalized prevention strategies divert resources towards persons that would never perform violent or criminal acts. This explains why most meta-analysis have found that the more focalized a program is, the bigger its possibilities of success (Abt and Winship, 2016). Even the evaluations done on focused deterrence strategies have shown that programs of this nature which are more focalized have higher probabilities of success.

The areas or population groups that tend to be perceived as unsafe or risky are generally not. Only a small group of people and places in those communities are the ones that concentrate most of the violence (Kennedy, 2011). Papachristos and Wildeman (2012) have performed research that precisely demonstrates that violence and crime tend to concentrate on networks of victims and victimizers. Understanding how those networks operate and providing prevention programs adapted for these populations, tends to bring good results regarding violence prevention. Instead of thinking on generalized

strategies for the city, the problem becomes more manageable when it is observed from the perspective of a handful of places and people. Another fundamental aspect of this type of strategies is that they start with violence itself. It is common to hear the phrase "we have to attend the root causes of violence". On that idea, a big number of resources have been assigned to attend socioeconomic issues with the intention of having some impact on violence and crime. The results have fallen short because most of these programs lack solid theories of change or lose effectiveness when implemented in environments with high violence and crime equilibriums (Chapa and Ley, 2015). In contexts of high uncertainty, people will tend to take everything they can while they can. In response to this, the premise behind focused deterrence strategies is that stopping the bleeding is first priority (Abt, 2019). Addiction prevention campaigns or work-oriented training will have little impact if the youth most at risk does not know if they will still be alive tomorrow.

The causal link between inequality and violence works both ways. Violence also perpetuates poverty and inequality in communities. Investments or prosperous businesses will hardly come to communities with high crime and violence equilibriums. Therefore, if we want socioeconomic programs to aide in reducing risk factors regarding violent or criminal conducts, it is essential to first stop the high violence chain that impedes these programs to perform adequately. Focused deterrence strategies aim to provide socioeconomic opportunities for youth at most risk, but first they attempt to stop the violence so that they can work.

To stop the violence, it is essential to change the incentives that generate high crime and violence equilibriums (Kleiman, 2010). Specially, we must address the uncertainty under which most high-risk individuals live. Government can reduce this uncertainty through policies that clearly state which conducts will not be tolerated and what would be the State´s response in case of incurring on them. Therefore, the degree in which policies for reducing violence increase the celerity and certainty regarding the State´s and community´s response to violent and criminal acts affects the probabilities of success. On the contrary, severity becomes irrelevant or, even, counterproductive. The more severe the sanctions are, the more difficult they are to implement with certainty and celerity. Less severe responses, but fast

and certain, have more probabilities of changing violent conducts (Kleiman, 2010).

It is under these premises that focused deterrence strategies contemplate clearly communicating to individuals at most risk which are the activities that would not be tolerated and the responses that will immediately follow. Of course, this communication focuses on the objective of helping these individuals to live the life they cherish away from violence, but it is important to be clear regarding the immediate consequences of violent conducts. Therefore, reducing uncertainty should not only be the aim of the socioeconomic programs offered, but also of the authority´s and community's responses to violent acts. By doing this, the narrative of not having other opportunities or that the authority´s response is discretional loses meaning.

Not all focused deterrence interventions are based on the epidemiological violence prevention model. However, many of them do recover the premises of such model to propose responses to the problem of urban violence. This model proposes that violence behaves like an epidemic that expands when risk factors increase. Therefore, in order to reduce violence it is necessary to decrease risk factors such as addictions, early pregnancy, unemployment, etc. (Buggs *et al*., 2022). Focused deterrence works by incrementing the costs of violent behavior on individuals most at risk, but also by attending the risk factors through outreach programs.

From this perspective, focused deterrence strategies first identify the individuals and places at most risk and then focus the efforts to reduce risk factors on those individuals and places. According to the epidemiological model, the best way to reduce violence is to stop the chain of contagions. To do this, these strategies may use social workers and violence interrupters which act as mentors and mediators. The model does contact tracing (typical of epidemic responses) to concentrate prevention efforts on violence hot spots, mainly to avoid retaliations. This complements the deterrence component of these strategies.

Focused deterrence strategies also build on the assumption that the best predictor of a homicide is a previous homicide (Papachristos and Wildeman, 2012). Therefore, an effective strategy for preventing violence is to detect and respond to violent acts quickly and prevent the retaliations that may derive. It is also essential to consider that most victimizers are at the same time victims

of violence (Blattman, 2022). A significant number of individuals which act violently suffered violence earlier. Hence, it is essential to attend the role of trauma in the violence cycle.

There are focused deterrence strategies that attend the role of trauma, complementing the deterrence component with actions known as trauma-based interventions. The premise behind this type of interventions is that most of the individuals which behave violently suffer some type of trauma derived from previous violent experiences. Therefore, cognitive behavioral therapy combined with economic incentives for this group of individuals can provide good results regarding violence reduction (Blattman, 2022). An important lesson from the evaluations performed on focused deterrence strategies is that the deterrence component alone is not enough. It is important to increase the costs and risks associated with violent behavior, but it is also important to provide an alternative to these individuals and to build the legitimacy that will derive in the collaboration of the community (Braga and Weisburd, 2015).

Previous experiences

During the 80´s and 90´s, the city of Boston lived a homicide crisis linked to the consumption of crack. The growth in violence was not exclusive of Boston, but the city decided to consult with a group of young researchers of the Kennedy School of Government at Harvard University to respond to the crisis. The result was the design of a strategy known as Operation Ceasefire. The main ideas behind the strategy were the law of violence concentration, the necessity of cooperation between authorities and communities, and an adequate balance between preventive and punitive actions (Kennedy, 2011).

The central premise was that a focalized approach which targeted those individuals at most risk and generators of most of the violence could provide better results than generalized strategies or systematic reaction (Abt, 2019). Hence, an agreement between communities and authorities was necessary to reach those individuals and offer them alternatives for leaving violence or, in case of not doing so, concentrate the punitive actions of the State on them. These individuals were offered cognitive behavioral therapy, mentorship, work-related training, access to economic incentives, and a variety of other services in exchange for ending their violent actions. They were also warned that, in

case of not ceasing their violent behavior, authorities were ready to proceed legally with their cases and concentrate the punitive action of the State on them (Kennedy, 2011).

For an adequate performance of Operation Ceasefire, it was fundamental that this small group of individual perpetrators of most of the violence, understood that the main objective was to help them change their lives, but if they didn´t take the opportunity, authorities and community were ready to stop them. Therefore, it was important to have the services and benefits ready and available to them, but also that the threat regarding the use of punitive tools by State was credible and clear (Abt, 2019).

The results of Operation Ceasefire were very promising. During its implementation, the city of Boston experimented a reduction of approximately 60% of its homicides, among other positive indicators. These results were responsible for naming that time period in the city as the Boston Miracle (Kennedy, 2011).

