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Place-Based Policies for Sports and Cultural Activities in Cali, Colombia

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Abstract

This paper studies the effect of two place-based policies implemented in Cali, Colombia on social capital and trust. We use the CaliBRANDO survey to account for institutional and interpersonal trust, matching neighborhood of residence and where policies are applied. We set up a difference-in-difference model to estimate the impact of the policies on the indexes that measure trust. We find that the organized sport policy improves institutional trust by about 4%. Our results are significant for soccer and basketball and not significant for futsal and other activities. The evidence does not support an effect of nightlights on trust.

JEL classifications: H41, O20, R1, C21, L38
Keywords: Trust, Place-based policies, Impact evaluation, Social capital, Urban policy

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1 Introduction

There is a steady decline in trust worldwide. Since the financial crisis of 2008, OECD countries are reporting a constant reduction in trust in governments and institutions. Lack of jobs, removal of welfare programs, and corruption have eroded citizens' trust in their governments OECD (2017a). However, trusting the government is a pivotal factor in government operations, the payment of taxes, and the strength of any democracy (Blind, 2007). Moreover, there is a strong correlation between trusting institutions and the government and trusting others because participation in communitarian and political activities affects trust by activating social interactions (Putnam, 1993; Fukuyama, 1995).

One of the mechanisms to foster institutional and interpersonal trust is through the efficiency and transparency of public program delivery. Citizens who are more satisfied with the government performance and the quality of the public programs to which they have access tend to trust more (Christensen and Lægreid, 2005). Many countries in Latin America are experiencing a steady decline in trust generated by corruption and the lack of spending on the public services that citizens demand (OECD et al., 2018).

Aiming at evaluating if the implementation of public programs increases interpersonal and institutional trust, we evaluate two policies implemented in Cali, the third-largest city in Colombia. One policy focuses on improving the built environment by increasing and improving lightning in parks and open green spaces from 2012 to 2019. The second policy is promoting sports and recreational activities in parks free of charge to residents. Our research question focuses on whether public programs improve social capital in urban areas. Our measures of social capital are institutional and interpersonal trust.

There is mixed evidence on the effect of place-based policies (O'Keefe, 2004; Reynolds and Rohlin, 2015; Kolko and Neumark, 2010; Mayer et al., 2012; Criscuolo et al., 2019; Devereux et al., 2007; Neumark and Simpson, 2014). Policies such as enterprise zones, discretionary grants, clusters, universities, and infrastructure pointed at gains in employment with positive and sometimes significant effects. Still, these effects are usually small or significant only in the short run. This paper explores the impact of place-based policies on trust using a difference-in-difference approach.

We use data from the CaliBRANDO survey and public policy administrative registries to set up a difference in difference model. We use Geographic Information Systems to geocode the administrative records; we match the locations where public policy is implemented to each survey at the neighborhood level by the neighborhood of residence. The CaliBRANDO survey collected for 2017 and 2018 includes questions related to trust, allowing us to explore changes in outcomes variables before and after policy implementation.

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We create a synthetic index to summarize institutional and interpersonal trust using Principal

Component Analysis (PCA). We perform a difference in difference model in a repeated cross-section setting to estimate the effect on comparable observations before and after the intervention and those in areas where the intervention did not take place. We control for socioeconomic characteristics and fixed effects.

Our results show that certain organized sports activities improve social capital. More specifically, soccer and basketball positively affect institutional trust; futsal activities, however, do not have a significant effect. Furthermore, the evidence related to increasing interpersonal trust is not significant. Finally, we do not find strong evidence to support that improvement in nightlights enhances trust. This result could be explained because previous investments had already improved trust, and we cannot estimate the effect of earlier changes in the 2017 and 2018 surveys.

This paper contains six (6) sections, including this introduction; the second section reviews the background literature on social capital and its relevance; the third section explains the data used and descriptive statistics. The fourth section describes the methodology used in the paper, the fifth section presents the results obtained, and the sixth section makes the final remarks.

2 Background Review

2.1 Defining Institutional and Interpersonal Trust

Trust in the public sector, and its institutions are crucial elements for the proper functioning of any government. Trust is possibly an essential ingredient for the legitimacy and sustainability of political systems (Blind, 2007; Fukuyama, 1995). Trust exist when parties holding positive perceptions of each other engage in a relationship that reaches the expected outcomes, without the need to verify the other's behavior (Wheeless and Grotz, 2006; Levi and Stoker, 2000). Trust also depends on shared values built within societies and works as a mechanism to reduce transaction costs of any economic or political relationship (Fukuyama, 1995).

Social theorists have proposed different frameworks to study and understand the paths and mechanisms through which political systems and institutions build trust. The institutional efficacy theory claims that trust in political institutions is a response to government performance. Trust results from people's perception of the delivery of policies and public services consistent with their expectations (Hetherington, 2005). The cultural environment theory argues that participation in communitarian activities affects trust levels by activating social interactions. Social capital builds through interactions with others that collectively influence their shared public life (Putnam, 1993, 1995, 2000; Inglehart, 1997; Coleman, 1988).

The study of trust in government interconnects elements such as social capital and the perception of government performance. Social capital encompasses different social life features, such as social networks, norms, and trust, that allow members of social groups to act together effectively to achieve shared objectives (Putnam et al., 1993). In addition, social capital has also defined cognitive components, such as interpersonal trust (Almedom, 2005).

The vast literature linking trust, social capital, and government, is framed from different angles. One angle refers to the influence of trust on public policy. In this strand of research, the largest

share of studies has explored the link between trust and economic growth (Knack and Keefer, 1997; Knack and Zak, 2003; Zak and Knack, 2001; Beugelsdijk et al., 2004; Dincer and Uslaner, 2007; Garen and Clark, 2013; Helliwell and Putnam, 1995; Putnam, 1995), trust and government performance (Bouckaert and Van de Walle, 2001; Song and Lee, 2016; Arizti et al., 2010) and trust and subjective well-being (Habibov and Afandi, 2014; Durand, 2014). Despite differences in methods, data, or scale of the research, the conclusion of this literature leads to the same path. Trust is a fundamental factor mediating the relationship between citizens and government, which in turn affects the outcomes of the policy decisions made by the government.

The other angle of the literature has explored the link between social capital and government trust (Pierce et al., 2002; Rice, 2001; Putnam, 1993; Andrews, 2011; Kampen, 2010). This line of research concludes that societies or political systems where social capital and collective political participation are constant achieve higher levels of government performance. Nevertheless, social capital not only has a significant influence on government performance, the research also shows conclusive evidence that social capital is necessary for achieving many individual outcomes. Social interactions and social capital play a considerable influence in educational achievement (Coleman, 1988), democracy (Putnam et al., 1993), levels of crime (Walberg et al., 1998; Kawachi and Berkman, 2001), emotional health (Rose, 2000, 2001) and mental health (Harris et al., 1999).

2.2 Trust, Government Capabilities, and Program Delivery

Trust is a crucial element for the proper functioning of any government; the quality of the public goods, the implementation of public policies, and more ambitious projects like political reforms require trust. High institutional trust is a fundamental aspect of enabling a high quality of life. It is essential for promoting economic progress, perceiving the government as transparent and efficient in delivering public goods and services, strengths societies, and democracies.

Despite the relevance of building and maintaining relationships based on trust, generally speaking, citizens distrust their governments. The OECD (2017b) reports a continued erosion of public trust in developed countries since 2008 as an aftermath of the financial crisis. High unemployment, job insecurity, perceived inequalities, corruption, regulations that favor relatively few, and the perception of lack of political leadership to effectively address those issues have eroded the trust that individuals have in their public institutions (OECD, 2013, 2017b).

