# Police Reform, Training and Crime: Experimental evidence from Colombia's Plan Cuadrantes[1]

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## Abstract

The Plan Nacional de Vigilancia Comunitaria por Cuadrantes ("Plan Cuadrantes"), is a new program of community policing introduced in the eight major cities of Colombia in 2010 by the Colombian National Police. The strategy consists of dividing the largest cities into small and well-defined geographical areas (*cuadrantes* – quadrants), assign to each a fixed number of policemen and hold them accountable for the results in their *cuadrante*. Under this Plan, policemen are expected to detect the main criminal problems in their quadrant, create a strategy to confront it and, when necessary, work together with the community and other branches of the police force to reduce criminal activities. The complexity of the intervention warranted a comprehensive training program for over 9,000 police officers whose patrolling routines were significantly altered under the Plan. By staggering the training schedule between three randomly chosen groups of police stations, we are able to generate experimental variation in the exposure to training and in the effective implementation of the new police protocols under Plan Cuadrantes. Comparing the 4 months immediately after training with the equivalent months from the previous year, we find a significant reduction in several types of crime attributable to the training program, ranging from around .05 of a standard deviation for homicides and home burglaries to .4 of a standard deviation for brawls. These average impacts are driven by very large effects in high crime areas and very small -or zero- effects in low crime neighborhoods. We suggest that the training program may have had direct effects on crime, possibly through police motivation, but also through improvements in the program's operation, especially in high crime areas.

Keywords: Crime, Police Interventions, Training Program.

JEL Code:

## 1. Introduction

Colombia and its largest cities have gone through long a pronounced cycles of crime and violence during the last 30 years. The homicide rate in Colombia has historically been one of the highest in the world, with a declining tendency only in the last ten years (Figure 1). In Medellin, for instance, the homicide rate reached a level above 400 per 100,000 inhabitants in 1993, when the war against Pablo Escobar and his organization was at its highest peak. During the last few 10 years, Medellin has gone through large variations in its levels of violence. In particular, the homicide rate went from a level above 100 in 2002 to about 30 in 2008. Nevertheless, after the extradition to the U.S. of Diego Fernando Murillo ("*Don Berna*") in May 2008, a new cycle of violence exploded and the homicide rate in Medellin went back up to levels above 60 within just two years[2]. Despite the large decrease observed in the levels of violence throughout the country, in Cali, the third largest city in Colombia, the homicide rate has remained relatively stable at levels above 70 homicides per 100,000 inhabitants (Figure 2).

A non-negligible portion of the violence observed in Colombia during the last 20 years has been drug-related[3] (e.g., associated with illegal drug markets and turf wars between criminal organizations over the control of the territories needed to produce and traffic illegal drugs). However, and as a result of different policies implemented since the year 2000 under the so-called *Plan Colombia*, the levels of violence (terrorist attacks, kidnappings, massacres, etc.) have rapidly decreased (see Figure 1 for the rapid decrease in the homicide rate between 2001 and 2011). Nevertheless, crime rates not associated with armed conflict but rather with urban-type phenomena such as burglaries, car theft, larceny theft, etc., still continue to be high. In order to confront this problem, in July 2010 the Colombian National Police launched a new Plan of community policing known as *Plan Nacional de Vigilancia Comunitaria por Cuadrantes* ("Plan Cuadrantes"). This Plan was the strategic response proposed by the National Police of Colombia in order to transform the way in which patrol policing was being carried out in urban areas. The new initiative under "Plan Cuadrantes" falls within the framework of police reforms introduced

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[2] Confrontations between criminal bands over the control of the drug trafficking routes that "*Don Berna*" used to control was the main reason for the new increase in the levels of violence observed over the last three years in Medellin.
[3] Mejia and Restrepo (2011) estimate that the homicide rate in Colombia would be 64% of what it currently is if the size of illegal Drug markets hadn´t increased to the extent they did (110%) between 1994 and 2008. That is, it would be 23 per 100,000 inhabitants instead of 36.

in different parts of the world during the last few decades and that became popular throughout Latin America since the 1990s (Fruhling, 2004). These reforms have made special emphasis on new forms of community policing (see Llorente et. al, 2011 and Fruhling, 2010). In particular, "Plan Cuadrantes" incorporates several aspects of past reforms that introduced different aspects of what is now known as "*problem oriented policing*," where police services make a transition from a predominantly reactive posture when crimes occur to planning and designing tailor-made responses to the specific types of problems associated with crime, in order to anticipate and prevent their occurrence. Among the main elements of the so-called *problem-oriented policing* are concentrating the attention on those individuals, groups or locations that account for a disproportionate share of crime, working in conjunction with other government institutions and the community, collecting and analyzing information in order to diagnose the main problems, altering the environment in order to reduce the opportunities for crime to recur, and making use of alternative forms of social control in order to reduce crime (Goldstein, 1990).

The main objectives of the *Plan* are to improve operational strategies, exploit strategic complementarities with other units within the National Police, and increase the levels of collaboration with other State agencies and the community (Llorente et al., 2011). In order to evaluate the effects of the implementation of Plan Cuadrantes on the levels of crime and on community perceptions about the police, a team from the Fundacion Ideas para la Paz – FIP (a well-known Colombian think-tank specialized in security studies), in conjunction with the National Police, designed a comprehensive training program for over 9,000 police officers in order to alter their patrolling routines and make them consistent with the new protocols introduced under Plan Cuadrantes. In order to evaluate the causal impact of the implementation of the Plan on criminality levels, the Colombian National Police agreed to stagger the training schedule between three randomly chosen cohorts of police stations. With this, we were able to generate experimental variation in the exposure to training and in the effective implementation of the new policing protocols under the *Plan*. When we compare the 4 months immediately after the training program with the equivalent months from the previous year, we find a significant reduction in several types of crime attributable to the training program, ranging from around .05 of a standard deviation for homicides and home burglaries to .4 of a standard deviation for brawls. These results seem to be largely driven by large reductions in high crime areas, while there seems to be almost no effect on those quadrants characterized by low initial levels of crime.