From this original intervention in Boston, several variants were developed which attempted to reduce violence or crime through the premises of focused deterrence. These variants can be categorized in three types: the programs that attend conflicts and violence between groups, those that target open drug markets, and the ones that focus on repeat offenders (Braga *et al*., 2018). Although the focus may vary, the mechanism by which they attempt to reduce violence or crime is the same: increase the perceived cost and risk of violent or criminal behavior complemented with outreach activities and increasing collective efficacy.

The first type of focused deterrence programs, which are focused on gang violence, draw on the Boston Ceasefire experience. The idea is to identify violent groups, communicate clearly to them which conducts won´t be tolerated, offer help for those who want it, and pull all levers on those who decide to continue with violent behaviors. Most of the experiences have been replicated under the name Ceasefire with reasonable success (Braga *et al*., 2018). Some of these experiences are Operation Ceasefire in Los Angeles, Operation Ceasefire in Rochester, Operation Peacekeeper in Stockton, and Operation Ceasefire in Newark. The *Alto al Fuego* program in México City stems from this type of strategies.

The second type of focused deterrence programs attempt to reduce violence and crime generated by open drug markets. The idea is to identify street-level dealers, incapacitate violent drug offenders, and suspend criminal cases for nonviolent dealers which maintain themselves away from violence and operating in open markets (Braga *et al*., 2018). These types of programs also depend heavily on clearly communicating to dealers which behaviors won´t be tolerated and offering help. Some of these types of experiences are Drug Market Intervention in Peoria, Drug Market Intervention in Nashville, Drug Market Intervention in High Point, and Drug Market Intervention in Roanoke.

Finally, a third type of focused deterrence interventions aim to prevent repeat offending by high-risk individuals. These strategies identify individuals most at risk, communicate to them that their violent and criminal behavior won´t be tolerated and their next offense will imply extraordinary legal attention (pulling all levers), and cooperate with the community to offer help to these individuals (Braga *et al*., 2018). Some of these types of experiences are Project Safe Neighborhoods in Lowell, Indianapolis Violence Reduction Partnership, Community Initiative to Reduce Violence in Glasgow, and No Violence Alliance in Kansas City.

Each of these alternatives have shown positive results in the reduction of homicides and gun violence. Of course, the findings are limited to the context and moment of the implementation. They do not imply that the implementation in a context like México would necessarily have the same results. However, the fact that focused deterrence strategies have been implemented in different countries and moments with good results is promising regarding possible results in México. It is also important to note that these results are limited to homicides and gun violence, no effect has been evaluated on other type of crimes.

Not all programs have been evaluated with the rigor that randomized control trials (RCTs) imply. The initial evaluations performed on focused deterrence programs which showed great reductions in homicides didn´t have the rigor of experimental or quasi experimental protocols. More recent evaluations, like the ones included in the Campbell reviews and which have more rigorous designs, show more modest significant reductions in homicides and violence. According to the Campbell Collaboration reviews and the meta-analysis conducted by Braga *et al*.,(2018), more rigorous evaluation designs

have led to more modest violence and crime reductions which can be attributed to focused deterrence programs. However, the positive effects identified still make them a useful tool to consider in the policy mixes for addressing violence and crime. The deficit of evaluations with randomized control trials for focused deterrence programs persists. Moreover, there is almost no evidence regarding the impact of this type of programs in Latin America.

It is also important to note that there is no conclusive evidence regarding how much each of the components, i.e. the punitive aspect vs. outreach actions of Operation Ceasefire, contribute to the positive results. The studies so far seem to conclude that there are modest reductions in violence and crime, but focused deterrence programs are treated as a black box, where there is still no evidence regarding the importance of each of the mechanisms behind these strategies (Braga *et al*., 2018).

A fundamental aspect which seems to be demonstrated by the evaluations performed is the importance of focalizing the efforts on the individuals most at risk of committing criminal or violent acts. The meta-analysis performed points out that, the most focalized an intervention is, the bigger its probabilities of success regarding violence reduction (Abt and Winship, 2016). Therefore, the premise of a small percentage of individuals and places concentrating most of the violence is sustained, making it more efficient to focus efforts on them rather than on generalized strategies.

Another fundamental aspect of focused deterrence programs is that they have an important spillover effect which has been identified in the systematic reviews performed by Braga and others (Braga *et al*., 2018). The incapacitation of specific offenders and direct communication with high-risk individuals of the implications of their behavior travel further than the individuals and groups directly involved. Therefore, it is important to consider the spillover effects on the evaluations of these types of strategies.

The Alto al Fuego program

The Plateros area in the Alvaro Obregon district of México City had been a homicide hot spot for several years before Claudia Sheinbaum became the head of México City´s government. More than 50% of homicides in Alvaro

Obregon happened in the Plateros area. Most of the homicide victims and victimizers were young men between the ages of 20 and 25 years. Also, most of these homicides had been related to disputes between several criminal groups. All these conditions seemed like an ideal scenario for the implementation of focused deterrence strategies (Programa de Seguridad Ciudadana de la Universidad Iberoamericana, 2022).

Different levels of government in México had tried to implement focused deterrence strategies before as a response to high homicide rates. However, they had failed to establish effective coordination setups between the judicial and the executive branch, sustain the program for a long enough period to observe some effect, or didn´t have the rigor to follow a clear focused deterrence methodology. Also, many efforts were discarded under the argument that focused deterrence will not work in México due to organized crime influence. With the assistance of Innovation for Poverty Action and Yale University, the Government of México City was able to adapt the Operation Ceasefire model used originally in Boston to the Mexican context and launch a pilot program in the Plateros area of the Alvaro Obregon district (H. Enkerlin, personal communication, July 28, 2022). Until today, the program has only been implemented in this sector of the Alvaro Obregon district. There are plans for introducing the program in other areas of México City, but they have not been implemented yet.[1].

During the design of the *Alto al Fuego* program, authorities found that fifty men were responsible for most of the violence in the Plateros area of Alvaro Obregon. They also found that the violence was related to disputes between criminal groups which operated in the area. Therefore, the program was designed to focus on those fifty men most at risk of violence and on the conflict dynamics between these groups. An intersectoral coordination group was established which meets twice a month to analyze the homicides and conflict dynamics in the sector. As products of these meetings, the group identifies the main generators of violence in the sector and elaborates a group violence scorecard. Upon these products, the resources of the program are deployed to

[1] According to the Rules of Operation of the program, it will also be implemented in the Gustavo A. Madero and Iztapalapa districts. However, until today, the program has only operated in the Plateros area of the Alvaro Obregon district (Secretaría de Seguridad Ciudadana del Gobierno de la Ciudad de México, 2023).

prevent and dissuade violent acts (Programa de Seguridad Ciudadana de la Universidad Iberoamericana, 2022).

