Early-Life Conditions, Parental Investments, and Child Development: Evidence from a Violent Conflict

Valentina Duque*
Columbia University

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Abstract

A growing body of evidence finds that early-life circumstances are an important determinant of an individual's future outcomes. Here I investigate how shocks in utero and in childhood affect human capital formation, and to what extent their experience at certain developmental stages matters more than others. I focus on violent conflicts that constitute multidimensional shocks to the well-being of many households in developing countries. Using monthly and municipality-level variation in the timing and severity of massacres in Colombia from 1999 to 2007, I show that children exposed to sudden changes in violence in utero and in childhood achieve lower height-for-age (0.09 SD), cognitive (PPVT falls by 0.17 SD and verbal ability, math reasoning, and general knowledge fall by 0.15–0.28 SD), and socio-emotional outcomes (adequate interaction falls by 0.04 SD). Furthermore, I explore changes in parental investments as potential mechanisms, finding that changes in violence during a child's early-life is associated with lower quantity and quality of parenting. Results do not seem to be driven by selective sorting, migration, fertility, or survival, and are robust to controlling for mother fixed-effects. This is the first study to investigate the effects of early-life violence on child cognitive and non-cognitive outcomes in a developing country and among the first to investigate the role of parenting as a potential channel of transmission.

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Growing research points to the important role that early-life conditions play in shaping adult outcomes (Barker, 1992; Cunha and Heckman, 2007; Almond and Currie, 2011). Evidence from natural experiments shows that adverse conditions during the in-utero and childhood periods (i.e., disease outbreaks, famines and malnutrition, weather shocks, ionizing radiation, earthquakes, air pollution) can have negative effects on health, education, and labor market outcomes (e.g., Almond, 2006; Almond et al., 2010; Van den Berg et al., 2006; Currie and Rossin-Slater, 2013; Almond, Edlund and Palme, 2009; Sanders, 2012). In this study, I focus on perhaps one of the most pervasive shocks that affect individual's well-being: Exposure to violence (i.e., wars, armed conflicts, urban crime). The World Bank (2013) estimates that more than 1.5 billion people in the developing world live in chronically violent contexts. Violence creates poverty, accentuates inequality, destroys infrastructure, displaces populations, disrupts schooling, and affects health. Moreover, I focus on children, which is a particularly vulnerable subpopulation: Children in developing countries are subject to more and more frequent adverse conditions, start disadvantaged, and receive lower levels of investments compared with children from wealthier environments (Currie and Vogl, 2013).

While recent research has shown the large damage on education and health outcomes from early life violence (Camacho, 2008; Akresh, Lucchetti and Thirumurthy, 2012; Minoiu and Shemyakina, 2012; Brown, 2014; Valente, 2011; Leon, 2012), several key questions remain unaddressed. First, how does violence affect other domains of human capital beside education and health (i.e., cognitive and noncognitive skills)? Identifying such effects is important both because measures of human capital (physical, cognitive, and non-cognitive indicators) can explain a large percentage of the variation in later-life educational attainment and wages (Currie and Thomas, 1999; McLeod and Kaiser, 2004; Heckman, Stixrud and Urzua, 2006) and to understand mechanisms behind previous effects found for educational attainment and health. Second, to what extent do the effects of violence at different developmental stages (i.e., in-utero vs. in childhood) differ? Do impacts on the particular type of skill considered (e.g., health vs. cognitive outcomes) differ by the developmental timing of the shock? Third, given the size and persistence of the effects of violence, it is also natural to ask whether and how parental investments also may respond to these shocks. Family investments are important determinants of human capital (Cunha and Heckman, 2007; Aizer and Cunha, 2014) and parental responses can play a key role in compensating or reinforcing the effects of a shock (Almond and Currie, 2011). At present, well-identified empirical evidence on this question is scarce. Finally, and perhaps most importantly from a policy perspective, is there potential for remediation: Can social programs that are available to the community help mitigate the negative effects of violence on vulnerable children?