According to international surveys like the Gallup World Poll, trust in governments went down by 45% from 2008 to 2015. The European Social Survey (OECD, 2017b) reported similar patterns with other cross-country surveys. In Latin America, the landscape is not different. Most of the citizens in the region perceive the government as inefficient and lacking transparency regarding tax allocation and spending (OECD et al., 2018). Thus, there is a vicious cycle of low trust: declining resources – poor perceived government performance – lower trust, which is constant in the weak trustful relationships between the citizenry and the government (Yang and Holzer, 2006).

2.3 Interpersonal Trust: Bridging and Bonding

Social capital is an attribute of a social unit that can be motivated and promoted by the government through the delivery of public goods, reaching a balance between the needs of individuals and society's needs (Putnam, 1993). In this perspective, there are two conditions of social capital: bridging and bonding. Those attributes are relevant when referring to interpersonal trust. Bridging refers to the networks providing the individual resources and information to reach others. Bridging is a resource of social networks, based on the relation that those interacting in the network share and make available to others. Some individuals bridge communities and are pivotal in constructing identities, goals, and ideals within the civic realm (Adler and Kwon, 2002; Burt, 2009).

Bonding refers to the collective relations between groups and the groups' internal structure, allowing cohesiveness to pursue the same goals (Coleman, 1988). Bonding is a trait facilitating associativity and trust in the networks (Leana III and Van Buren, 1999). Although bridging is an external characteristic of the groups and bonding an internal one, some definitions of social capital do not make such distinction. Furthermore, bonding and bridging are attributes of social capital and not bifurcating characteristics. Both attributes influence people's behavior by incentivizing solidarity necessary to build substantial social capital (Adler and Kwon, 2002).

Bridging and bonding are also necessary for building interpersonal trust. The assumption behind this idea relies on the evidence that individuals who share a common space or civic realm (like the neighborhood, the community, or any other shared space of personal characteristic) create an in-group bias that promotes cooperation and trust (Stolle et al., 2008). Social interaction is the mechanism leading to interpersonal trust, which fosters a more generalizable trust, for instance, trust in the government or institutions (Putnam, 2007). Bridging and bonding can be cultivated organically (groups organize by themselves) or promoted through government interventions to foster social cohesion within communities.

2.4 Delivery of Service: The Key Element to Increase Trust

Citizens report higher levels of government trust when they are satisfied with the services and goods they receive (Lagreid and Christensen, 2005). The literature in this area refers to the "micro-performance hypothesis" to explain the mechanism behind the connection between government delivery of services and citizens' trust. The logic behind the hypothesis is straightforward: better public services lead to satisfied users, which generates trust. There is also a component of aggregated individual positive experiences leading to societal satisfaction with public services and trust in public institutions (Van de Walle, 2003; Yang and Holzer, 2006; OECD, 2017a). There are necessary elements to increase trust based on service delivery: access, quality of the services, fairness in socioeconomic distribution, innovation in design and delivery (Chen et al., 2012; Guerrero, 2011).

The direct experience of citizens with the goods received is what, in the end, shapes attitudes and perceptions about government performance, and compliance with rules and taxation (Győrffy, 2013). Moreover, satisfaction or distrust extends to other services. For instance, people who do not have a good experience in the health system may neglect information from practitioners or actors representing the sector, neglecting beneficial information, leading to sub-optimal outcomes

in public policies (Whetten et al., 2006).

One of the significant challenges for governments in Latin America is to improve the quality of the services it provides to taxpayers. The steady economic growth experienced in recent decades allowed governments to increase coverage in public services, such as education, which is close to universal in several countries in the region (Ferreira et al., 2013). However, an expanding middle class demands more than coverage. They expect quality in government services in exchange for a growing share of taxes imposed on the population. Thus, a critical component of trust is the quality of the population's policies and programs (Badri et al., 2015). Comparative studies across world regions suggest that the quality of the policies implemented in Latin America lags behind many regions globally, surpassing only Africa and South Asia (Franco Chuaire and Scartascini, 2014).

In Latin America, citizens expect better services from the government –education, welfare programs, health, and employment- but are unwilling to pay more taxes due topeople's mistrust of governments (OECD et al., 2018). When mistrust is high, citizens prefer short-term programs with immediate results. However, changes in public policy are generally slow and require long-term investments to affect social and economic growth (Izquierdo et al., 2018).

2.5 Sports and Social Capital

Scartascini and Jaitman (2017) explain that sports create bridging and bonding between people. Sports activities create spaces for bridging and bonding increasing trust and social capital growth in communities. Several studies support the bridging and bonding mechanisms in soccer programs, Scartascini and Jaitman (2017) provide a list of studies that have found existing evidence for these programs. Svensson and Woods (2017) thoroughly review "Sport for Development and Peace" programs and overview the state of the field. Furthermore, Spaaij et al. (2016) explain that the efficiency of sport for development programs is related to three dimensions: participation, power, and reflexivity. Successful programs have high degrees of participation, power shifting, and reflexivity. Still, another key requirement for a successful policy is to consider inclusivity and collaboration in the design of the policy.

2.6 Cali Context and Description of the Interventions

Cali is the third-largest city in Colombia, with a population of 2.5 million DANE (2019). The city reflects many trends reported in cities in Latin America: rapid urbanization, an increase in the middle class, high socioeconomic disparities, and lack of urban planning and government capabilities to keep up with the high demands of an expanding city (Martínez et al., 2019). One of the significant particularities of Cali is the long-lasting conflict in the city. The city became internationally known in 1980 - 1990 due to the activities of drug cartels and the escalation of urban violence as a byproduct of drug trafficking. During the 1990s, homicides per 100,000 inhabitants were recorded at 110, making Cali one of the most violent cities in the world (Bank, 2002). Nowadays, the city is a safer place to live. Homicides, the most prominent issue in the city, are steadily declining, reaching levels historically low. By 2017, 51 homicides were reported per 100,000 habitats (Cali Como Vamos, 2018). However, the numbers have to be in context.

In Colombia (and Latin America), homicide rates were on average, 25 per 100,000 inhabitants in 2015, representing four times the global average (Jaitman et al., 2017; Ardanaz et al., 2014).

Cali is a safer city nowadays compared with its conditions 20 years ago, but it is still a city with crime rates well above the global average. Another source of insecurity comes from street crime (assaults/robbery and cellphone theft) that has increased at steady rates. Assaults increased by 53% and cellphone thefts 22% between 2011-2017, and this information may be biased downwards, given low complaint rates (Cali Como Vamos, 2018).

During the term of Rodrigo Guerrero (2012 – 2015), the city launched a program to improve lighting in public parks and green areas. The primary rationale was to intervene in the built environment and improve the physical condition of public places that deteriorated due to a lack of investment. Safety was the primary outcome to modify since abandoned parks were sites of criminal activity (El País, 2012). Maurice Armitage, the following major (2016 - 2019), continued with the lighting program and included a new intervention to improve social capital and reduce crime. Armitage promoted a city-wide program of guided physical activity. At least twice a week, an instructor visited the lightened parks to guide residents in a variety of physical exercises including, dancing, functional training, and yoga. Programs were also targeted based on population characteristics. One particular program, "canas y ganas," targeted the 60 years and older population, and other programs focused on school-age children, adolescents, and others in the general adult population. In total, 15 programs were implemented in the city, reaching all neighborhoods in different schedules and options for the population to choose (Alcaldía de Cali, 2019). The program we are interested in is "Deporvida." This widely-attended program, created at the end of 2017, focuses on promoting spaces to engage in sports in different neighborhoods.

3 Data

The data used in the study comes from three major sources. The first, which includes the trust information, is the CaliBRANDO survey. The sources for the public policy information are the government registry and newspaper and media reports from the program implementation.