One of the main components of the strategy is to communicate to those individuals most at risk that they have been identified as generators of violence and authorities are ready to act in case the violence does not stop. However, the program does not use call-ins as in the United States. Instead, authorities communicate one on one, mainly in the home of the individual, the message that the intention is to help them live a life worth living away from violence, let them know the social services offer available to them, and the warning that if violence does not stop, they will pull all levers to stop them. The program can be divided into four steps: analyzing the problem (identifying generators of violence), dissuasive communication, pulling levers, and providing social services (H. Enkerlin, personal communication, July 28, 2022).

The program is coordinated by the Office for Crime Prevention (Dirección de Prevención del Delito) of the Secretaría de Seguridad Ciudadana of México City´s Government. However, it depends heavily on cooperation with México City Attorney´s office (Fiscalía General de la Ciudad de México). The target population are young adults at high risk of being victims or victimizers of armed violence in the Plateros sector of the Alvaro Obregon district (same populations will be considered in the efforts to expand the program in the Gustavo A. Madero and Iztapalapa districts of México City). The minimum age to be considered as a beneficiary is 12 years old, since studies have shown it is an age when young men start to get involved in criminal and violent activities Secretaría de Seguridad Ciudadana del Gobierno de la Ciudad de México (SSC CDMX, 2023).

The social component of the program can be divided into three main actions. *Sanar* is a strategy focused on the victims of violence which offers therapy and social services to them with the intention of preventing retaliation and helping them heal from trauma. *Mentoría* is a component centered on the victimizers which offers them cognitive behavioral therapy, social services, constant counseling, job opportunities, and in some cases a stipend. *CurArte* is an initiative that provides art-based therapy for a more general population (not focused on victims or victimizers) which lives and socializes with the population at risk. Recently, two complementary components were added to the program: *Sociedad de Niñas* (workshops for teen women in high violence contexts

regarding sexuality, empowerment, and life plan) and a unique cash transfer of $1400 Mexican pesos for victims of armed violence. In 2023, the program intends to directly provide these services to 203 beneficiaries (Programa de Seguridad Ciudadana de la Universidad Iberoamericana, 2022; SSC CDMX, 2023).

The program relies heavily on conditional cash transfers to support the participation of high-risk individuals in the activities contemplated on the social component of the program. In 2023, 69 monthly stipends of $2000 Mexican pesos for a period of four months were assigned to beneficiaries of the *Sanar* workshops. Also, twenty monthly stipends of $2000 Mexican pesos for a period of two months were assigned to beneficiaries of the *Mentoría* component. It is also important to mention that forty-four monthly stipends of $1500 Mexican pesos for a period of four months were assigned to beneficiaries of the *CurArte* workshops. Thirty monthly stipends of $1500 Mexican pesos were assigned to beneficiaries of the *Sociedad de Niñas* workshops. Finally, forty unique cash transfers of $1500 Mexican pesos were assigned to victims of armed violence (SSC CDMX, 2023).

An important difference between *Alto al Fuego* and other focused deterrence interventions is the use of police officers with degrees in psychology or social work for providing social services like counseling or therapy. Most focused deterrence strategies rely on external providers, mainly people from the communities affected by violence with a similar life story to that of potential victims and victimizers, for assisting the target population with counseling, therapy or as violence interrupters. *Alto al Fuego* relies on specialized police officers for performing those tasks. It is important to mention that México´s City police can do this because it has 79,567 officers assigned to proximity tasks and 2865 officers assigned to prevention tasks throughout the city. It has the highest proportion of preventive police officers per 1000 inhabitants in México with a rate of 3.7, while the national average is 0.9 preventive police officers per 1,000 inhabitants according to Instituto Nacional de Estadística y Geografía (Inegi, 2023a).

Despite differences like the one mentioned above, *Alto al Fuego* remains faithful to the main focused deterrence principles. The program is based on the premise that violence tends to concentrate in a few people and places. It is also designed on the premise that the main predictor of future violence is previous

violence. Therefore, the program addresses the risks of social proximity to violence. Also, the program relies heavily on cognitive behavioral therapy approaches to stop the spirals of violence, as in many of the most successful focused deterrence interventions. Finally, the program uses dissuasive communication to provide certainty and celerity regarding the authority's response to violent acts.

The program relies on its partnership with Yale University and Innovation for Poverty Action to ensure program fidelity. Despite it being implemented only in the Plateros area so far, the spillover effects known to focused deterrence strategies make it plausible for the program to have impacted other areas of the Alvaro Obregon district. The implementation has faced challenges regarding the transfer of a program designed originally for contexts in the United States to a Latin American context, but there have been adaptations like the involvement of police officers in outreach activities which have allowed for the program to remain faithful to the focused deterrence model.

During the implementation of *Alto al Fuego*, thirty-six people responsible for violence in the Alvaro Obregon district have been arrested. Eighteen of them were priority targets due to their violent activities. Homicides have been reduced in the Plateros sector of the Alvaro Obregon district from 58 in 2019 to 23 in 2022. Until march of 2023, 498 people had been beneficiaries of the social components of the program (Alzaga, 2023).

Methodology

This article analyzed the impact of the *Alto al Fuego* program on homicides in the Alvaro Obregon district of México City. The hypothesis was that the implementation of the program reduced homicides rates. Therefore, the independent variable (treatment) was the implementation of the program, and the dependent variable was homicide levels. The research design was longitudinal. There were two methodologies applied. First, I used interrupted-time series analysis with control groups to compare the evolution of homicides in Alvaro Obregon to similar districts in México City. After that, the analysis is complemented with synthetic control methods to compare the evolution of homicides in the Alvaro Obregon district with a synthetic control. The selection

of the *alcaldia* (district) level of analysis responds to the spillover effects known to focused deterrence strategies.

The first method used for the analysis were interrupted-time series with control groups. This is a quasi-experimental method which evaluates the statistical significance of changes in the behavior of a variable (in this case, homicides) due to an intervention (in this case, the implementation of the *Alto al Fuego* program). The interrupted time-series model was applied to the homicide data reported in each of the districts selected. I used the data reported by the Secretariado Ejecutivo del Sistema Nacional de Seguridad Pública, since it is the official data used by different government levels. The use of interrupted time-series analysis evaluates changes in level and tendency associated to an intervention, while controlling for the global tendency on the variable of interest (Penfold and Zhang, 2013). Interrupted time-series help identify the moment of the change, what was happening before the intervention, what happened immediately after the intervention, and what happened in a longer period after the intervention (Rodgers and Topping, 2012). Three interrupted time-series analysis with control group were applied. The data complies with the requirements for the use of interrupted time series and the corresponding autocorrelation tests were applied.