To explore these questions, I analize survey microdata on 21,000 children collected in 2007 to evaluate the largest social program in Colombia: a home-based childcare program known as *Hogares Comunitarios de Bienestar (HCB)*. HCB was implemented in the 1980s and currently operates nationwide. The goal of the program is to promote low-income children's physical growth, health, and cognitive and socio-emotional development, as well as to enhance women's participation in the labor market. Poor families send their children to a HCB center in the community where they receive childcare, nutritional support (50 to 70 percent of the recommended daily allowance), and psychosocial stimulation. HCB serves approximately 800,000 low-income children between 0 and 7 years of age throughout most of Colombia's 1,100 municipalities (Bernal and Fernández, 2013). The household survey provides rich measures on child development, as well as detailed information on parental investments and parenting behaviors. Most importantly, these data contain information on each child's year and month of birth, as well as household migration history, which allows me to identify with some precision a child's violence exposure in utero and in childhood. The data also include a small sample of siblings that I use to estimate models that account for mother fixed-effects.

I measure violence shocks using the occurrence and severity of massacres at the monthly and municipality levels during Colombia's armed conflict. Massacres are defined as the intentional killing of four or more people by another person or group. As discussed in more detail in the background section, these shocks were a common practice employed by violent groups during the most intense years of the conflict. From 1999–2007, the period of interest in this paper, more than 1,000 massacres occurred across more than half of all municipalities in the country, ranging from 4 to more than 25 victims killed in each episode; as such, they represented significant shocks to a household's well-being.

This paper exploits the large temporal and geographical variation in violence at the municipality and month-year levels in Colombia from 1999 to 2007, to estimate the effects of violence on children and families. While the occurrence of massacres in a given municipality was not random—armed groups could have targeted specific populations or, in some cases, could have announced their terrorist plans—, the identification strategy relies on the fact that the occurrence of a massacre at a given moment in time and place (e.g., February of 2000 in Bogotá versus March of 2000 in Bogotá) is uncorrelated with other factors affecting human capital investments and with a child or family unobserved characteristics. I provide some evidence that supports this identifying assumption using an event time study that is presented in the results section.

Using models that control for a variety of individual-level characteristics, as well as fixed-effects at the municipality, year, and month of child's birth, and municipality linear time trends, I show that children exposed to violence in-utero and in childhood experience a significant decline in their physical, cognitive, and socio-emotional development. Exposure to the average level of massacres in late pregnancy and in childhood reduce height-for-age Z-scores (HAZ) by 0.09 of a standard deviation (SD) and exposures in early pregnancy and in childhood lower cognitive test scores by 0.16–0.29 SD. Adequate interaction, an indicator of child socio-emotional development, falls by 0.04 SD among children who were exposed to violence after birth. I also use models that account for a mother's fixed-effect, which allow me to control for all time-invariant characteristics of mothers that may be correlated with living in a municipality with high violence and children's human capital, and I find consistent estimates of the effect of violence on child outcomes.

Moreover, results show that violence is negatively associated with birth weight, an important input in the production of human capital. This impact is driven by exposure during the first trimester of pregnancy. Turning to potential mechanisms, I examine the association between violence and parenting – to my knowledge, this is the first study that investigates this link. Results show little evidence that parents compensate the negative effect of violence on child outcomes. First, I find that among young children, exposure to violence in childhood is associated with a decline in the total time a mother spends with her child as well as a decline in the time she spends in activities that stimulate her child's cognitive development (reading books, singing songs, etc.), and there is an increase in the incidence of psychological aggression. This result provides some evidence that could suggest that parents reinforce the negative effects of the shock. Second, I find that among older children, there is no significant association between violence and parenting. As is discussed further below, this empirical finding *is* consistent with parental preference for equality across children. Lastly, I find little evidence that suggests that HCB could help mitigate the negative effect of violence on young children's outcomes. I employ an instrumental variables approach to address the issue of selective participation in the program using distance from a household to the nearest HCB center as an instrument.

Finally, I present some evidence on the external validity of my results by replicating my analysis using other datasets such as the Demography and Health Survey (DHS) and the baseline wave of the Colombian Longitudinal Survey conducted by Universidad de los Andes (ELCA). Further analyses on potential sources of selection bias suggest that results do not seem to be driven by selective sorting, migration, fertility, or survival.