The paper is composed by six sections in addition to this introduction. In Section 2 we describe the building blocks of Plan Cuadrantes; section 3 describes the related literature and pinpoints the main contribution of this paper; in section 4 we describe the data used in the analysis and describe in detail the experimental design that we use in the impact evaluation of Plan Cuadrantes; section 5 presents the main results derived from our estimations; section 6 explores the possible channels through which the implementation of Plan Cuadrantes may have impacted different types of crime and contraventions; finally section 7 presents the concluding remarks.

## 2. Colombia's Plan Cuadrantes

Under the new strategy, so far implemented in the eight largest cities in Colombia[4], each city was subdivided into small and well-defined geographical areas (*cuadrantes* – quadrants). A team, composed of street patrols of about six policemen divided in three shifts (about two policemen per shift), was assigned to each quadrant and held responsible for identifying the most pressing issues related to crime and insecurity, and devising a strategy to intervene and reduce the levels of criminality. In order to fulfill these objectives, the Plan introduced specific protocols to provide the necessary tools for diagnosing the main security problems in the quadrant, make plans for intervening, and monitoring and evaluating the results of the intervention. More precisely, the new Plan induces a change from patrolling and reacting when a crime occurs to setting up protocols to anticipate and prevent new crimes from occurring. As such, "Plan Cuadrantes" introduces new operational tools and police tactics to the way in which the police runs its main activities every day. In practice, Plan Cuadrantes involves the deploying of street patrols to smaller geographical areas in order to guarantee the coverage of policing services in all areas of the city. The assigned units (patrols) are expected to plan their activities beginning with a diagnosis of the most pressing security issues in the quadrant, devise an intervention strategy in order to confront the problems and set up a system of indicators in order to follow-up on the results of the interventions. In order to operationalize these protocols, each team has to fill a form, known as the *minimum action required form* (Tabla de acciones minimas requeridas – TAMIR) in order to help them plan their service, set the goals and follow up on the results of the

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[4] Bogotá, Medellín, Cali, Barranquilla, Cartagena, Bucaramanga, Pereira and Cúcuta.

intervention. At the technical infrastructure level, Plan Cuadrantes outfits each police station with a Strategic Information Center (Centros de Informacion Estrategica Policial Seccional – Salas CIEPS) that includes computing equipment with up-to-the-minute information on geo-coded criminal activity for all quadrants in the station. At the managerial level, the *Plan* induces adjustments in the way in which physical and human resources are allocated; in particular, the *Plan* guarantees that all city areas are covered by policing services. Furthermore, the Plan decentralizes strategic decisions by empowering the quadrants' patrols in the process of diagnosing the most pressing issues, planning the required interventions and following up the evolution of criminal activities at the quadrant level.

## 3. Related literature

[To be completed]

## 4. Data description and experimental design

Most of the data used in this paper comes from official administrative records. More precisely, we have police reports on 25 crimes and 25 contraventions, but choose to focus only on the three crimes that have the smallest reporting error: homicides, home burglaries and vehicle theft and on two additional crimes that, while generally measured with significant error, are particularly likely to be affected by the program: personal injuries and brawls[5]. Table 1 shows the average levels of each of these crimes (per 100,000 people) for the years 2010 and 2011 and for the seven cities included in the analysis. Cartagena (the eighth city) is excluded because the roll-out schedule of the plan was not implemented appropriately. Our baseline analysis uses data at the level of the *cuadrante* (1,419 in total), but we also report results at the station level. The larger cities most often have higher levels of crime, with some exceptions such as Cali, where homicide rates were the highest in the country in 2010 (Figure 2), or where vehicle theft seems to be worse than any other city. Personal injuries are by far worse in Bogota than elsewhere, but contraventions such as brawls appear to be more of a small-city phenomenon. Overall, crime fell

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[5] We verify this claim using victimization surveys for Bogota, Medellin, Cali and Barranquilla; for the smaller cities we do not have victimization data, but assume that the reporting error is larger for other crimes.

in Colombia between 2010 and 2011, and the goal of this paper is to determine what role police reform and training had in that decline.

As a key component of the implementation of the Plan, a training program was devised in order to develop the police force's readiness for the various tasks the reform involved; also, the training program made special emphasis on improving the soft skills they would need in order to effectively engage the community and to adequately coordinate with teams from other divisions inside the National Police or other state and city institutions. Given that the police trainers could not cover the entire patrol police (9,183 police officers as of May 2011) simultaneously, the evaluation team took advantage of this to propose a phased-in training schedule, constructing three randomly assigned cohorts of police stations in each city. There were 120 stations in total and 35% were assigned to the first cohort, 31% to the second and 34% to the third cohort. Since the city of Cartagena was excluded from the analysis due to implementation problems (12 stations), and population information is not available for a small group of rural stations in Bucaramanga and Cucuta (10 stations) the resulting sample includes 98 stations with 36 in the first cohort, 29 in the second and 33 in the third cohort. Figure 3 shows a timeline of the training program, which lasted 7 weeks for each cohort. The total time span does not match exactly the sum of the training and work weeks because while the first group of cities had their first cohort begin training in May 2011, the second group had their first cohort begin in July 2011. The results presented here correspond to the analysis of the 4 months after training of the first cohort and just before the second cohort begins its training. This is the time period for which the experiment is at its highest level of power, since, after this, the size of the control group is reduced by 29 stations[6]. Given the distribution of stations across cities and the quality of information in small cities with rural stations, out of the 98 stations included, only 14 belong to the second group of smaller cities: 3 in Cucuta, 4 in Pereira and 7 in Bucaramanga, so most of the results will be driven by impacts in the first group of larger cities.

Figure 4 shows the level of homicide rates for the three cohorts (all cities pooled together) for the 12 months prior to the beginning of training for the first cohort (May 2011 for the first group and

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[6] For these first four months, there is a larger imbalance between the size of treatment and control groups, but afterwards, the number of experimental units is much smaller. More precisely, $1/\sqrt{.36(1-.36)98} = .21$ for the first 4 months after training, and $1/\sqrt{.52(1-.52)69} = .24$, so the Minimum Detectable Effect increases (power decreases) by 14% after the second cohort begins its training.