The selection of the control cases was done through a matching process that considered several aspects of districts, such as sociodemographic characteristics, geographic proximity, economic activity, and political and institutional development. Also, a similar level and trend on the variable of interest (homicides) was considered on the matching process. Finally, I controlled for hidden variables using parallel tendencies. The selected control cases were Magdalena Contreras, Coyoacán, and Benito Juárez districts.

The second method used were synthetic controls. This is a quasi-experimental method that compares changes in the outcome variable after an intervention between the treated and untreated units. Synthetic controls estimate changes in the outcome variable in the treatment unit had the intervention not occurred. The synthetic control is constructed through a weighted average of pre-treatment covariates and outcomes in untreated units.

For the construction of the synthetic control, the donor pool consisted of the following districts: Tlalpan, Magdalena Contreras, Cuauhtemoc, Cuajimalpa,

Azcapotzalco, Coyoacan, and Benito Juarez. The variables considered in the development of the synthetic control were: human development index, perception of insecurity, prevalence of conflicts, Gini coefficients, confidence in police, population density, population in extreme poverty, prevalence of shootings, and prevalence of illegal drugs. The estimated treatment effect is calculated as the difference between the observed (treatment) unit and the weighted synthetic control.

Independent variable

The Alto al Fuego program is a focused deterrence intervention whose objective is to reduce homicides in a specific area. The program is inspired in the Operation Ceasefire model implemented in several cities of the United Stated of America. These interventions are based on the assumption that a small percentage of individuals and places concentrate most of the violence. The objective is to reach individuals most at risk and in partnership with the community offer them several support programs and make them know that violence will not be further tolerated. The program was implemented as a pilot in the Alvaro Obregon district in México City. The extension of the program to other areas of the city is under analysis.

Dependent variable

Homicide supposes the knowledge and will of the person that commits it. Its main characteristic is the intention to kill. Most homicides in México are related to organized crime and are committed with firearms. During the last two decades, México has faced extremely high levels of homicides. Several policies have been implemented in an attempt to reduce them. However, the deployment of military personnel has dominated the efforts to reduce violence in the country. This research analyses all homicides, regardless of their relation to organized crime or the type of weapon used.

To evaluate the impact of the *Alto al Fuego* program on homicide levels and tendencies, I used the homicide data published by the Secretariado Ejecutivo del Sistema Nacional de Seguridad Pública. Since it is data of official

investigations started by the attorneys' offices, it is important to consider possible underreporting. However, this is the official data used by the different levels of governments in México to evaluate homicide rates evolution.

Results for the time series analysis

To evaluate the results of the model, it is important to mention that the use of interrupted time series facilitates the observation of changes in two aspects of the variable of interest: level and tendency. Change in level refers to the variation in the quantity of a variable immediately after an intervention. The change in tendency refers to the variation of the slope of the tendency line before and after an intervention.

Interrupted time-series model with Magdalena Contreras as control

The model results show that Alvaro Obregon did have a statistically significant (at the 0.10 p-value threshold) reduction in homicide levels in comparison to Magdalena Contreras after the implementation of *Alto al Fuego*. Also, in comparison to Magdalena Contreras, the district of Alvaro Obregon had a very slight reduction in tendency, but it was not statistically significant. Even though Alvaro Obregon did show a reduction in level and tendency of homicides after the implementation of *Alto al Fuego*, the reduction in tendency and level of homicides in Magdalena Contreras, the control group, implies that the reductions in homicide trends observed in both cases could be caused by something besides the program.

In summary, although Alvaro Obregon did show reductions in homicide level and trend after the implementation of *Alto al Fuego*, it was only possible to find changes that were statistically significant regarding the level of homicides. This could be attributed to a similar reduction in homicide trend observed in the control group, Magdalena Contreras. Alvaro Obregon did show reductions in homicides that were bigger than those of the control group, Magdalena Contreras, but the similarities in the changes did not allow for statistically significant results. The results of the model only corroborate the

hypothesis that the implementation of *Alto al Fuego* would cause a reduction in homicide levels, but wouldn´t affect trends.

The results of the model only corroborate the hypothesis that the implementation of Alto al Fuego would cause a reduction in homicide levels. However, an effect on trends could not be statistically significantly corroborated, as can be seen in table 1 and figures 1 and 2.

These are the results of the interrupted time-series model with Magdalena Contreras as control group:

Generalized least squares fit by maximum likelihood

Model: Homicides ~ Time + AlvaroObregon + AlvaroObregonTime + Level + Tendency + AlvaroObregonlevel + AlvaroObregontendency

Table 1

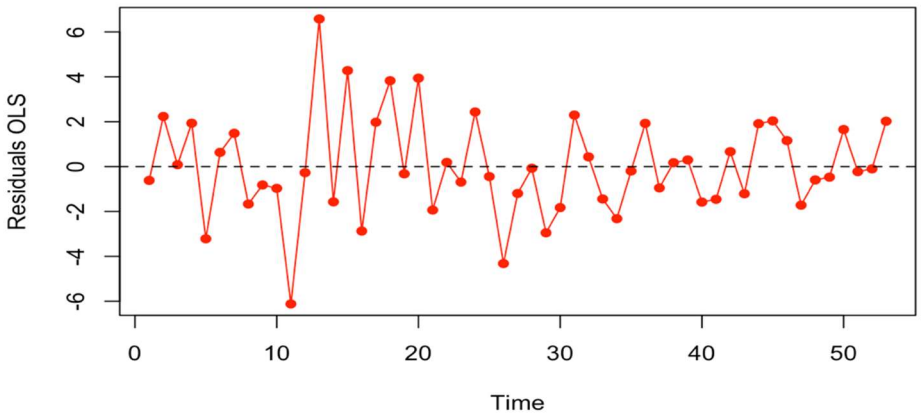
Results of the interrupted time-series model for Alvaro Obregon with Magdalena Contreras as control

Variable	Coefficient
Time	0.194265 (0.0486359)*
AlvaroObregon	7.330442 (0.7167674)*
AlvaroObregonTime	-0.035801 (0.0502107)
Level	-2.548657 (0.5360047)*
Trend	-0.197975 (0.0523754)*
AlvaroObregonLevel	-1.672236 (0.9292277)
AlvaroObregonTendency	-0.050658 (0.0800366)
Constant	0.146105 (0.5799765)
AIC	447.3818
BIC	497.9872
LogLik	-204.6909

*Significant at the 1% level (p<0.01)
Figures in brackets are standard errors.
Source: Own elaboration with data of Secretariado Ejecutivo del Sistema Nacional de Seguridad Pública (2023).