This study is structured as follows. In Section 1, I briefly describe recent findings on the effects of violence in the early stages on later-life outcomes, and I provide some background information on Colombia's armed conflict. I then discuss the data in Section 2 and methods in Section 3, followed by the results in Section 4 and some robustness checks in Section 5. I provide a brief conclusion in Section 6.

1 Background

1.1 Theoretical Framework

There are two strands of the literature on human capital formation. The first strand proposes that human capital is a dynamic process of skill formation and suggests that any adverse shock that affects an individual's early-life environment is likely to have long-term consequences on his or her future outcomes. Two features of the human-capital production function support this idea. First, future skills depend on past skills: a shock affecting a *critical stage* of human capital formation (i.e., in-utero) is likely to affect the accumulation of future skills. The existence of critical stages implies that certain dimensions of human development can only be affected at certain ages (e.g., some studies suggest that cognitive ability can only be affected until age 10; Hopkins and Bracht, 1975). This concept is known as "self-productivity" (Cunha and Heckman, 2007). Second, the level of skills today influences the productivity of current and future investments: an adverse shock in an influential stage is also likely to reduce future skills by decreasing the productivity of investments (e.g., stunted children never catch up with later-life nutritional supplementation). This idea is called "dynamic complementarities" (Cunha and Heckman, 2007).

The second strand of the literature on human capital is motivated by the fetal origins hypothesis (Barker, 1992). This hypothesis argues that adverse conditions during the prenatal period can "program" a fetus to have metabolic characteristics associated with future disease. This idea has motivated scientists across a variety of fields (i.e., psychology, epidemiology, economics), to investigate how conditions during an individual‘s early-life, the period from conception up to age five, affect his or her future well-being (Almond and Currie, 2011).

1.2 The Effects of Violence on Human Capital

Previous studies have shown the negative effects of exposure to violent conflicts in early life on human-capital outcomes such as health, education, and labor-market prospects. Among the studies investigating the impacts of prenatal exposure to violence, Camacho (2008), Mansour and Rees (2012), and Brown (2014) find that violence reduces a child's birth weight and Valente (2011) finds an increase in the likelihood of having a stillbirth or miscarriage.[1] Another group of studies shows evidence that exposure to war in early-life—up to age 6—reduces educational attainment and has a negative impact on labor-market outcomes and adult height (Chamarbagwala and Morán, 2011; Leon, 2012; Galdo, 2013; Grimard and Laszlo, 2014).[2]

Relevant to my study, existing literature has found a robust association between vi-

[1] Camacho (2008) found that pregnant mothers exposed to landmine explosions in Colombia give birth to babies who are 8.7 grams less heavy. Using data from Palestine, Mansour and Rees (2012) found a small increase in the incidence of low birth weight (Brown, 2014), for the case of Mexico, found that exposure to the average increase in local homicide rates was associated with a decline in birth weight of 75 grams and a 40% increase in in the probability of low birth weight. Valente (2011), for the case of Nepal, found a 10% increase in the probability of misscarriage. These authors found the strongest impacts of violence shocks in the first trimester of pregnancy.

[2] Chamarbagwala and Morán (2011) for the case of Guatemala found a decline in years of education, and for the case of Peru, Leon (2012) found a decline in future years of schooling of 0.09, Galdo (2013) found a 4% fall in adult‘s monthly wages, and Grimard and Laszlo (2014) found a decline in HAZ of 0.05 among women.

olence during the first years of life and child HAZ, a common measure of health and nutritional status that is associated with adult height, cognitive ability, earnings, and productivity (Case and Paxson, 2008; Strauss and Thomas, 1998). This research compared young children exposed to civil war in the area of residence with unexposed children and found that violence exposure reduces a child's HAZ by 0.2–1.0 SD (Bundervoet, Verwimp and Akresh, 2009; Akresh, Lucchetti and Thirumurthy, 2012; Minoiu and Shemyakina, 2012). However, these studies do not distinguish in-utero and early-childhood exposures, so these effects could represent the accumulated impacts of prenatal and postnatal exposure to conflicts. Moreover, these remarkably large impacts could be due to the fact that this research focuses mostly on African children, a population that even in the absence of violence starts from a lower nutritional baseline and which is therefore highly vulnerable to adverse environmental conditions.[3]