3.1 CaliBRANDO

Survey data: CaliBRANDO is a structured survey representative of Cali's socioeconomic, gender, and racial-ethnic composition with a margin of error of 2.8% and a confidence level of 95% (Martínez, 2017). The survey has been implemented annually since 2014. The survey uses a multistage stratified sampling, selecting first 32 central points across the city (bus stations, malls, public parks, etc.) to conduct the surveys. The central points for survey collection cover the 22 districts (Comunas) of the city. At those points, randomly selected adults who live in the city and wish to participate in the study are interviewed by trained pollsters in face-to-face interviews. The survey collects information about health outcomes, life satisfaction, employment, education, and neighborhoods where people live, allowing spatial analysis. Using information of neighborhood of residence, the data are pooled into the districts of the city. The survey is a sample of population from all neighborhoods in the city and the rural areas located outside the city urban area.

For the years 2017 and 2018, the survey included a module of interpersonal and institutional trust, previously tested by the Organisation for Economic Co-operation and Development (OECD, 2017). The OECD team working on personal, interpersonal, and institutional trust provided technical support on translation and revision of the questionnaire. Annexes 1 and 2 present the CaliBRANDO survey for 2017 and 2018.

For 2017 and 2018, we asked the following questions:

Interpersonal trust:

- In general, how much do you trust most people? (0-10 scale)
- In general, how much do you trust most people you know personally? (0-10 scale)
- Do you think your wallet (or your valuables) would be returned to you if a neighbor found it? (Yes –No)
- Do you think your wallet (or your valuables) would be returned to you if a stranger found it? (Yes –No)

Institutional trust:

- Even if you have had very little or no contact with these institutions, please base your answer on these institutions' general impression. On a score of 0-10, how much you personally trust each of the institutions I read out.
  - Police
  - Public Officials
  - Municipal Council

A zero (0) value means you do not trust an institution at all, and a ten (10) means you have complete trust.

3.2 Policy Information

Official records on sports and recreation intervention: The Office of Sports and Recreation has already shared with the research team the frequency, location, and type of activities of organized sports and physical activity programs for 2017, 2018, and 2019. We also have the number of average participants for the program. Still, this information is not available by activity, which means we can only know how many persons attend all the locations for each program. This information is available by neighborhood, and we can match it with the place of residence of each surveyed person.

However, the government of Cali created the programs between 2016 and 2018; therefore, we cannot evaluate the effectiveness of programs designed before the survey takes place. We will control for their presence and assess the impact of the most important programs created in 2018. Figure 1 allows us to highlight the timeframe for all programs by creation per year and when each program begins to apply.

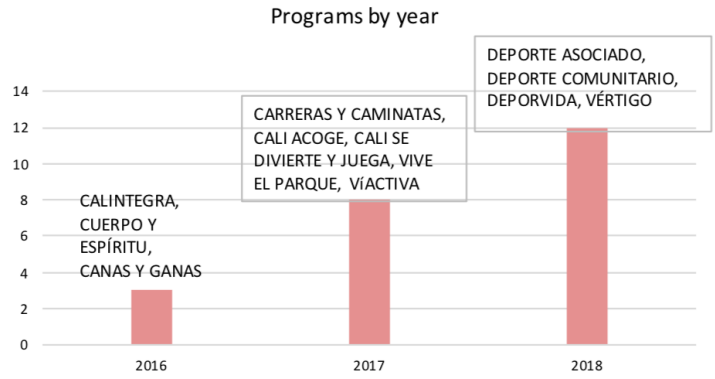


Figure 1: Public Policy programs in Cali by Year of Implementation

It is important to highlight that the most attended of these programs is *Deporvida*, created in August 2017 and during the time between our CaliBRANDO surveys in the periods 2017 and 2018. This program includes 27 different activities such as salsa dancing, soccer, cheerleading and table tennis, among others. Figure 2 reveals the number of attendants that each activity has in Cali. In addition, there is *Deporte Comunitario*, another place-based program that began between 2017 and 2018. This program, however, does not have the same level of attendance as *Deporvida*.

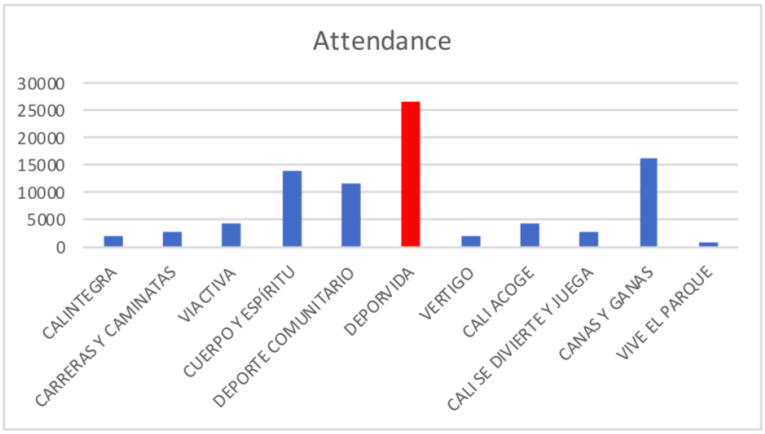


Figure 2: Attendance at All Programs Created by the Local Government

The number of neighborhoods with a Deporvida activity in Cali is 203, while the number of neighborhoods without a program is 127 (see Table 1). Furthermore, all neighborhoods do not have the same activities. The effects of different programs could therefore be asymmetrical.

The maps in Figure 3 show the neighborhoods where Deporvida activities are held (Figure 3a), and it can be compared to other programs such as "Deporte comunitario" in Figure 3b and "canas y ganas" in Figure 3c. It is noticeable that the number of neighborhoods included in any Deporvida activity is a large section of the city. We also consider the different sports programs

Table 1: Neighborhoods with a Deporvida Activity in Cali in 2018

Deporvida neighborhood	Sum
No	127
Yes	203

in Deporvida, such as soccer, basketball, and futsal. Furthermore, Figures 3d, 3e, and 3f show the neighborhoods where these activities take place.

3.3 Lighting in Public Spaces and Parks

Official records on lighting intervention: The office of Urban Planning has already shared with the research team the location of over 1,000 interventions on lighting in parks and green areas across the city from 2012 – 2019. We geocoded all parks and green spaces where these interventions took place and matched them to the neighborhood where the surveyed person lives.

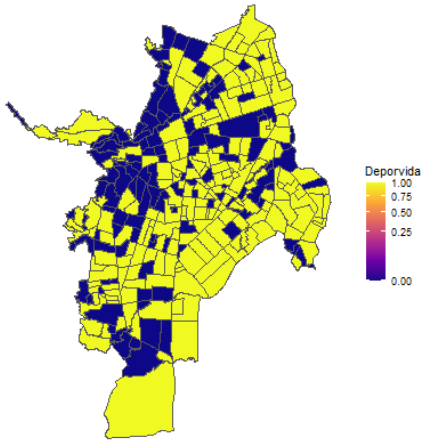
Figure 4 present the neighborhoods where nightlights improved before 2017 and on 2017. More explicitly, the parks improvements were finished by the end of 2015 and 2016. We analyze and evaluate the impact of improvements that took place at the end of 2017.

3.4 Descriptive Statistics

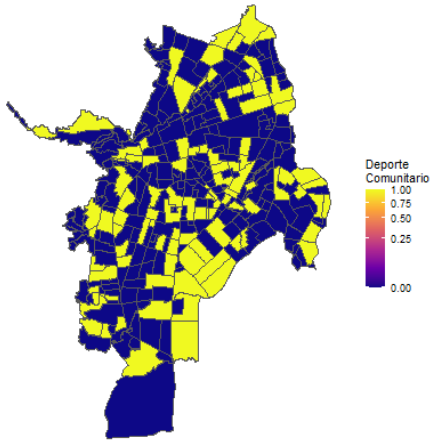
In total, we collected 2,488 observations between 2017 and 2018 with the CaliBRANDO dataset. In all surveys, the respondent's socioeconomic information was collected, including neighborhood. The number of observations that have complete information on answers to the trust questions is 2,180.