Figure 1

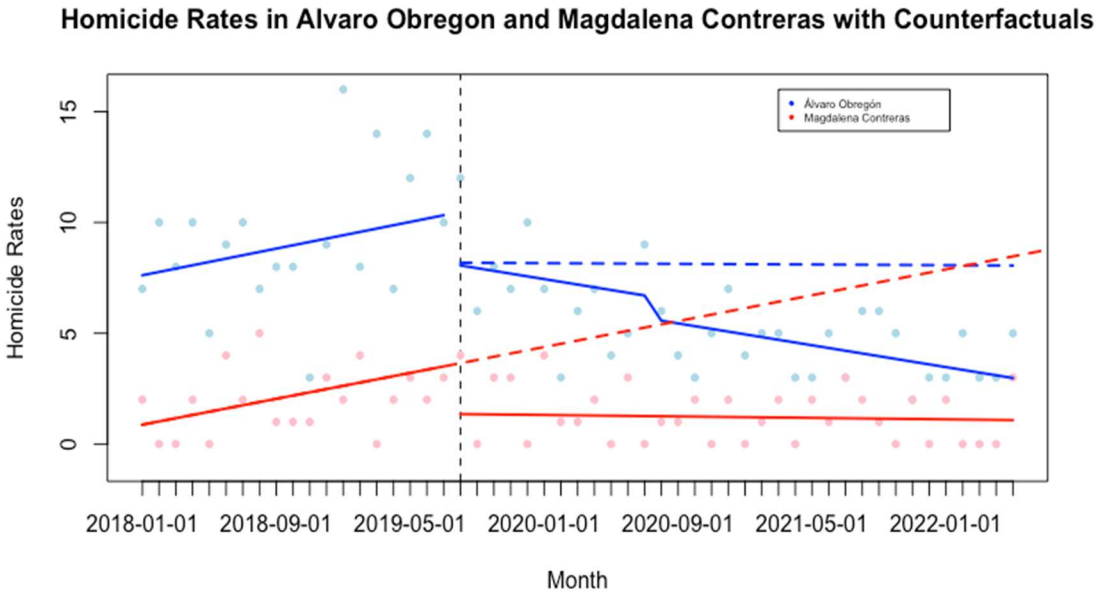
Model residuals analysis



Source: Own elaboration with data of Secretariado Ejecutivo del Sistema Nacional de Seguridad Pública (2023).

Figure 2

Interrupted time-series with Magdalena Conteras as control group



Source: Own elaboration with data of Secretariado Ejecutivo del Sistema Nacional de Seguridad Pública (2023).

Interrupted time-series model with Coyoacan as control group

The model results show a reduction in the level of homicides in Alvaro Obregon in comparison to Coyoacan after the implementation of the *Alto al Fuego* program. However, this change is not statistically significant. Also, in comparison with Coyoacan, the Alvaro Obregon district showed a reduction in the trend of homicides that was not statistically significant. Despite the observed reductions in homicide level and trend in Alvaro Obregon after the implementation of the program, a similar behavior in the control group, Coyoacan, may imply that those reductions could be attributed to something else besides the program.

Even though changes in homicides levels and trends are consistent with the hypothesis that the implementation of a focused deterrence program like *Alto al Fuego* would reduce homicides, it was not possible to statistically attribute causality. Therefore, the model results cannot confirm that the program reduced homicide levels and trends.

These are the results of the interrupted time-series model with Coyoacan as control group:

Generalized least squares fit by maximum likelihood
Model: Homicides ~ Time + AlvaroObregon + AlvaroObregonTime + Level + Tendency + AlvaroObregonlevel + AlvaroObregontendency

Table 2
Results of the interrupted time-series model for Alvaro Obregon with Coyoacan as control

Variable	Coefficient
Time	0.042189 (0.0815983)
AlvaroObregon	4.372185 (1.4500051)*
AlvaroObregonTime	0.058597 (0.1034859)
Level	-1.028451 (0.8045895)
Trend	-0.083815 (0.1006270)
AlvaroObregonLevel	-0.471362 (1.2386282)

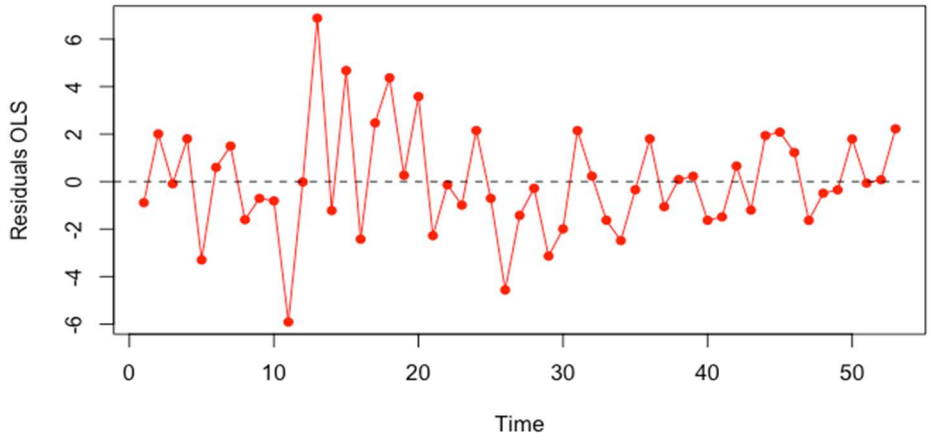
Table 2 (*continue*)

Variable	Coefficient
AlvaroObregonTendency	-0.180167 (0.1470480)
Constant	3.401861 (1.0462226)*
AIC	464.5591
BIC	501.8472
LogLik	-218.2795

*Significant at the 1% level (p<0.01)
Figures in brackets are standard errors.
Source: Own elaboration with data of Secretariado Ejecutivo del Sistema Nacional de Seguridad Pública (2023).

Figure 3

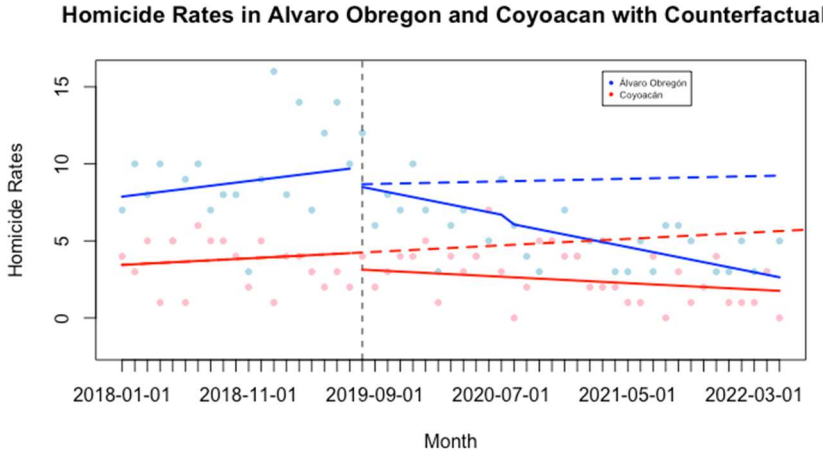
Model residuals analysis



Source: Own elaboration with data Secretariado Ejecutivo del Sistema Nacional de Seguridad Pública (2023).