July 2011 for the second group), and shows that, prior to the randomized intervention, the three groups showed no discernible differences in pre-treatment trends in monthly homicide rates. The analogous comparison for all other crimes studied here yields the same conclusion. Other station-level characteristics (personnel, area covered, etc.) showed no statistically significant difference across cohorts, confirming that the randomization at the station-level yields a valid control group[7].

## 5. The effect of training on crime

Although we are primarily interested in ascertaining the impact of the Plan Cuadrantes, we first examine the reduced form effect of the training program on different types of crime and then determine whether any such impacts occurred through an improvement in the program's operation. Given the random assignment of police training, our empirical specification is a standard difference in difference specification:

$$CRIME_{it} = \alpha + \beta_0 TRAINING_{it} + \gamma_t + \delta_i + \varepsilon_{it} \qquad (1)$$

where *i* indexes the *cuadrante* and *t* denotes the 4-month average in 2010 or 2011. We are also interested in understanding possible heterogeneous effects of police training, so we estimate equations of the form:

$$CRIME_{it} = \alpha + \beta_0 TRAINING_{it} + \sum_{\tau=1}^{10} \beta_\tau 1(DECILE_\tau) * TRAINING_{it} + \gamma_t + \delta_i + \varepsilon_{it} \qquad (2)$$

or where instead of deciles of initial levels of crime we may also use a linear form or use counts of a different variable such as the number of drug spots within the *cuadrante*.

Tables 3 through 7 show our basic set of results. The first three columns of each table refer to the four cities in group 1, columns (4) and (5) refer only to Bogota (for which we have processed the data on drug spots in the city) and columns (6) - (8) include both groups of cities, although given the size of the smaller cities and the number for which we have data, these estimates are very similar to those obtained for the large cities alone. For ease of comparability across crimes and

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[7] An F-test of the joint significance of station characteristics such as population, area and initial crime in a regression where the cohort is the dependent variable yields a p-value of .873, rejecting the joint significance of these variables in explaining the treatment.

with other interventions, all coefficients are measured in standard deviations of the crime level before the training program was implemented (corresponding months in 2010). Column (1) of the tables show a negative effect of around 5% of a standard deviation in homicides and home burglaries, around 10% of a standard deviation for vehicle theft and battery / personal injury and about 40% of a standard deviation on brawls. In contrast to home burglary, battery and brawls, the average effect on homicides and vehicle theft is not statistically significant. Column (2) reports the direct effect of the training program but includes an interaction of the program and the level of crime in 2010, and shows a negative and very statistically significant coefficient, generally wiping out the significance of the average effect, which suggests the possibility of very nonlinear effects. Column (3) in the tables includes interactions of the program with indicators of deciles along the distribution of crime in 2010. For all crimes, there are large and very statistically significant negative effects of the training program on crime in the cuadrantes, with the highest levels of initial crime (top 10%). There is a reduction of .69 of a standard deviation in the areas with the highest homicide rates, thanks to the training, a reduction of .72 of a standard deviation in home burglaries, of 1.17 standard deviations in vehicle thefts, 1.43 standard deviations in battery / personal injuries and 1.8 standard deviations in brawls.

These impacts are consistent with the idea that police training increased police effectiveness in general, but that the effect of such improved competence is only apparent where crime levels are high enough so that the impact is large relative to the average crime level. The fact that the size of the coefficients increases in absolute value (becomes more negative) in every case as we move up the distribution of initial crime, suggests this is plausible.

An additional dimension along which the program may have had differential effects is drug-trading spots (frequently called *Ollas*). Drug spots may be associated with high levels of violent crime such as homicides, street fights or personal injuries because drug users and traders may resort to violence as a conflict resolution mechanism more often; drug trading is itself a crime, however, and may command police resources regardless of whether violent crimes are associated with the trade[8]. We estimate a model with an interaction of the training program with the number of drug spots in each cuadrante (column 4 in tables 3 - 7) and with indicators of the presence of

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[8] There is a recent literature studying drug trading organizations' incentives to engage in violent behavior; in general the non-violent equilibrium is the preferred outcome (see De Melo and Mejia, 2011 and Lessing, 2011).

one spot or two or more spots (column 5). This exercise is only carried out for Bogota, since the information on *Ollas* in other cities is not yet been available. The results show that the presence of drug spots does not specially affect the impact of the training program on crime, but instead, that the *absence* of drug spots increases the effectiveness of police training on home burglary, vehicle theft and personal injuries, all of which are related to the time police units actually spend patrolling the streets. Informal conversations with police officers revealed that patrol police officers are often required by their supervisors to seek out and close down the drug spots, which takes up a significant amount of time and limits the amount of time they can devote to patrolling the streets elsewhere. So a given positive effect of training on police effectiveness should be more significant where police attention is not diverted to continually seeking out the drug spots. There is evidence that many of these spots, once closed, are in fact displaced to other nearby locations (ref.), so this interaction is unlikely to be transitory.

Columns (6) - (8) in all these tables essentially replicate columns (1) - (3), but extend the sample to include the second group of cities (14 additional stations or 172 additional *cuadrantes*). These specifications control for seasonal differences in crime rates between the two groups originating in the different training dates. The results are essentially the same, if slightly smaller in absolute value than those corresponding to the four largest cities alone. We also estimate equations (1) and (2) using monthly and bi-monthly *cuadrante* and station-level data with robust standard errors clustered at the station level and obtain similar, albeit less precise, results.


**6. What are the channels?**

As part of the evaluation effort carried out by the Fundación Ideas para la Paz a performance survey was conducted of police officers and higher ranked officialsin order to ascertain the extent to which specific program protocols were being followed. This survey was conducted between November 2010 and February 2011, before the training program began and then a second round, between August and December 2011, after the first cohort finished its training. The survey generates 6 indicators at the station level that measure the extent to which police officers use the basic building blocks of Plan Cuadrantes :  problem-solving orientation,

complementarities with other units in the police, corresponsability, diagnosis and follow up, training, and permanence.