Table 2 presents the descriptive statistics of the data used in this analysis. The variables that account for $Trust$ have a higher mean when trust relates to interpersonal ($Trust_{people}$ and $Trust_{Known}$) and a lower mean when it is related to institutions such as police, politicians, and public officials ($Trust_{Council}$, $Trust_{Police}$, and $Trust_{Officials}$). The table also includes the socioeconomic characteristics of the surveyed population of Cali. The characteristics included are a dummy for male, the log of the income, a dummy for the level of education, the socioeconomic strata, and the comuna (district) where the person lives.

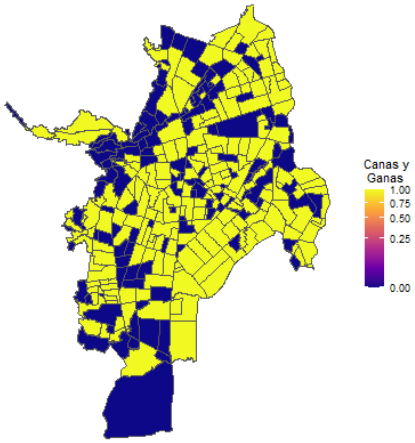
Each surveyed person provided the neighborhood where they live. We match this information with the locations where the government implemented the policy. The variables $Du\,NL_{All}$, $Du\,NL_{Other}$, and $Du\,NL_{GC}$ take a value of one (1) if the person lives in a neighborhood where there was an improvement in lightning in a park or green area and zero (0) otherwise. We built the dummy variables associated with organized sports activities (Deporvida) following the same method (They are coded as $Du\,DP_{All}$, $Du\,DP_{Soccer}$, $Du\,DP_{basket}$, and $Du\,DP_{futsal}$). Table 2 summarizes the dummy variables for Deporvida and nightlights improvements among the surveyed persons in our sample.



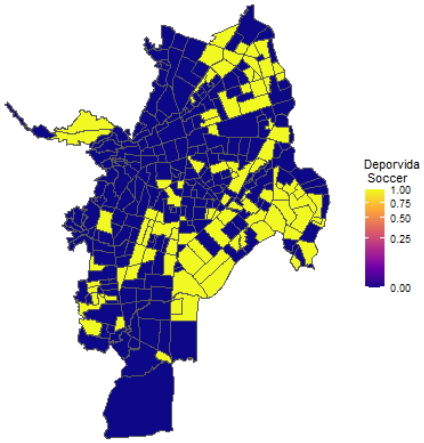
(a) Any Deporvida Activity



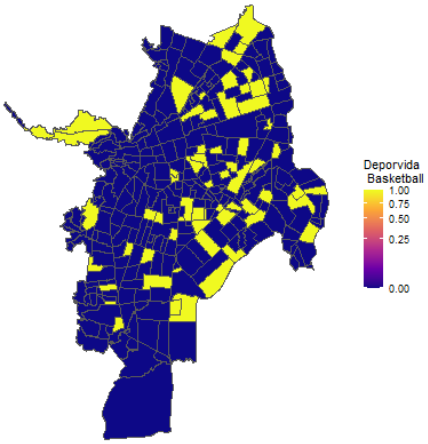
(b) Any Deporte Comunitario Activity



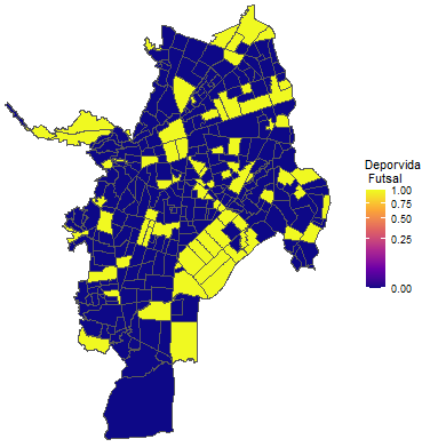
(c) Any Canas y Ganas Activity



(d) Deporvida soccer.

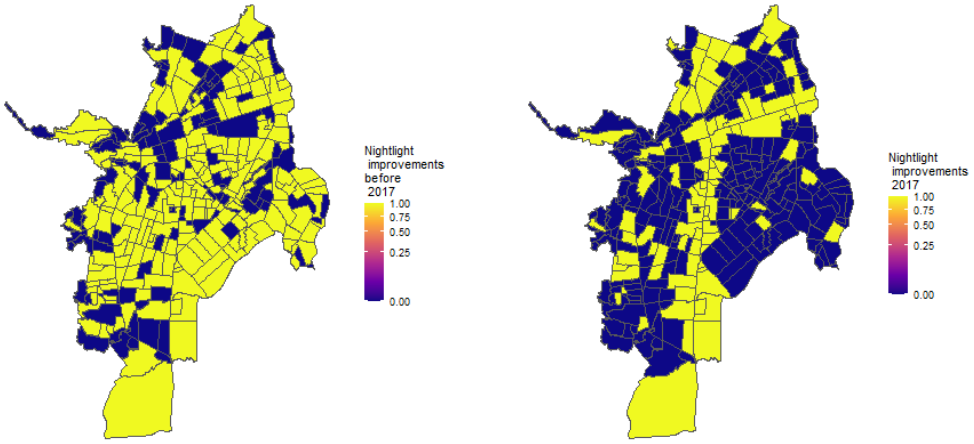


(e) Deporvida Basketball



(f) Deporvida Futsal

Figure 3: Neighborhoods Where Sports Programs are Held



(a) Nightlight Improvement Projects before 2017

(b) Nightlight Improvement Projects Finished in 2017

Figure 4: Neighborhoods Where Parks Improved Nightlights

Table 2: Descriptive Statistics

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
$Strata$	2,180	2.514	1.233	1	1	3	6
$Trust_{people}$	2,180	4.304	2.674	0	2	6	10
$Trust_{Known}$	2,180	7.076	2.756	0	5	9	10
$Trust_{Council}$	2,180	3.218	2.712	0	0	5	10
$Trust_{Police}$	2,180	3.807	2.801	0	1	6	10
$Trust_{Officials}$	2,180	2.806	2.679	0	0	5	10
$Strata$	2,180	2.514	1.233	1	1	3	6
$Du_{Education}$	2,180	0.489	0.500	0.000	0.000	1.000	1.000
$Trust1$	2,180	0.378	0.206	0.000	0.206	0.535	1.000
$Trust2$	2,180	0.523	0.205	0.000	0.413	0.673	1.000
$Comuna$	2,180	11.553	6.354	1	6	17	24
$Married$	2,180	0.478	0.500	0	0	1	1
Du_{Male}	2,180	0.505	0.500	0	0	1	1
$Du\,NL_{Prev}$	2,180	0.815	0.389	0	1	1	1
$Du\,NL_{All}$	2,180	0.220	0.414	0	0	0	1
$Du\,NL_{GC}$	2,180	0.109	0.311	0.000	0.000	0.000	1.000
$Du\,NL_{Other}$	2,147	0.115	0.319	0.000	0.000	0.000	1.000
$Du\,DP_{All}$	2,092	0.436	0.496	0.000	0.000	1.000	1.000
$Du\,DP_{futbol}$	2,092	0.202	0.401	0.000	0.000	0.000	1.000
$Du\,DP_{futsal}$	2,092	0.218	0.413	0.000	0.000	0.000	1.000
$Du\,DP_{basket}$	2,092	0.156	0.363	0.000	0.000	0.000	1.000

4 Methodology

For this research we follow difference-in-difference methodologies, as thoroughly described by Bernal and Peña (2011) and Cunningham (2018). These models use an impact evaluation model that considers a continuous dependent variable. We follow this approach because the CaliBRANDO survey is not a panel but a yearly cross-section, which allows us to estimate changes in perception between comparable treated and untreated units.