Figure 4

Interrupted time-series with Coyoacan as control group



Source: Own elaboration with data of Secretariado Ejecutivo del Sistema Nacional de Seguridad Pública (2023).

Interrupted time-series model with Benito Juarez as control group

The model results show a reduction in the level of homicides in Alvaro Obregon in comparison to the control group, Benito Juarez, after the implementation of the *Alto al Fuego* program. However, these results are not statistically significant. The trend in homicides showed a statistically significant reduction (at the 0.10 p-value threshold) in Alvaro Obregon since the implementation of the program, in comparison to Benito Juarez. This last result is consistent with the hypothesis that the implementation of the *Alto al Fuego* program would reduce homicide trends.

In summary: the results confirm that the implementation of the program reduced homicide trends in Alvaro Obregon in comparison to Benito Juarez. This was not observed regarding homicide levels, since a similar reduction in Benito Juarez negatively affects getting statistically significant results. It is important to mention that, despite reductions in homicide level and trend in the treatment group after the intervention, similar reductions in the control group affect achieving statistically significant results in most cases.

Generalized least squares fit by maximum likelihood

Model: Homicides ~ Time + AlvaroObregon + AlvaroObregonTime + Level + Tendency + AlvaroObregonlevel + AlvaroObregontendency

Table 3

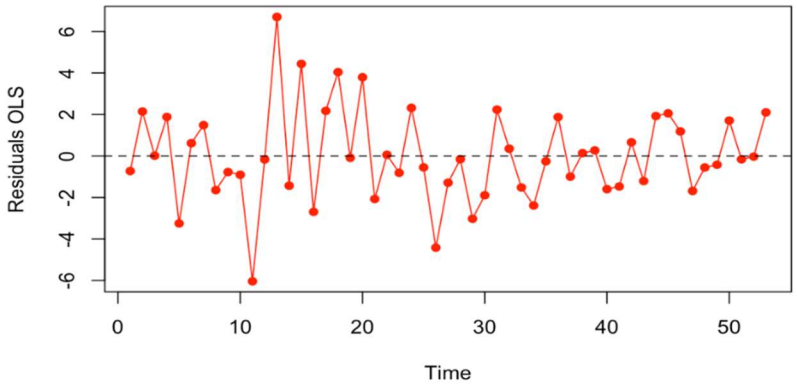
Results of the interrupted time-series model for Alvaro Obregon with Benito Juarez as control

Variable	Coefficient
Time	0.085327 (0.0688796)
AlvaroObregon	6.364891 (1.1931442)*
AlvaroObregonTime	0.051620 (0.0846606)
Level	-1.729841 (0.7241813)*
Trend	-0.073674 (0.0828233)
AlvaroObregonLevel	-0.750359 (1.1395887)
AlvaroObregonTendency	-0.204348 (0.1221433)
Constant	1.146528 (0.8698136)
AIC	454.2907
BIC	491.5789
LogLik	-213.1454

*Significant at the 5% level ($p<0.05$)
Figures in brackets are standard errors.
Source: Own elaboration with data of Secretariado Ejecutivo del Sistema Nacional de Seguridad Pública (2023).

Figure 5

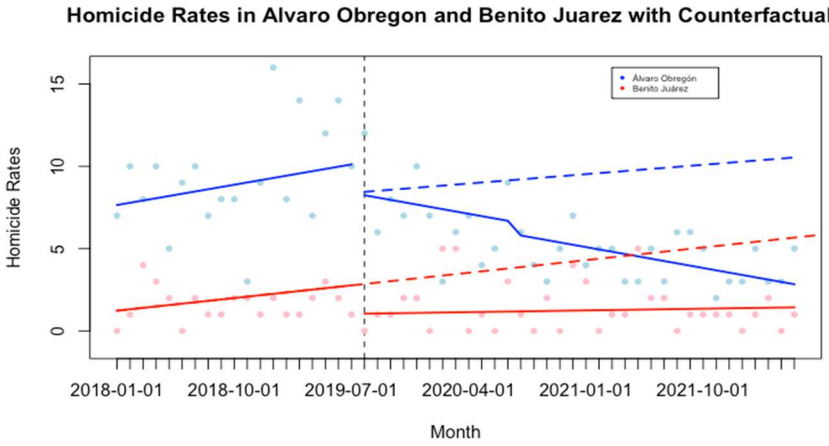
Model residuals analysis



Source: Own elaboration with data of Secretariado Ejecutivo del Sistema Nacional de Seguridad Pública (2023).

Figure 6

Interrupted time-series with Benito Juarez as control group



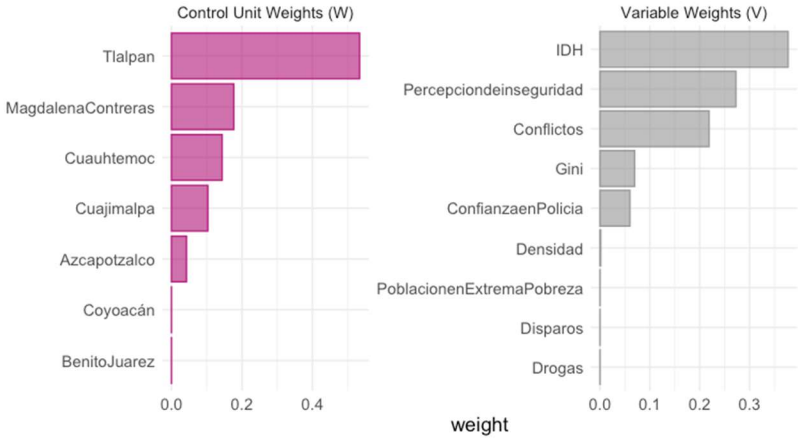
Source: Own elaboration with data of Secretariado Ejecutivo del Sistema Nacional de Seguridad Pública (2023).

Results for the synthetic control methods

Before discussing the results using synthetic control methods, it is important to describe how the synthetic control was elaborated. The following graph describes the weights assigned to each case in the donor pool. Also, the graph describes the weights assigned to each of the pre-treatment covariates.