Only two studies have explored how violence shocks affect other dimensions of human capital. Sharkey et al. (2012) investigated the impact of exposure to local homicides in Chicago on four-year-old children's behavior and academic skills. They found that exposure to a homicide in their neighborhood reduced children's attention, impulse control, and test scores by over a third of a standard deviation. While these are very large effects, the fact that this study uses data from a developed country makes it difficult to compare estimates to those in a developing country. As previous research has shown, children in developing countries are subject to more and more frequent adverse conditions and receive lower levels of investments compared with children from wealthier environments (Currie and Vogl, 2013; Paxson and Schady, 2007; Fernald and Hidrobo, 2011). Also, the estimates in Sharkey et al. (2012) correspond to short-term impacts and do not reflect whether violence has a lasting effect on child human capital. Rodriguez and Sánchez (2013) also found that exposure to a one-standard-deviation increase in the intensity of armed conflict in Colombia reduced standardized test scores by 0.86 SD for children 11–18 years of age, a sample much older than the group analyzed here.

Together, these results suggest that violent conditions experienced during a child's prenatal and postnatal periods should have significant impacts on children developmental outcomes.

1.3 Potential Mechanisms: Economic Resources, Biological Pathways, and Parental Responses

Violence can affect child development through a number of mechanisms. First, it can limit the amount and quality of resources in the local community (supply-side mechanisms). High violence can disrupt the economy (i.e., reduce household economic resources), destroy infrastructure (e.g., hospitals, schools), reduce the quality of public services (exodus of

[3] For instance, Bundervoet, Verwimp and Akresh (2009) found that children in Burundi have on average a HAZ of less than -2.3, Akresh, Lucchetti and Thirumurthy (2012) for Eritrea and Ethiopia found a HAZ < -1.5, and Minoiu and Shemyakina (2012) for Cote d'Ivoire found <-1.9.

skilled medical doctors, teachers), and limit investments (e.g., resources may be crowded away from education and healthcare to military spending during wars), all of which affect human capital. A number of studies have provided evidence on potential supply-side mechanisms. Leon (2012) showed that attacks against teachers in conflict-affected areas during Peru's political conflict decreased educational attainment; Rodriguez and Sánchez (2013) showed that negative economic shocks and lower school quality due to violence increased school dropout and child labor in Colombia; Akbulut-Yuksel (2009) also found that school-facility destruction and teacher absence in WWII Germany accounted for declines in education, and malnutrition and destruction of health services worsened the health outcomes of cohorts exposed to the war. Minoiu and Shemyakina (2012) found that household economic losses helped explain declines in children's height during Cote d'Ivoire's civil conflict.[4]

Second, violence can affect child development through its impacts on mother's and child's health and nutrition, and through maternal stress. The fetal origins hypothesis predicts that changes to the prenatal environment can "program" the fetus in ways that can affect future health (Barker, 1992). Nutritional deprivation and chronic stress in pregnancy can lead to significant declines in fetal and newborn health and cognitive outcomes through changes in the immune and behavioral systems that may lead to permanent alterations in the body's systems (Denckel-Schetter, 2011; Gluckman and Hanson, 2005).[5] For example, fetal exposure to excess cortisol—the hormones responsible for regulating fetal maturation—may lead to impaired development of the brain and spinal cord, thereby diminishing the mental and motor skills of infants (Huizink et al., 2003), and is associated with significantly lower schooling attainment and verbal IQ scores and are more likely to have a chronic health condition at age 7 (Aizer, Stroud and Buka, 2012). The medical literature suggests that the timing of these alterations during pregnancy matter for a child's physical and cognitive development. Since the number of neurons is mostly determined by mid-gestation, both nutritional deprivation and maternal stress in the first half of pregnancy may be particularly harmful for cognitive development (Gluckman and Hanson, 2005). On the other hand, child height can be particularly sensitive to nutritional deprivation in the second half of pregnancy, the period in which the mother gains significantly more weight (Stein and Lumey, 2000; Kramer, 1987), and during the first years of life (Victora et al., 2010).

Third, stress may compromise the family environment by affecting parental mental health and family relationships, weakening parenting quality that in turn may hinder child development (Campbell, 1991). Households can also modify their behavior in order

[4]Others have shown that child soldiering in Northern Uganda negatively affects the long-term economic performance of child soldiers in terms of skills, productivity, and earnings (Blattman and Annan, 2010).