In our survey, however, the questions to evaluate trust provide discrete answers. Therefore we follow the approach used by Alessandro et al. (2019) to create a dependent variable that simplifies the values from their trust survey from discrete choice answers into a continuous variable. The authors use principal component analysis (PCA); this statistical procedure is useful to reduce dimensions from variables that measure are used to create indexes based on their variations.

Husson et al. (2017) provide a thorough description of principal component analysis and a guide to applying it using R. Principal components analysis takes a number of variables and creates one synthetic variable that summarizes the effect of these variables maximizing their variance. The authors also provide other methodologies to reduce dimensions such as correspondence analysis, which is more adept at dealing with binary variables or discrete variables. However, those methodologies create a large number of parameters, and given our range of responses their values and interpretation are difficult to consider. The principal component analysis methodology uses equation (1) to create the synthetic variable. This equation summarizes the values from each question related to trust (Z). This methodology assigns a β to each variable and all these variables create an index of trust for each person that answered the survey and provides an overall score of trust for each person.

$$Trust_{ijt} = \beta_1 Z_{1,ijt} + \beta_2 Z_{2,ijt} + \beta_3 Z_{3,ijt} + \beta_4 Z_{4,ijt} + \beta_5 Z_{5,ijt} \tag{1}$$

The difference in difference models used by Bernal and Peña (2011) and Cunningham (2018) in equation (2) includes as the dependent variable the variables that measure trust, an intercept (α_t) associated with the year of the survey, and the covariates (X_{ijt}) that can affect the trust by the individual. The treatment variable is a dummy that takes the value of 1 when the person resides in a neighborhood where the policy is applied, and a post-treatment variable that takes values of 1 when the policy is implemented. The result interpreted in the coefficient θ shows the impact of the policy.

$$Y_{ijt} = \alpha t + \beta X_{ijt} + \gamma D_{ijt} + \theta D_{ijt} \times Post_{ijt} + e_{ijt} \tag{2}$$

Figure 5 presents the Directed Acyclic Graph for our model to explain the variables that affect or condition the index for trust. The covariates in the model are Income, education, and gender. We expect that people with higher income and educational attainment will display higher levels of trust. Finally, we expect that men in a male-dominated society will have higher trust than women.

All the surveys were indexed to the neighborhoods where the Deporvida program was implemented. The full sample with social capital and trust information includes 2180 observations,

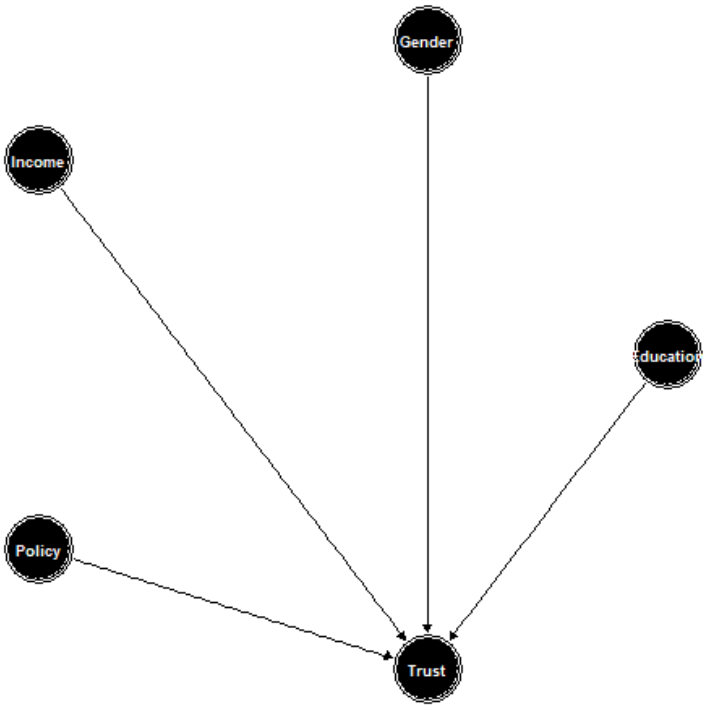


Figure 5: Directed Acyclic Graphs (DAG) for the model

and the number of persons living in neighborhoods where the program is applied is 1,700. Table 3 shows the treatment dummy variable results.

Table 3: Frequency Table: Surveyed Population Living in Neighborhoods with Deporvida Activities, 2018

Treated & Sample
No & 1,280
Yes & 900

5 Results

The results section has two subsections. The first subsection addresses the principal component analysis and how we use this technique to create two indexes to measure trust using the CaliBRANDO survey data. This analysis allow us to create two indexes: one related to institutional trust and one related interpersonal trust. The second subsection includes the impact evaluation analysis and discusses the results.

5.1 Indexes to Measure Trust

The application of the principal component analysis following the methodology set up by Husson et al. (2017) provides 5 components, but only components one and two capture most of the variation of the variables. The Eigenvalues in the appendix show which components capture the highest variance. All variables in both components have a positive sign, which means that the score increases due to all the variables included.

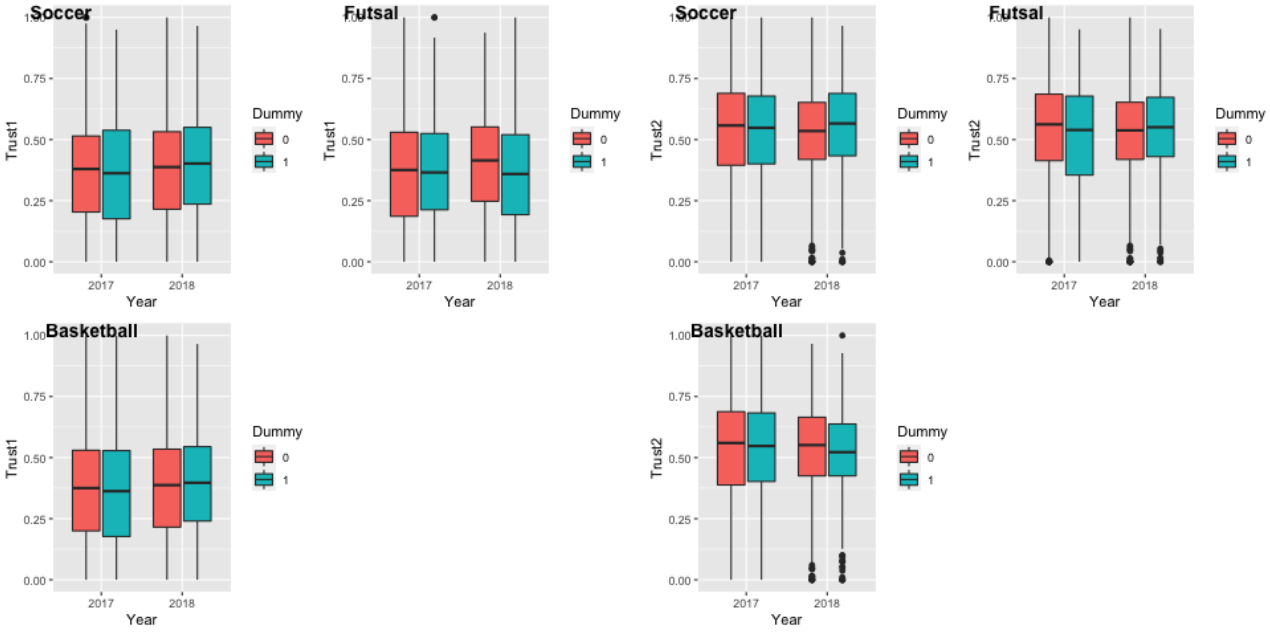
However, in the graph of the PCA we find that there are two groups of trends that contradict each result. The first group includes trust in other people and trust in government officials (see Appendix Figure 8). This suggests that there should be two indexes to account for trust, based on each perception: in the first component, the variables that measure trust in public officials, government servants, and police have a higher share. The second component assigns larger shares to the interpersonal trust variables. Appendix Table 13 presents the coefficients used to create both components. Due to high dispersion, we re-scale the composite trust variables between 0 and 1.Low values of the index imply low values of trust, and values closer to one (1) imply higher levels of trust.