Figure 7

Construction of the synthetic control

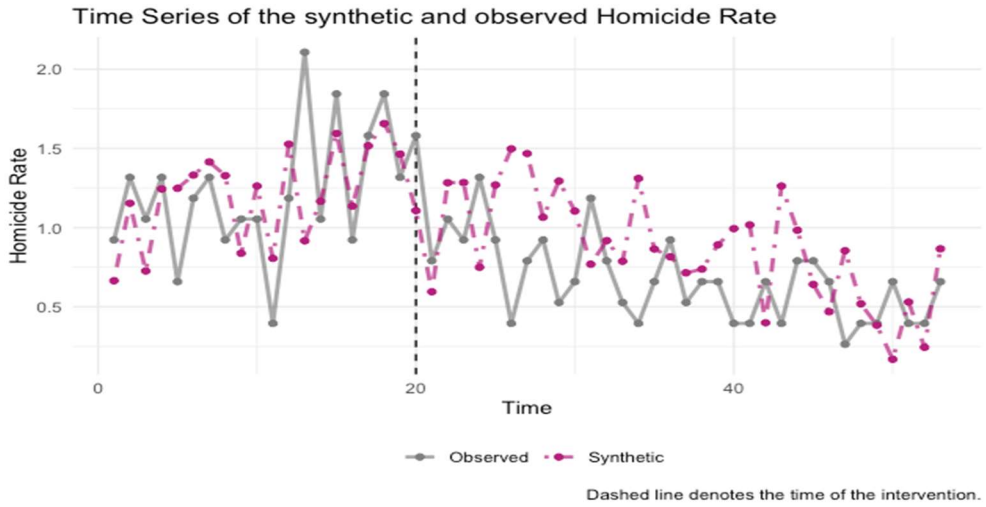


Source: Own elaboration with data from Inegi (2023b) and Secretariado Ejecutivo del Sistema Nacional de Seguridad Pública (2023).

Following the construction of the synthetic control, I could analyze the evolution of homicides in the treatment case in comparison to their evolution in the synthetic control. The following figure illustrates the evolution of homicides in both. The graph shows homicides in the synthetic control are generally higher than in the treatment case in the post-intervention period. However, this is not constant since several moments in the post-intervention period show higher homicide rates in the treatment case than in the synthetic control. The results indicate a reduction in homicides in Alvaro Obregon in comparison to the synthetic control after the implementation of the *Alto al Fuego* program. However, results seem to be inconclusive.

Figure 8

Homicides in the synthetic control and treatment case

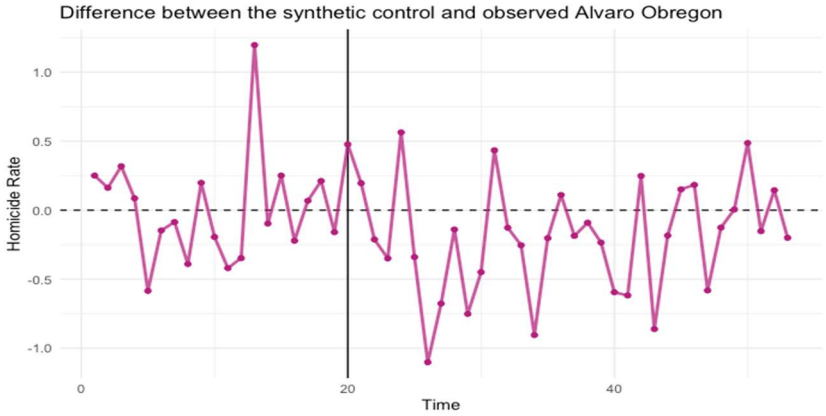


Source: Own elaboration with data from Inegi (2023b) and Secretariado Ejecutivo del Sistema Nacional de Seguridad Pública (2023).

Regarding the specific difference between homicides in the synthetic control and the treatment case, the following graph illustrates the evolution of this difference. It is clearly larger in the post-treatment period than in the pre-treatment period, as expected. Also, the difference is mainly negative in the post-treatment period, indicating a reduction in homicides in Alvaro Obregon in comparison to the synthetic control. However, these results appear inconclusive.

Figure 9

Difference in the synthetic control and observed effect in Alvaro Obregon

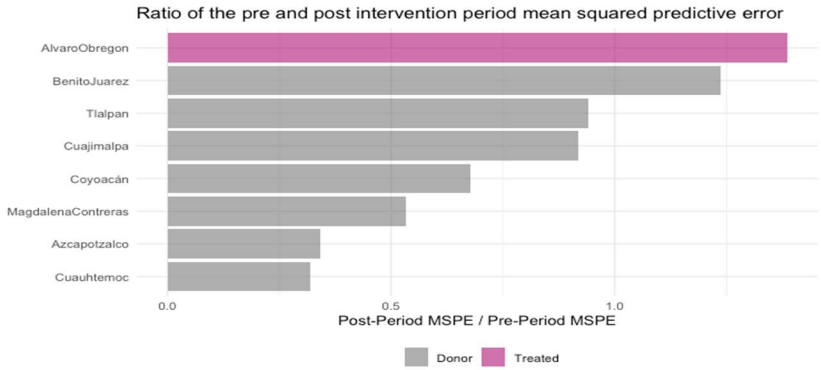


Source: Own elaboration with data of Inegi (2023b) and Secretariado Ejecutivo del Sistema Nacional de Seguridad Pública (2023).

Regarding the mean squared predictive error (MSPE), the following figure shows that Alvaro Obregon, the treated unit, is the case with the highest MSPE, with a result of 1.39. All the cases in the donor pool had a MSPE below the observed result for the district of Alvaro Obregon. This indicates that homicides had a bigger reduction in Alvaro Obregon after the intervention than in the other districts considered in the donor pool. However, the magnitude of the difference in MSPE indicates the results might not be enough to attribute causality.

Figure 10

Ratio of the pre and post intervention period MSPE



Source: Own elaboration with data from Inegi (2023b) and Secretariado Ejecutivo del Sistema Nacional de Seguridad Pública (2023).

The following table shows that Alvaro Obregon was the district in México City with the highest pre and post intervention period MSPE ratio. This confirms the reduction in homicides in the district after the implementation of the *Alto al Fuego* program. The reduction is slightly higher than in other districts that did not receive the intervention, but also experienced a reduction in homicides like Benito Juarez and Tlalpan. The fact that most cases in the donor pool experienced a reduction in homicides (lower than in the treatment case, but still a reduction), is affecting the significance of the results which fall slightly short of being statistically significant (p-value of 0.125). Despite observing a higher reduction in homicides in Alvaro Obregon than in other cases in the donor pool, the results are not conclusive regarding causality.