The training program was intended to improve the police officers' readiness and adaptation to the philosophy and protocols of Plan Cuadrantes, which in principle should be reflected in a differential improvement in the management indicators between trained and control stations. We estimate an equation of the form:

$$MANAGEMENT_{it} = \mu + \varphi_0 TRAINED_{it} + \sum_{\tau=1}^{10} \varphi_\tau 1(DECILE_\tau) * TRAINED_{it} + \omega_t + \pi_i + u_{it}$$

as well as the linear counterpart (setting $\varphi_\tau's = 0$), to determine whether training did in fact improve the measured performance of the plan, and also if this effect could have varied across *cuadrantes* with different levels of crime before the training began. When looking at the average effect alone, the training program seems to have had very little effect on management indicators, but when the effect is disaggregated by initial crime, it appears to have improved the indicator of "diagnosis and follow-up" in high crime areas, specifically, in the *cuadrantes* in the 9th or 10th decile of the distribution of homicides, personal injuries and vehicle theft. It seems plausible that the training program had an effect on crime at least in part through the improvement in the actual implementation of the plan in high crime areas, which were the areas with the lowest initial management indicators as well.

Police training may have had an effect on crime through a motivational channel as well. As was remarked on before, beyond the police academy, patrol police officers rarely receive any additional training, and this was the first time they received a training program on soft skill development such as teamwork, leadership or negotiation skills. Conversations with patrol police officers  suggested they were very positively impressed with the initiative and in general felt a higher sense of duty after training, which they viewed as an act of recognition and appreciation by the police's top leadership.

## 7. Concluding remarks

Police training in Colombia has helped reduce the incidence of various types of crime, often related to the presence of police officers in patrolling duties such as vehicle theft, home burglaries and brawls. It has also improved indicators of violent crimes such as homicides and personal injuries. However, training reduced criminality levels only in high crime areas and, in many cases, only in very high crime areas (often called hot spots). The findings are consistent with an interpretation where training increased the police officer's motivation and sense of duty in general, as well as some of the operational indicators of the plan in places where they were most lacking. This increased effectiveness and motivation of the police officer is most likely to be identifiable statistically in high crime neighborhoods.

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Table 1. Scope and size of the PNVCC

|  | Population | Stations | Cuadrantes | Cuadrantes / Station | Police officers | Population / Cuadrantes |
|---|---|---|---|---|---|---|
| Bogota | 7,347,795 | 19 | 768 | 40 | 4,610 | 9,567 |
| Medellin | 2,309,446 | 26 | 184 | 7 | 1,045 | 12,551 |
| Cali | 2,207,994 | 27 | 198 | 7 | 1,165 | 11,151 |
| Barranquilla | 1,182,493 | 12 | 93 | 8 | 520 | 12,715 |
| Cartagena | 899,200 | 14 | 85 | 6 | 528 | 10,579 |
| Cucuta | 597,385 | 7 | 77 | 11 | 350 | 7,758 |
| Bucaramanga | 567,286 | 9 | 84 | 9 | 500 | 6,753 |
| Pereira | 383,623 | 6 | 81 | 14 | 465 | 4,736 |
| Total | 15,495,222 | 120 | 1,570 |  | 9,183 |  |

Table 2. Descriptive statistics. Crimes per 100k persons in 2010 and 2011

|  | Homicides | | Home burglaries | | Vehicle theft | | Personal injuries | | Brawls | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 2010 | 2011 | 2010 | 2011 | 2010 | 2011 | 2010 | 2011 | 2010 | 2011 |
| Bogota | 52.0 | 66.3 | 288.4 | 238.7 | 352.9 | 199.3 | 1049.6 | 1009.9 | 178.6 | 252.2 |
| Medellin | 62.8 | 74.5 | 6.2 | 5.3 | 92.9 | 88.0 | 70.5 | 77.7 | 58.0 | 16.1 |
| Cali | 95.7 | 70.5 | 82.3 | 44.0 | 375.5 | 212.3 | 349.1 | 259.7 | 308.8 | 253.4 |
| Barranquilla | 52.7 | 47.7 | 36.3 | 33.7 | 130.5 | 80.5 | 401.7 | 465.8 | 234.4 | 258.1 |
| Bucaramanga | 23.0 | 20.9 | 129.3 | 199.9 | 44.0 | 30.0 | 532.1 | 525.5 | 532.2 | 368.8 |
| Cucuta | 2.8 | 2.3 | 2.1 | 8.1 | 2.5 | 4.7 | 1.6 | 9.7 | 25.8 | 0.7 |
| Pereira | 9.4 | 13.8 | 25.2 | 29.8 | 3.4 | 4.2 | 7.9 | 40.3 | 0.0 | 0.0 |

Note: Figures are officially recorded 12-month average for each city-crime

Table 3. Impact of police training on homicides rates

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| TRAINING * Y2011 | -0.0507 | 0.0230 | 0.0681 | -0.0992 | -0.0844 | -0.0449 | 0.0182 | 0.0545 |
| | (0.113) | (0.116) | (0.140) | (0.197) | (0.210) | (0.0980) | (0.100) | (0.118) |
| TRAINING * Y2011 * Crime Decile7 | | | -0.137 | | | | | -0.117 |
| | | | (0.294) | | | | | (0.265) |
| TRAINING * Y2011 * Crime Decile8 | | | -0.152 | | | | | -0.134 |
| | | | (0.289) | | | | | (0.258) |
| TRAINING * Y2011 * Crime Decile9 | | | -0.167 | | | | | -0.155 |
| | | | (0.306) | | | | | (0.272) |
| TRAINING * Y2011 * Crime Decile10 | | | -0.689** | | | | | -0.622** |
| | | | (0.322) | | | | | (0.283) |
| TRAINING * Y2011 * Crime level in 2010 | | -0.0016*** | | | | | -0.0015*** | |
| | | (0.00056) | | | | | (0.00051) | |
| TRAINING * Y2011 *  # of Drug spots | | | | -0.00993 | | | | |
| | | | | (0.152) | | | | |
| TRAINING * Y2011 * One drug spot | | | | | -0.0756 | | | |
| | | | | | (0.342) | | | |
| TRAINING * Y2011 * Two or more drug spots | | | | | -0.0107 | | | |
| | | | | | (0.441) | | | |
| Group of cities | Gr 1 | Gr1 | Gr 1 | Bogotá | Bogotá | Gr 1 & 2 | Gr 1 & 2 | Gr 1 & 2 |
| R-squared | 0.001 | 0.007 | 0.005 | 0.002 | 0.002 | 0.001 | 0.007 | 0.004 |
| Observations | 2,300 | 2,300 | 2,300 | 1,470 | 1,470 | 2,644 | 2,644 | 2,644 |
| Number of cuadrantes | 1,150 | 1,150 | 1,150 | 735 | 735 | 1,322 | 1,322 | 1,322 |