[5]Almond, Mazumder and van Ewijk (2011) show that in-utero malnutrition significantly lowers achievement scores: exposure to Ramadan during the first trimester reduces math, reading, and writing test scores by 0.06 to 0.08 SD. Several studies have also found effects of maternal stress during pregnancy on child health, behavioral, and cognitive outcomes (LeWinn et al., 2009; Almond, Mazumder and van Ewijk, 2011).

to prevent victimization. For instance, mothers may limit their children's access to the streets (e.g., refrain from letting the child leave the home, play outside, etc.). Sharkey et al. (2012), for example, found that local violence is positively associated with higher parental distress, suggesting that parental responses may be a likely pathway by which local violence affects young children. Moreover, neurobiologists have shown that a strong and positive attachment in infancy (i.e., attachment theory) promotes brain growth and healthy development (Schore, 2001). Thus, if violence disrupts the home environment, it is likely to affect the child through changes in the mother–child interaction.

Moreover, violence can affect how parents allocate resources to children. Economic theory provides competing hypotheses on how parents make investments based on a child‘s endowment (e.g., birth weight). If parents are motivated by maximizing the returns of their investments, resources are invested in their high-ability children (Becker and Tomes, 1986), whereas if parents seek to equalize outcomes across their children, resources are directed to their less-able children (Behrman et al., 1982). Overall, there is limited evidence for compensatory responses by parents, particularly when design-based experiments are considered (Almond and Mazumder, 2013). Moreover, there is little evidence on how violence could affect parental investments on children. Based on their preferences for equality, parents may respond to violence shocks by investing more on affected-children (e.g., increasing the amount and quality of time and parenting) or they may actually reinforce the negative effects of violence by directing fewer resources to their more-affected child.

1.4 Colombia's Armed Conflict

For more than 50 years, Colombia has faced an internal armed conflict, one of the longest in the world. The main actors are two communist guerilla groups and one right-wing paramilitary group. The two guerrilla forces are the FARC (Colombian Revolutionary Armed Forces) and the ELN (National Liberation Army) that emerged in the 1960s in response to political exclusion of the rural poor. The paramilitaries were armed groups of peasants created in the early 1980s by landowners for protection against the guerilla threat. The main paramilitary group was the AUC (the United Self-Defense Forces of Colombia).

While the country has experienced several waves of high violence, the more recent violence started in the early 80s with the emergence of the illegal drug cultivation and trade business, providing a significant source of income to guerillas and paramilitary forces. These enormous profits derived from the drug business, the presence of paramilitary groups, limited state capacity, among other factors, have led to an intense fighting between the guerrillas and the paramilitary, with the civilian population caught in the crossfire. Government attempts to help the army combat the armed groups have fueled the conflict even more. Human rights advocates have accused rebels of committing massacres, kidnappings, torture, extortion, and forced displacement, among other atrocities

(Gaviria, 2000).

1.5 Massacres

Massacres were central for armed groups in their purpose of controlling local populations and they distinguish from other measures of violence (e.g., homicides), in their high levels of cruelty and visibility of violence. From 1980 to 2012, armed groups committed 1,982 massacres, in which 11,751 people were killed (6 deaths per massacre on average). Paramilitary groups were responsible for more than 60% of the total massacres within this period; guerrillas for 18%; and other groups for 20% (Grupo de Memoria Histórica, 2013, 48).[6]

Massacres took place in almost half of the country: there was at least one massacre in 526 municipalities (out of the 1,100) from 1980 to 2011. Three quarters of the massacres were small: they involved 10 or fewer victims. Using data on massacres at the monthly-municipality level, available since 1993, Figure 1 presents the number of massacres and victims of massacres that were killed in Colombia. As the Figure shows, there is a large variation in these violence shocks over time, with a peak in year 2000 when more than 200 massacres occurred with approximately 1,300 victims. Since 2003, the number of massacres declined due to the demobilization of paramilitary groups (at this point, armed groups committed less than 100 massacres with 500 people killed). Figure 2 illustrates the distribution of victims across municipalities in 2000 – a highly violent year – and in 2005 – a year with a relatively low level of violence. As Figure 2 illustrates, massacres were concentrated towards the western and northern parts of Colombia, which are regions with a higher population density, more likely to be urban, and with a higher presence of paramilitary groups. The blue areas depicted in Figure 2, represent the municipalities I focus on in my anlysis. As it can be observed, there is a high variation in violence exposure across the sample of municipalities in the data. Figure 3 shows the number of victims of massacres by month by city for the six most important cities in Colombia, which together represent 45% of the sample. I will describe the data in more detail in the next section.