Table 4

Significance of MSPE results

unit name	type	pre_mspe	post_mspe	mspe_ratio	rank	fishers_exact_pvalue	z_score
Alvaro Obregon	Treatment	0.147	0.204	1.39	1	0.125	1.49
Benito Juarez	Donor	0.163	0.202	1.24	2	0.25	1.12
Tlalpan	Donor	0.394	0.370	0.941	3	0.375	0.370
Cuajimalpa	Donor	0.346	0.318	0.919	4	0.5	0.316
Coyoacan	Donor	0.442	0.300	0.678	5	0.625	-0.295
Magdalena Contreras	Donor	0.528	0.282	0.533	6	0.75	-0.660
Azcapotzalco	Donor	0.613	0.210	0.342	7	0.875	-1.14
Cuauhtemoc	Donor	2.28	0.730	0.319	8	1	-1.20

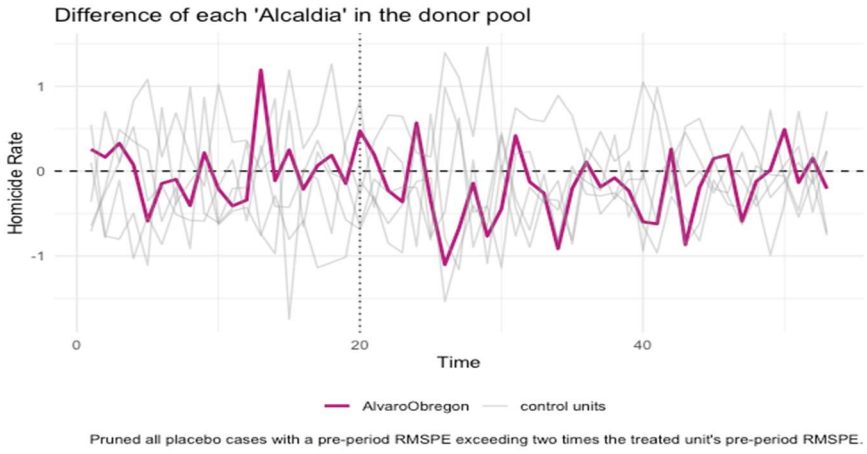
Source: Own elaboration with data from Inegi (2023b) and Secretariado Ejecutivo del Sistema Nacional de Seguridad Pública (2023).

Regarding the results of the placebo tests, the following figure shows that Alvaro Obregon has homicide rates that appear close to the average of the control units in the pre-intervention period. After the intervention, the homicide

rates in the treatment unit, Alvaro Obregon, appear closer to the bottom of the results observed in the donor cases. Despite the change in homicide rates in Alvaro Obregon after the intervention, it is still within the margin of results observed in the donor cases. Therefore, the results are not conclusive regarding causality.

Figure 11

Placebo tests results



Note: RMSPE (Root Mean Squared Prediction Error).
Source: Own elaboration with data from Inegi(2023b) and Secretariado Ejecutivo del Sistema Nacional de Seguridad Pública (2023).

Conclusions

From the research results, it is possible to arrive at several important conclusions regarding the impact of the *Alto al Fuego* program on homicides in the Alvaro Obregon district. It is clear that homicides in the district were reduced substantially since the implementation of the program. This coincides with the hypothesis that focused deterrence strategies can reduce homicide rates in Latin America. This is also aligned with most literature on the United States of America, Liberia, Central America, and the Caribbean regarding the efficacy of focused deterrence programs for reducing violence (evidence is mixed, but most evaluations show promising results) (Braga *et al*., 2018). It would appear that this first focused deterrence effort in a Mexican context corroborates the usefulness of strategies that focus on people most at risk, with an adequate balance of preventive and punitive actions for reducing gun

related violence in a country like México. However, none of the methodologies applied (interrupted time-series and synthetic control methods) provided statistically significant results. Despite observing reductions in homicides in Alvaro Obregon in the post-treatment period, the fact that most districts in México City also show reductions in homicide levels and trends, makes it difficult to isolate the effect of the *Alto al Fuego* program. Therefore, no conclusive evidence regarding the effect of the *Alto al Fuego* program could be obtained with the methodologies used in this research.

A first conclusion derived from the analysis is that the treatment unit (Alvaro Obregon) did show higher reductions in homicide levels and trends than the counterfactuals, but the observed reductions in the control units make it difficult to isolate the effect of the program and conclusively attribute causality. The program appears to provide the results expected according to the theory, but the methodologies applied were unable to provide conclusive evidence due to a context of homicide reductions in all of México City. The program is still young and future studies, perhaps at the neighborhood level and with more time points, could provide more conclusive evidence regarding the effect of the *Alto al Fuego* program on homicides.

A second conclusion derived from the analysis is that despite not finding conclusive evidence regarding a positive effect of the *Alto al Fuego* program on homicides, the results are promising enough to continue the program and keep exploring the implementation of focused deterrence strategies in urban contexts in México. The fact that the treatment case shows higher reductions in homicide levels and trends than the control cases, should be promising enough to continue exploring the effectiveness of focused deterrence strategies in a context of high homicide levels occurring for a sustained period, as observed in México.

A third conclusion derived from the study is that the *Alto al Fuego* program evaluation seems to show the same challenges as other evaluations regarding focused deterrence programs, *i.e.* concluding with mixed evidence. This research complemented interrupted time-series analysis with synthetic control methods in an effort to generate a more robust counterfactual, but the generalized reduction in homicides in most of México City during the post-treatment period, suggests that other factors besides the program are causing homicides to decline in the city. Therefore, it becomes more difficult to isolate

the effect of the *Alto al Fuego* program, even though Alvaro Obregon is the only district where it is being implemented.

Finally, regarding public policy, the results are promising enough to continue implementing a program like *Alto al Fuego* and to explore its replication in other Mexican cities. Many urban areas in the country have violence conditions like the ones found in the Alvaro Obregon district: high concentration of violence in a small percentage of young men related to disputes between rival groups. The difficulties regarding coordination between government areas and cooperation between authorities and communities, have made it difficult for other focused deterrence efforts in México to succeed. However, lessons from the *Alto al Fuego* program, like the importance of technical accompaniment by external specialists and starting with a pilot study, might increase the probabilities of success of future efforts to implement focused deterrence programs in the country.

Further studies with more points in time and a focus at the neighborhood level might provide more conclusive evidence regarding the impact of the *Alto al Fuego* program. Understanding the effectiveness of focused deterrence strategies in a context like México might provide better tools for governments in Latin America to deal with the violence crisis present in many of its communities.

Although the results were inconclusive, they are promising enough to continue exploring the effectiveness of focused deterrence strategies in contexts like the ones found in the Alvaro Obregon district. Violence associated to group rivalries, open drug markets, and repeat offenders (the target of focused deterrence strategies) is present in many Latin American communities. Also, the main principles behind focused deterrence interventions seem to remain valid for contexts like the ones found in Mexican urban areas. This research adds to what we know regarding the feasibility of using focused deterrence strategies to reduce homicides in the most violent region of the world. Despite not being able to attribute causality with the methodologies used in this research, the results imply that focused deterrence strategies might be an instrument which Latin American governments could implement to reduce violence in urban contexts with certain degree of confidence that were will be no harm, are less costly than other type of strategies, and might provide good results regarding homicide reduction.

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Curricular review

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