Note: Statistically significantly different than zero at 99% (***), 95% (**), 90% (*) confidence. In all regressions the 2011 value is the four-month average immediately after the training is concluded and the 2010 value is the average of the same four months in 2010: July-October for group 1 and September-December for group 2. Cartagena is excluded as the training schedule was not implemented properly. All regressions include time and cuadrante fixed effects.

Table 4. Impact of police training on home burglary rates

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| TRAINING * Y2011 | -0.0464* | 0.00302 | 0.0310 | -0.0945** | -0.103** | -0.0460* | -0.000225 | 0.0293 |
| | (0.0272) | (0.0155) | (0.0356) | (0.0479) | (0.0510) | (0.0236) | (0.0135) | (0.0310) |
| TRAINING * Y2011 * Crime Decile5 | | | -0.0115 | | | | | -0.0109 |
| | | | (0.0918) | | | | | (0.0798) |
| TRAINING * Y2011 * Crime Decile6 | | | -0.0131 | | | | | -0.0131 |
| | | | (0.0763) | | | | | (0.0671) |
| TRAINING * Y2011 * Crime Decile7 | | | -0.0278 | | | | | -0.0268 |
| | | | (0.0705) | | | | | (0.0625) |
| TRAINING * Y2011 * Crime Decile8 | | | -0.0397 | | | | | -0.0389 |
| | | | (0.0693) | | | | | (0.0616) |
| TRAINING * Y2011 * Crime Decile9 | | | -0.0764 | | | | | -0.0774 |
| | | | (0.0833) | | | | | (0.0743) |
| TRAINING * Y2011 * Crime Decile10 | | | -0.723*** | | | | | -0.580*** |
| | | | (0.0801) | | | | | (0.0641) |
| TRAINING * Y2011 * Crime level in 2010 | | -0.00011*** | | | | | -0.00011*** | |
| | | (2.34e-06) | | | | | (2.19e-06) | |
| TRAINING * Y2011 * # of drug spots | | | | 0.0405 | | | | |
| | | | | (0.0370) | | | | |
| TRAINING * Y2011 * drug spots=1 | | | | | 0.0679 | | | |
| | | | | | (0.0831) | | | |
| TRAINING * Y2011 * drug spots>=2 | | | | | 0.117 | | | |
| | | | | | (0.107) | | | |
| Group of cities | Gr 1 | Gr1 | Gr 1 | Bogotá | Bogotá | Gr 1 & 2 | Gr 1 & 2 | Gr 1 & 2 |
| R-squared | 0.010 | 0.679 | 0.079 | 0.014 | 0.015 | 0.011 | 0.678 | 0.072 |
| Observations | 2,300 | 2,300 | 2,300 | 1,470 | 1,470 | 2,644 | 2,644 | 2,644 |
| Number of cuadrantes | 1,150 | 1,150 | 1,150 | 735 | 735 | 1,322 | 1,322 | 1,322 |

Note: Statistically significantly different than zero at 99% (***), 95% (**), 90% (*) confidence. In all regressions the 2011 value is the four-month average immediately after the training is concluded and the 2010 value is the average of the same four months in 2010: July-October for group 1 and September-December for group 2. Cartagena is excluded as the training schedule was not implemented properly. All regressions include time and cuadrante fixed effects.

Table 5. Impact of police training on vehicle thefts

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| TRAINING * Y2011 | -0.108 | 0.0654*** | 0.0598 | -0.194* | -0.247** | -0.0921 | 0.0570*** | 0.0507 |
| | (0.0660) | (0.0154) | (0.0820) | (0.116) | (0.124) | (0.0573) | (0.0134) | (0.0681) |
| TRAINING * Y2011 * Crime Decile7 | | | -0.0232 | | | | | -0.0192 |
| | | | (0.166) | | | | | (0.148) |
| TRAINING * Y2011 * Crime Decile8 | | | -0.0421 | | | | | -0.0380 |
| | | | (0.171) | | | | | (0.154) |
| TRAINING * Y2011 * Crime Decile9 | | | -0.0806 | | | | | -0.0764 |
| | | | (0.174) | | | | | (0.159) |
| TRAINING * Y2011 * Crime Decile10 | | | -1.174*** | | | | | -1.170*** |
| | | | (0.164) | | | | | (0.149) |
| TRAINING * Y2011 * Crime level in 2010 | | -0.00048*** | | | | | -0.00048*** | |
| | | (3.37e-06) | | | | | (3.15e-06) | |
| TRAINING * Y2011 * # of drug spots | | | | 0.0619 | | | | |
| | | | | (0.0901) | | | | |
| TRAINING * Y2011 * drug spot=1 | | | | | 0.276 | | | |
| | | | | | (0.202) | | | |
| TRAINING * Y2011 * drug spots>=2 | | | | | 0.145 | | | |
| | | | | | (0.260) | | | |
| Group of cities | Gr 1 | Gr1 | Gr 1 | Bogotá | Bogotá | Gr 1 & 2 | Gr 1 & 2 | Gr 1 & 2 |
| R-squared | 0.008 | 0.946 | 0.053 | 0.010 | 0.012 | 0.007 | 0.946 | 0.053 |
| Observations | 2,300 | 2,300 | 2,300 | 1,470 | 1,470 | 2,644 | 2,644 | 2,644 |
| Number of cuadrantes | 1,150 | 1,150 | 1,150 | 735 | 735 | 1,322 | 1,322 | 1,322 |

Note: Statistically significantly different than zero at 99% (***), 95% (**), 90% (*) confidence. In all regressions the 2011 value is the four-month average immediately after the training is concluded and the 2010 value is the average of the same four months in 2010: July-October for group 1 and September-December for group 2. Cartagena is excluded as the training schedule was not implemented properly. All regressions include time and cuadrante fixed effects.