Massacres were not random terrorist acts; instead, they were a deliberate strategy of illegal armed groups to expand their territorial, economic, and social control. Armed groups chose specific regions based on their strategic location, availability and quality of lands and natural resources, presence of rival groups and state forces, and support from local landlords and authorities, among other factors (Duncan, 2006).

While the decision of armed groups to commit a massacre in a given region was not random, I argue that my identification strategy – exploit the timing of massacres across municipalities–, allows to overcome this selection problem and provides evidence on the causal impact of violence on individual outcomes. First, the timing of massacres

[6] Although the information on who were the victims of massacres is scarce, some reports document that 88% of victims were men, 96% were adults, and among the occupations of the victims of massacres, 60% were peasants and 30% worked in sales or in their own business (Grupo de Memoria Histórica, 2013, 54).

within municipalities and years can be considered random. For example, the occurrence of a massacre at a given moment in time and place (e.g., February of 2000 in Bogotá versus March of 2000 in Bogotá), is uncorrelated with other factors affecting human capital investments. I provide some evidence that supports this assumption using an event time study that is presented in the results section. I show that the occurrence of a massacre in time t is uncorrelated with changes in other aggregate factors (e.g., GDP per capita, investments in education, wages, unemployment rate, other indicators of the dynamics of other measures of violence such as the proportion of the population that was forced displaced, weatherconditions), 12 months before and after this episode. Second, this paper focuses on the period from 1999 to 2007, which coincides with the most intense years of the conflict, 1996-2002 (see Figures 1 and 2). During these intense years, armed groups (especially paramilitaries) significantly increased the number of random attacks in their purpose of expanding their territorial control. Grupo de Memoria Histórica (2013) documents that more than half of the massacres that ever took place, occurred within this short period. Third, while massacres could have been announced in some cases, this was typically done within days prior to the episode, limiting the coping strategies of households, and still causing significant amounts of stress, losses, and damages to the local population. Anecdotal evidence gives account on this. A victim who survived the massacre of Segovia (a small municipality in the department of Antioquia) in September 11, 1998 reports her testimony 15 years later:

> *How were the days before the massacre? Were there any warnings?*
> We used to go out normally. People said: "Do not go out because there are some strange cars, different people from us." They had found some warnings that said "Death to Revolutionaries from the Northeast" and they had written them in the walls and in the town hall.
>
> *Did the warnings persist for many days?*
> Yes. During the day we tried to act normal. But at 4pm ... the fear and sadness began. We thought someone was coming to knock on the door, and they were going to throw us bombs ("granadas") or do something.
>
> *What happened that day?*
> They entered the house, knocked down the doors, windows, destroyed everything there was. They threw us bombs, broke the t.v., ..., everything was damaged. They killed my sick dad .... They killed my two brothers .... Really painful. I was disabled. I can't work. I have suffer from a heart disease. (Bonilla, 2013, November 2)

Another victim from the massacre of El Tigre, in the department of Putumayo, on January 9th, 1999, reports his testimony:

> During the massacre, paramilitary groups burnt six houses. These were the

places where our businesses operated, places where people not only lived but places where people worked. They destroyed our sources of work. After eight days and with the presence of [Colombian] army, the same paramilitary groups burnt another house. That same night they also destroyed some of our property, the tv, plants, everything was stolen. From my house for example they took some jewelry and money. Our animals also suffered with the massacre, then we had no eggs to sell [at the local market], or hens or pigs to sell. Anyhow, there was anyone willing to buy, there was no money. Many abandoned the farms, stopped going there ... (Grupo de Memoria Histórica, 2013, 52).