5.2 Estimation Results

First, we graphically examine for a possible relationship between the indexes that measure trust and public policy. The data in Figures 6 and 7 show that people living in neighborhoods with nightlights improvements have higher trust in the institutions. However, this result does not apply to interpersonal trust. The graphical results of the effect of programs creating spaces for sports and cultural activities on the trust of people are slightly positive. Nevertheless, due to the complexity of the type of intervention and the sports activities, this analysis should consider the different types of activities.

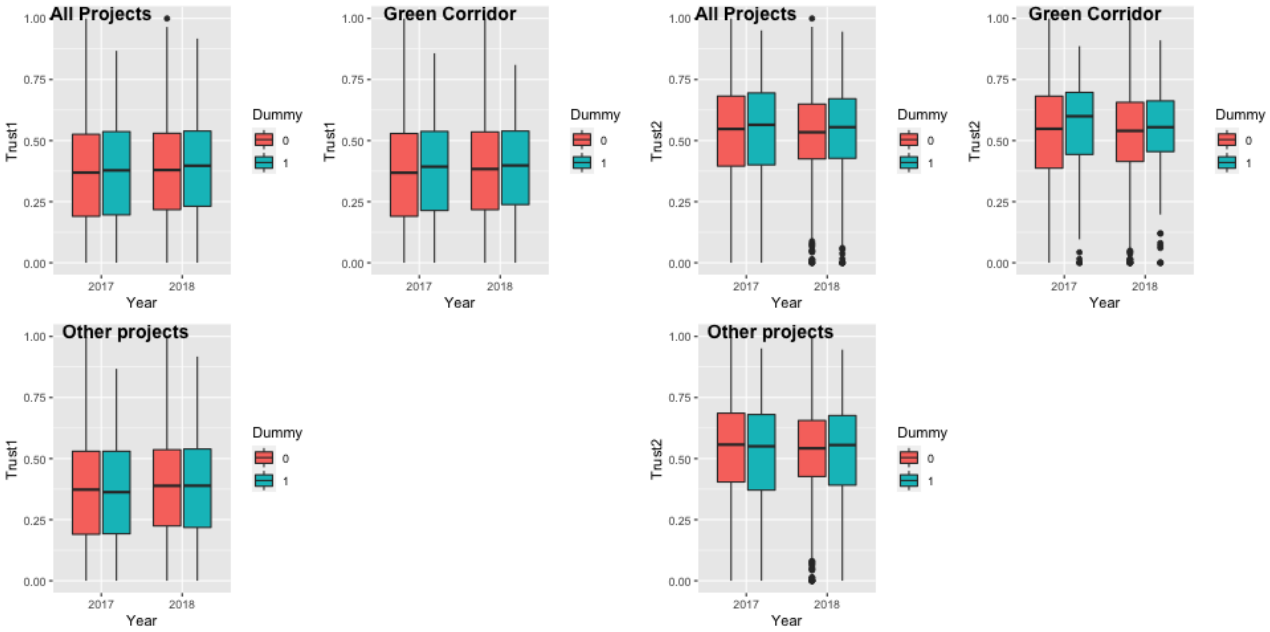
Our regression analysis focuses first on the impacts from the program Deporte Comunitario and its effects on the two indexes that measure trust. The regression results in table 4 show a non-significant coefficient in columns one (1), two (2), three (3), and four (4). More specifically in columns three and four, the coefficient for $Du_{Deporte\ Comunitario} \times Post$ is not significant on the surveyed institutional trust ($trust1$) and interpersonal trust ($trust2$). This suggests that the program does not have a significant causal effect on the trust of people living in the neighborhoods. This result could be explained by the argument proposed by Spaaij et al. (2016), where the authors argue that successful programs have a high degree of participation and, according to Figure 2, Deporte Comunitario is not a highly attended program.

The next part of the analysis focuses on the effect on trust from people living in a neighborhood where the government applied the Deporvida program. These results are divided into different tables since we are able to evaluate the program by type of activity and we will focus on the three most important activities: soccer, futsal, and basketball. The regressions in Table 5



(a) Institutional Trust (trust1) (b) Interpersonal trust (trust2)

Figure 6: Graphical Evaluation Effects of Deporvida on Trust



(a) Institutional trust (trust1) (b) Interpersonal Trust (trust2)

Figure 7: Graphical Evaluation of Effects of Nightlight Improvements on Trust

Table 4: Regression Results of Effects of Deporte Comunitario on Institutional Trust and Interpersonal Trust (All regressions include fixed effects by Comuna and clustered standard errors.)

	Dependent variable:			
	Institutional trust ($Trust1$)	Interpersonal trust ($Trust2$)	Institutional trust ($Trust1$)	Interpersonal trust ($Trust2$)
	(1)	(2)	(3)	(4)
$Du_{Deporte\,Comunitario} * Post$	−0.237	−0.382	−0.233	−0.377
	(1.359)	(1.428)	(1.358)	(1.426)
$Du_{Deporte\,Comunitario}$	1.531	3.588***	1.634	3.726***
	(1.270)	(1.231)	(1.268)	(1.231)
$Canas\,y\,ganas$			−1.168	−1.570
			(1.498)	(1.315)
Controls	Yes	Yes	Yes	Yes
Observations	1,832	1,832	1,832	1,832
R^2	0.051	0.081	0.052	0.081
Adjusted R^2	0.036	0.066	0.036	0.066
Residual Std. Error	20.135	19.975	20.136	19.973
Std. Error	(df = 1802)	(df = 1802)	(df = 1801)	(df = 1801)
Note:				*p<0.1; **p<0.05; ***p<0.01

show evidence that after the program started it caused an increase in trust in public workers (institutional trust or trust1). The evaluation of the main sports gatherings highlights a positive and significant effect on the post of soccer and basketball (columns (1) and (3)), but it is not significant for futsal (column (2)). This result means that these activities are associated with an increase in the average trust of the targeted population. The coefficients show that the program causes an increase of 0.3 in average trust in institutional representatives, which is slightly higher than a standard deviation of trust.

Table 5: Regression Results Deporvida on Institutional Trust ($trust1$) (All regressions include fixed effects by Comuna and clustered standard errors.)

	Dependent variable:		
	Institutional trust ($Trust1$)		
	(1)	(2)	(3)
$Du\,DV_{Soccer} * Post$	3.521**		
	(1.663)		
$Du\,DV_{Soccer}$	0.388		
	(1.395)		
$Du\,DV_{futsal} * Post$		−0.388	
		(1.815)	
$Du\,DV_{futsal}$		0.434	
		(1.300)	
$Du\,DV_{Basket} * Post$			3.976*
			(2.368)
$Du\,DV_{Basket}$			−1.442
			(1.604)
Controls	Yes	Yes	Yes
Observations	1,832	1,832	1,832
R^2	0.055	0.050	0.053
Adjusted R^2	0.039	0.035	0.038
Residual Std. Error (df = 1802)	20.098	20.144	20.116
Note:			*p<0.1; **p<0.05; ***p<0.01

The regressions in Table 6 present the impacts of the organized sports programs associated

with the index for interpersonal trust ($trust2$). The effect found in the models is positive but not significant for all projects, and for most organized sports; the only significant result is the effect of soccer activities on interpersonal trust. Soccer activities relate positively to increases in interpersonal trust, but the increase is only 0.2. All other activities have a non-significant effect. These results improve trust in officials due to increased interaction with a person appointed by the government to organize the sports activities.

Table 6: Regression Results of Effects of Deporvida on Interpresonal Trust ($trust2$). (All regressions include fixed effects by Comuna.)