Table 6. Impact of police training on battery (personal injuries)

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| TRAINING * Y2011 | -0.114* | 0.0609 | 0.0329 | -0.224* | -0.259** | -0.109* | 0.0697* | 0.0215 |
| | (0.0692) | (0.0433) | (0.126) | (0.122) | (0.130) | (0.0602) | (0.0380) | (0.101) |
| TRAINING * Y2011 * Crime Decile3 | | | -0.0531 | | | | | -0.0384 |
| | | | (0.253) | | | | | (0.223) |
| TRAINING * Y2011 * Crime Decile4 | | | -0.0534 | | | | | -0.0387 |
| | | | (0.186) | | | | | (0.162) |
| TRAINING * Y2011 * Crime Decile5 | | | -0.0522 | | | | | -0.0374 |
| | | | (0.218) | | | | | (0.192) |
| TRAINING * Y2011 * Crime Decile6 | | | -0.0570 | | | | | -0.0420 |
| | | | (0.214) | | | | | (0.192) |
| TRAINING * Y2011 * Crime Decile7 | | | -0.0831 | | | | | -0.0677 |
| | | | (0.207) | | | | | (0.180) |
| TRAINING * Y2011 * Crime Decile8 | | | -0.0691 | | | | | -0.0529 |
| | | | (0.214) | | | | | (0.185) |
| TRAINING * Y2011 * Crime Decile9 | | | -0.0992 | | | | | -0.0801 |
| | | | (0.210) | | | | | (0.183) |
| TRAINING * Y2011 * Crime Decile10 | | | -1.427*** | | | | | -1.046*** |
| | | | (0.242) | | | | | (0.185) |
| TRAINING * Y2011 * Crime level in 2010 | | -0.00055*** | | | | | -0.00053*** | |
| | | (1.29e-05) | | | | | (1.18e-05) | |
| TRAINING * Y2011 * # of drug spots | | | | 0.0869 | | | | |
| | | | | (0.0944) | | | | |
| TRAINING * Y2011 * drug spot=1 | | | | | 0.237 | | | |
| | | | | | (0.212) | | | |
| TRAINING * Y2011 * drug spots>=2 | | | | | 0.197 | | | |
| | | | | | (0.273) | | | |
| Group of cities | Gr 1 | Gr1 | Gr 1 | Bogotá | Bogotá | Gr 1 & 2 | Gr 1 & 2 | Gr 1 & 2 |
| R-squared | 0.003 | 0.613 | 0.036 | 0.005 | 0.006 | 0.003 | 0.608 | 0.030 |
| Observations | 2,300 | 2,300 | 2,300 | 1,470 | 1,470 | 2,644 | 2,644 | 2,644 |
| Number of cuadrantes | 1,150 | 1,150 | 1,150 | 735 | 735 | 1,322 | 1,322 | 1,322 |

Note: Statistically significantly different than zero at 99% (***), 95% (**), 90% (*) confidence. In all regressions the 2011 value is the four-month average immediately after the training is concluded and the 2010 value is the average of the same four months in 2010: July-October for group 1 and September-December for group 2. Cartagena is excluded as the training schedule was not implemented properly. All regressions include time and cuadrante fixed effects.

Table 7. Impact of police training on brawls

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| TRAINING * Y2011 | -0.402** | -0.128 | -0.0275 | -0.450 | -0.453 | -0.362*** | -0.0946 | -0.00867 |
| | (0.159) | (0.162) | (0.226) | (0.274) | (0.292) | (0.139) | (0.141) | (0.192) |
| TRAINING * Y2011 * Crime Decile6 | | | -0.0878 | | | | | -0.0610 |
| | | | (0.649) | | | | | (0.586) |
| TRAINING * Y2011 * Crime Decile7 | | | -0.175 | | | | | -0.148 |
| | | | (0.417) | | | | | (0.367) |
| TRAINING * Y2011 * Crime Decile8 | | | -0.262 | | | | | -0.233 |
| | | | (0.383) | | | | | (0.338) |
| TRAINING * Y2011 * Crime Decile9 | | | -0.253 | | | | | -0.283 |
| | | | (0.411) | | | | | (0.348) |
| TRAINING * Y2011 * Crime Decile10 | | | -1.801*** | | | | | -1.752*** |
| | | | (0.390) | | | | | (0.338) |
| TRAINING * Y2011 * Crime level in 2010 | | -0.00077*** | | | | | -0.00079*** | |
| | | (0.000121) | | | | | (0.000110) | |
| TRAINING * Y2011 * # of drug spots | | | | -0.0856 | | | | |
| | | | | (0.212) | | | | |
| TRAINING * Y2011 * drug spot=1 | | | | | -0.0643 | | | |
| | | | | | (0.476) | | | |
| TRAINING * Y2011 * drug spots>=2 | | | | | -0.235 | | | |
| | | | | | (0.613) | | | |
| Group of cities | Gr 1 | Gr1 | Gr 1 | Bogotá | Bogotá | Gr 1 & 2 | Gr 1 & 2 | Gr 1 & 2 |
| R-squared | 0.006 | 0.040 | 0.026 | 0.009 | 0.009 | 0.005 | 0.043 | 0.026 |
| Observations | 2,300 | 2,300 | 2,300 | 1,470 | 1,470 | 2,644 | 2,644 | 2,644 |
| Number of cuadrantes | 1,150 | 1,150 | 1,150 | 735 | 735 | 1,322 | 1,322 | 1,322 |

Note: Statistically significantly different than zero at 99% (***), 95% (**), 90% (*) confidence. In all regressions the 2011 value is the four-month average immediately after the training is concluded and the 2010 value is the average of the same four months in 2010: July-October for group 1 and September-December for group 2. Cartagena is excluded as the training schedule was not implemented properly. All regressions include time and cuadrante fixed effects.