	Dependent variable:		
	Interpersonal trust ($Trust2$)		
	(1)	(2)	(3)
$Du\,DV_{Soccer} * Post$	1.667		
	(1.488)		
$Du\,DV_{Soccer}$	0.854		
	(1.276)		
$Du\,DV_{futsal} * Post$		−1.348	
		(1.363)	
$Du\,DV_{futsal}$		1.857	
		(1.293)	
$Du\,DV_{Basket} * Post$			1.423
			(1.589)
$Du\,DV_{Basket}$			0.266
			(1.368)
Controls	Yes	Yes	Yes
Observations	1,832	1,832	1,832
R^2	0.077	0.076	0.076
Adjusted R^2	0.062	0.061	0.061
Residual Std. Error (df = 1802)	20.016	20.024	20.027
Note:	*p<0.1; **p<0.05; ***p<0.01		

However, we need to consider that other previously created programs such as "Canas y ganas" could affect trust. We therefore create dummies to account for the neighborhoods treated previously. The regressions in Tables 7 and 8 show that the significant coefficients for the activities that increase institutional trust are the dummies associated with soccer and basketball activities (see columns 1, 2, and 3 on table 7). These coefficients are positive and have significant effects, and the inclusion of the dummy for "Canas y ganas" does not modify the coefficients. We find a negative and not significant coefficient associated with the dummy of Canas y ganas, therefore not affecting trust. The difference-in-difference coefficients associated with the effect from Deporvida on interpersonal trust in Table 8 are not significant.

Table 9 shows the regression estimates to evaluate the impact of nightlight programs on institutional and interpersonal trust. The evidence is only significant for the relationship between other nightlight projects and institutional trust. The estimated effect is around 0.2 but as stated it is not significant when considered all nightlight programs, or the nightlight program, or the green corridor (columns 1, 2, and 3). We also find that previous nightlight projects do not affect current levels of trust, we create a dummy for the neighborhoods where nightlight programs finished in 2015. The policy's implementation effect is not significant because it is not noticeable unless people begin to use the parks and public spaces, but we think that this policy's impact already took effect before 2017 and further improvements will not significantly increase trust thereafter.

Table 7: Regression Results of Effects of Deporvida on Institutional Trust ($trust1$) Accounting for Previous Programs (All regressions include fixed effects by Comuna and clustered standard errors.)

	Dependent variable:		
	Institutional trust ($Trust1$)		
	(1)	(2)	(3)
$Du\ DV_{Soccer} * Post$	3.522**		
	(1.663)		
$Du\ DV_{Soccer}$	0.473		
	(1.401)		
$Du\ DV_{Futsal} * Post$		−0.395	
		(1.816)	
$Du\ DV_{Futsal}$		0.612	
		(1.313)	
$Du\ DV_{Basket} * Post$			3.957*
			(2.369)
$Du\ DV_{Basket}$			−1.354
			(1.594)
$Dummy\ canas\ y\ ganas$	−1.155	−1.030	−0.952
	(1.485)	(1.533)	(1.485)
Controls	Yes	Yes	Yes
Observations	1,832	1,832	1,832
R^2	0.055	0.050	0.053
Adjusted R^2	0.039	0.035	0.037
Residual Std. Error (df = 1801)	20.100	20.147	20.119
Note:	*p<0.1; **p<0.05; ***p<0.01		

Table 8: Regression Results of Effects of Deporvida on Interpersonal Trust ($trust2$) Accounting for Previous Programs (All regressions include fixed effects by Comuna and clustered standard errors.)

	Dependent variable:		
	Interpersonal trust ($Trust2$)		
	(1)	(2)	(3)
$Du\ DV_{Soccer} * Post$	1.667		
	(1.488)		
$Du\ DV_{Soccer}$	0.942		
	(1.281)		
$Du\ DV_{Futsal} * Post$		−1.357	
		(1.363)	
$Du\ DV_{Futsal}$		2.090*	
		(1.263)	
$Du\ DV_{Basket} * Post$			1.401
			(1.590)
$Du\ DV_{Basket}$			0.370
			(1.356)
$Dummy\ canas\ y\ ganas$	−1.202	−1.350	−1.125
	(1.358)	(1.382)	(1.356)
Controls	Yes	Yes	Yes
Observations	1,832	1,832	1,832
R^2	0.077	0.077	0.076
Adjusted R^2	0.062	0.061	0.061
Residual Std. Error (df = 1801)	20.018	20.025	20.029
Note:	*p<0.1; **p<0.05; ***p<0.01		

Table 9: Regression Results on Effect of Nightlights Improvement in Parks on Institutional and Interpersonal Trust (All regressions include fixed effects by Comuna and clustered standard errors.)

	Dependent variable:					
	Institutional trust ($Trust1$)			Interpersonal trust ($Trust2$)		
	(1)	(2)	(3)	(4)	(5)	(6)
$Du\,NL_{All} * Post$	0.017			−0.004		
	(0.015)			(0.015)		
$Du\,NL_{All}$	−0.018			−0.009		
	(0.014)			(0.014)		
$Du\,NL_{Greencorridor} * Post$		0.006			−0.010	
		(0.023)			(0.023)	
$Du\,NL_{Greencorridor}$		−0.030			−0.025	
		(0.020)			(0.020)	
$Du\,NL_{Other} * Post$			0.029			0.004
			(0.021)			(0.021)
$Du\,NL_{Other}$			−0.006			0.009
			(0.018)			(0.018)
$Du\,NL_{Previous}$	0.012	0.003	−0.0005	0.021	0.013	0.009
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,832	1,773	1,773	1,832	1,773	1,773
R^2	0.051	0.054	0.053	0.077	0.079	0.077
Adjusted R^2	0.036	0.038	0.037	0.061	0.063	0.061
Residual	0.201	0.201	0.201	0.200	0.199	0.200
Std. Error	(df = 1801)	(df = 1742)	(df = 1742)	(df = 1801)	(df = 1742)	(df = 1742)
Note:						*p<0.1; **p<0.05; ***p<0.01

We performed an analysis to estimate joint effects from the implementation of nightlight programs and organized sports programs on people's trust. Tables 10 and 11 show the regression coefficients in the evaluation of the interaction of both programs. The coefficients that evaluate the causal effects from the Deporvida programs are positive and significant in columns 1, 2, 3, 4, and 6. The coefficients found for the dummies associated with soccer and basketball Deporvida programs sports increase trust by 0.3. The dummies associated with nightlight programs are not significant, and the interaction dummies between nightlights and Deporvida are not significant either. Muralidharan et al. (2019) explain that, in order to measure interaction effects, these models require that the number of observations must be very large; therefore our current model would not have enough statistical power to find such significant effects.

5.3 Falsification Test to Estimate Robustness of Deporvida

We also performed a robustness check by assigning the intervention to a randomly chosen surveyed population that lived in a neighborhood that implemented the policy. We apply a falsification check on institutional and interpersonal trust. The coefficient for the deporvida Basketball and soccer programs is not significant (see Table 12). The falsification test is not significant, which provides evidence that the selection of the neighborhoods is not significant to higher levels of trust (see columns 1 to 4).

Table 10: Regression Results of Effects of Deporvida and Nightlight Improvements on Institutional Trust ($Trust1$) Accounting for Previous Programs (All regressions include fixed effects by Comuna and clustered standard errors.)