Figure 1.  Homicide rate in Colombia: 1985 - 2011
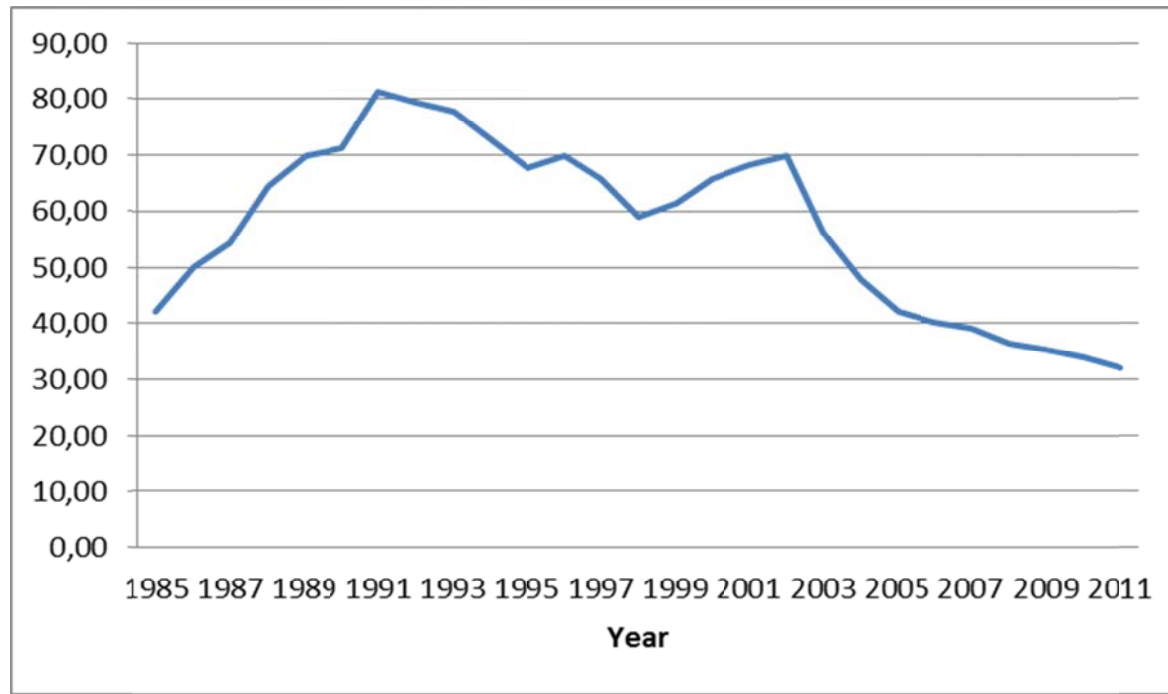


Source: Athors' calculations based on information from the Colombian National Police.

Figure 2.  Homicide rate in the four largest cities: 2003 - 2011
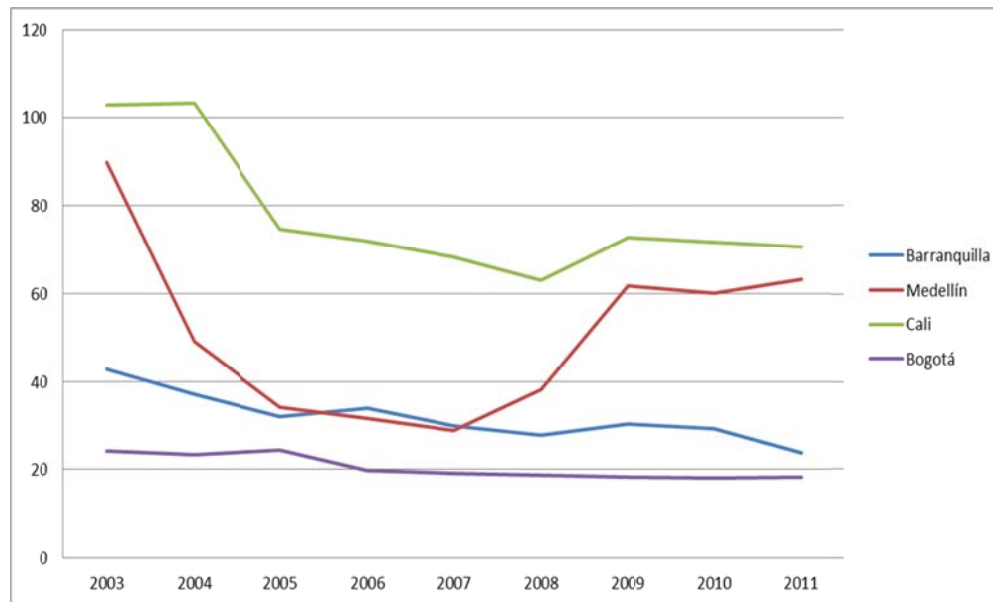


Source: Athors' calculations based on information from the Colombian National Police.

Figure 3. Timing of the training schedule for three cohorts in 8 cities

Cohort 1
(7 weeks)

Cohort 2
(7 weeks)

Cohort 3
(7 weeks)

No training
(12 weeks)

No training
(22 weeks)

51 stations,
510 cuad.