	Dependent variable:					
	Institutional trust ($Trust1$)					
	(1)	(2)	(3)	(4)	(5)	(6)
$Du\,NL_{All} * Post$	−1.022			−0.553		
	(1.201)			(1.269)		
$Du\,NL_{GC} * Post$		−2.551			−2.537	
		(1.658)			(1.620)	
$Du\,NL_{Other} * Post$			0.055			0.664
			(1.465)			(1.478)
$Du\,DV_{Soccer} * Post$	2.809*	3.073**	2.953**			
	(1.668)	(1.474)	(1.383)			
$Du\,DV_{Basket} * Post$				3.607**	2.759	3.063*
				(1.768)	(1.970)	(1.603)
$Du\,NL_{All} * Du\,DV_{Soccer} * Post$	2.361					
	(2.612)					
$Du\,NL_{GC} * Du\,DV_{Soccer} * Post$		1.750				
		(3.116)				
$Du\,NL_{Other} * Du\,DV_{Soccer} * Post$			1.815			
			(3.337)			
$Du\,NL_{All} * Du\,DV_{Basket} * Post$				−1.326		
				(3.686)		
$Du\,NL_{GC} * Du\,DV_{Basket} * Post$					−0.501	
					(3.783)	
$Du\,NL_{Other} * Du\,DV_{Basket} * Post$						−0.960
						(4.623)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,832	1,773	1,773	1,832	1,773	1,773
R^2	0.055	0.057	0.056	0.053	0.056	0.054
Adjusted R^2	0.039	0.041	0.040	0.037	0.039	0.038
Residual	20.097	20.064	20.076	20.123	20.081	20.096
Std. Error	(df = 1801)	(df = 1742)	(df = 1742)	(df = 1801)	(df = 1742)	(df = 1742)
Note:						*p<0.1; **p<0.05; ***p<0.01

Table 11: Regression Results of Effects of Deporvida and Nightlight Improvements on Interpersonal Trust ($Trust2$) Accounting for Previous Programs (All regressions include fixed effects by Comuna and clustered standard errors.)

	Dependent variable:					
	Interpersonal trust ($Trust2$)					
	(1)	(2)	(3)	(4)	(5)	(6)
$Du\,NL_{All} * Post$	−0.568			−0.318		
	(1.142)			(1.168)		
$Du\,NL_{GC} * Post$		−3.392**			−2.854*	
		(1.701)			(1.627)	
$Du\,NL_{Other} * Post$			1.728			1.567
			(1.297)			(1.256)
$Du\,DV_{Soccer} * Post$	2.472*	1.184	2.899**			
	(1.449)	(1.331)	(1.303)			
$Du\,DV_{Basket} * Post$				2.951*	1.455	2.204
				(1.606)	(1.356)	(1.449)
$Du\,NL_{All} * Du\,DV_{Soccer} * Post$	−0.727					
	(2.486)					
$Du\,NL_{GC} * Du\,DV_{Soccer} * Post$		4.488				
		(3.235)				
$Du\,NL_{Other} * Du\,DV_{Soccer} * Post$			−3.721			
			(3.035)			
$Du\,NL_{All} * Du\,DV_{Basket} * Post$				−2.849		
				(2.399)		
$Du\,NL_{GC} * Du\,DV_{Basket} * Post$					−1.096	
					(3.003)	
$Du\,NL_{Other} * Du\,DV_{Basket} * Post$						−2.663
						(2.661)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,832	1,773	1,773	1,832	1,773	1,773
R^2	0.077	0.080	0.079	0.077	0.079	0.078
Adjusted R^2	0.062	0.065	0.063	0.061	0.063	0.062
Residual	20.022	19.937	19.951	20.025	19.950	19.963
Std. Error	(df = 1801)	(df = 1742)	(df = 1742)	(df = 1801)	(df = 1742)	(df = 1742)
Note:						*p<0.1; **p<0.05; ***p<0.01

Table 12: Falsification Regressions (All regressions include fixed effects by Comuna and clustered standard errors.)

	Dependent variable:			
	Institutional trust ($Trust1$)		Interpersonal trust ($Trust2$)	
	(1)	(2)	(3)	(4)
$FakeDummy_{basket}$	−0.014		−0.0002	
	(0.017)		(0.017)	
$FakeDummy_{soccer}$		−0.006		−0.007
		(0.017)		(0.017)
Controls	Yes	Yes	Yes	Yes
Observations	1,111	1,111	1,111	1,111
R^2	0.044	0.043	0.083	0.083
Adjusted R^2	0.019	0.018	0.059	0.059
Residual Std. Error (df = 1082)	0.208	0.208	0.211	0.211
Note:				*p<0.1; **p<0.05; ***p<0.01

6 Final Remarks

This paper explores the effects of two policy implementation programs on two indexes that account for trust. To explore these hypotheses we use three different sources of data: the CaliBRANDO survey, administrative reports from the Secretary of Sports, and administrative reports from the Secretary of Public Spaces. Using the neighborhood of residence of the surveyed person, we are able to match it with the administrative reports to create a dummy for intervention.

We set up a difference-in-difference model to evaluate the effects of the policy for the periods of 2017 and 2018 on trust among surveyed individuals. Our model includes socioeconomic covariates and the intervention variables thoroughly test the effect of the policy interventions. Our model highlights the effects of Deporvida organized sports and finds the nightlight improvement program is not significant.

Our results highlight soccer and basketball activities as relevant and significant. The rationality behind the positive result associated with soccer and basketball could be related to the required commitment to have sustainable soccer and basketball activities, while futsal activities have lower requirements, making futsal activities more prone to violent behavior between participants. Furthermore, to have a soccer team, it is necessary to have at least 15 players per team, and that is a burdensome requirement for viable weekly practice. Moreover, as basketball is less popular than soccer and futsal, it is harder to gather the needed number of players. After considering these team needs, the sports with more strenuous requirements will be more sustainable because players will behave better or will be unable to have the activity.

We use joint tests to estimate the effect of the policies, but the evidence found is not significant for the interaction (see Muralidharan et al. (2019) for an empirical explanation). We also perform falsification tests for the intervention and show that it is not significant when assuming the program to happen before it does.

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A Results of the Principal Component Analysis

This appendix includes the results of the Principal Component Analysis and the figures.

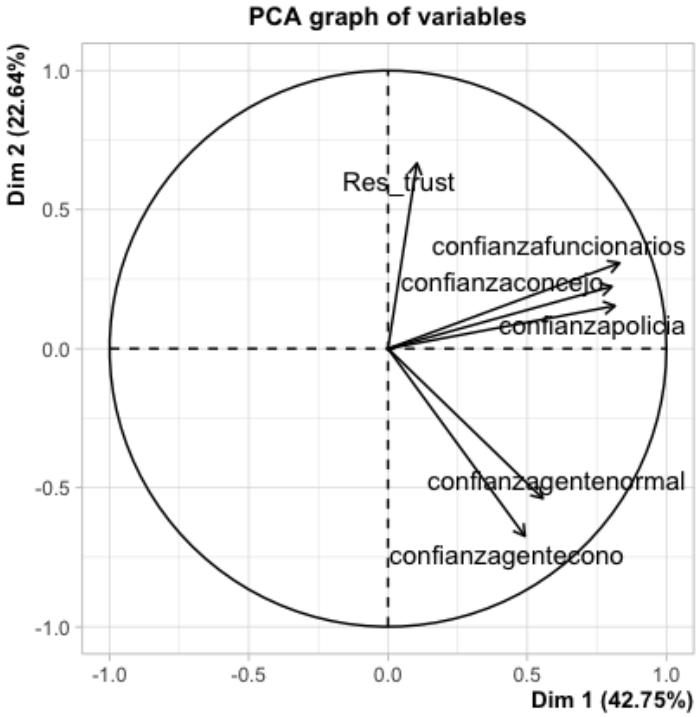

Figure 8: Principal Component Analysis and Correlations between Different Trust Variables

Table 13: Principal Component Analysis

	Dim.1	Dim.2	Dim.3	Dim.4	Dim.5
$Trust_{people}$	12.474	34.923	50.412	2.188	0.003
$Trust_{Council}$	25.045	7.364	1.642	50.763	15.186
$Trust_{Known}$	10.042	42.511	44.148	3.025	0.275
$Trust_{Officials}$	26.508	9.804	0.010	0.187	63.490
$Trust_{Police}$	25.931	5.398	3.787	43.837	21.047