41 weeks of experimental variation
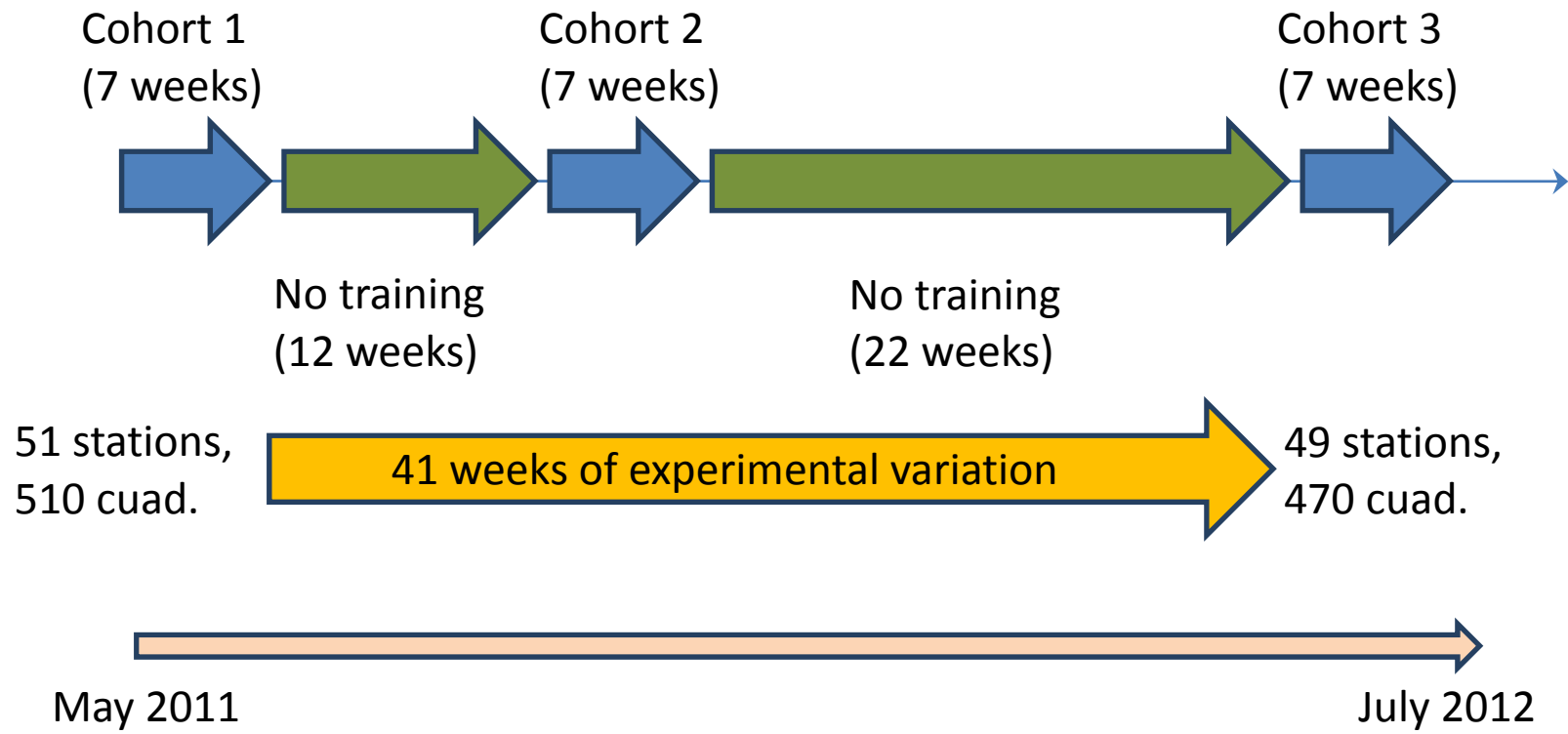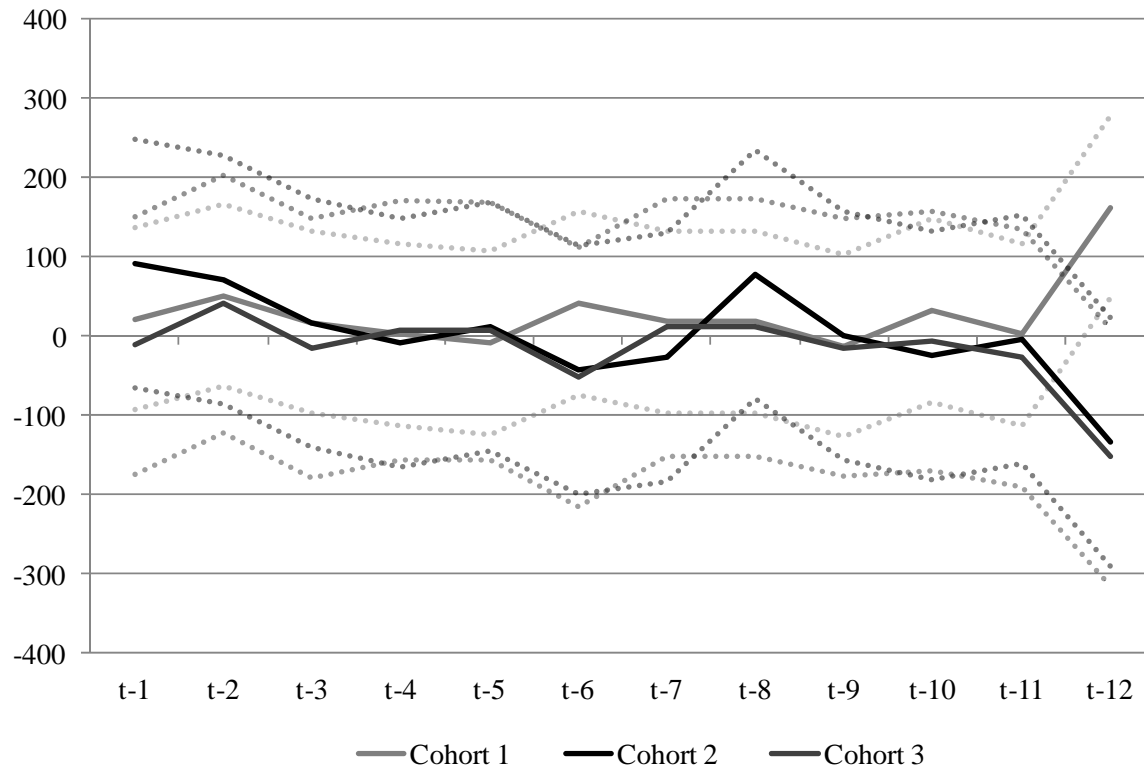
49 stations,
470 cuad.

May 2011

July 2012

Figure 4. Homicide rates by cohort in the 12 months prior to treatment (includes both groups of cities)



Note: Figure shows coefficients on monthly time lags for all cities setting t=0 the time when training began in each city, controlling for group mean and seasonal differences as well as group and cohort fixed effects (which were not significantly different from zero).