2 Data

To investigate the effects of violence on child development, I use a rich a household survey collected in 2007 to evaluate Colombia's a home-based childcare program known as *Hogares Comunitarios de Bienestar (HCB)*. HCB was implemented in the 1980s and currently operates in all geographic regions of the country. The goal of the program is to promote low-income children's physical growth, health, and cognitive and socio-emotional development, as well as to enhance women's participation in the labor market. Poor families send their children to a HCB center in the community where they receive childcare, nutrition (50 to 70 percent of the daily allowance), and psychosocial stimulation. HCB serves approximately 800,000 low-income children between 0 and 7 years of age throughout most of Colombia's 1,100 municipalities (Bernal and Fernández, 2013).

Because the program had already been implemented for several decades before it was formally evaluated in 2007, scientists used a non-experimental approach. Data for the evaluation were collected from a random sample of HCB childcare centers across 69 municipalities (out of the 1,100), in 29 departments (out of the 33), and included 10,500 children in the treatment group and 10,400 children in the control group. Children in the control group had similar demographic characteristics (gender, age, etc.,), program eligibility criteria (i.e., poverty score used to focalize public policy programs to low-income households), and resided in the same neighborhoods as children in the treatment group.[7] The HCB data include exceptional measures on child outcomes for 21,000 children. Most importantly, these data contain information on each child's year and month of birth, as well as household migration history, which allows me to identify with some precision a child's violence exposure in early life. The data also include a small sample of siblings which represents another advantage of the data, as they allow me to estimate models that account for maternal fixed effects and limit the possibility of omitted variable bias. I provide more detail information on the identification of a child's violence exposure in utero and in childhood further below.

Given that this childcare program is exclusively for the poorest households in the

[7]For further details on the HCB evaluation see Bernal et al. (2009).

country, the survey only samples families in the lowest income quartile; it is therefore not representative of the Colombian population. Moreoever, given the selection criteria of HCB centers in the HCB data, the municipalities included in the sample are mostly urban (Figure 2 shows the municipalities sampled in the HCB evaluation survey (blue areas)). I address the issue of external validity of my results in the robustness checks section.

2.1 Outcomes

The analytic sample in this study includes approximately 21,000 children 1–7 years of age who were born between 2000 and 2006 (N varies by the outcome measured). The outcomes of interest in this study are measures of children's health and cognitive and socio-emotional development:

(1.) *Physical health (nutritional status)* is measured using the child's HAZ constructed based on the World Health Organization (WHO) Multicenter Growth reference datasets for all children in the sample. HAZ is considered an appropriate indicator of children's long-run nutritional status and health (Martorell and Habicht, 1986).[8]

(2.) *Cognitive development* is measured using several test scores for children 3 years of age and above. The first measure is the Spanish adaptation of the Peabody Picture Vocabulary Test (PPVT; in Spanish, the Test Visual de Imagenes Peabody, TVIP). The PPVT measures a child's receptive language. This test has been widely used to test a child's language and cognitive ability (Dunn and Dunn, 1997). The second set of cognitive measures follow the Spanish version of the Woodcock–Johnson battery III (Woodcock–Munoz, WM) that examines a child's cognitive ability and achievement. I focus on verbal ability, mathematical reasoning, and general knowledge about the world. These indicators are standardized with zero mean and unit standard deviation.

(3.) *Socio-emotional development* is measured using the Penn Interactive Peer Play Scale (PIPPS). This behavioral rating instrument used to assess children's behavior while in peer play interactions is available for children three and above. On 32 items, childcare providers (or mothers in the case of nonparticipant children) indicate how often they have observed a range of behaviors during free play in the previous two months—e.g., "Shares toys with other children"—(Bernal and Fernández, 2013). Three measures are considered: play disruption (aggressiveness), play disconnection (withdrawal), and play interaction (adequate interaction).

[8]Height-for-age reflects stunted growth, "a process of failure to reach linear growth potential as a result of suboptimal health and/or nutritional conditions" (De Onis, 1997, , 46). A child having impaired growth implies some means of comparison with a reference child of the same age and sex. This reference group is established by the WHO by comparing information on child growth across many countries. Differences of genetic origin are evident for some comparisons; however, these variations are relatively minor compared with the large worldwide variation in growth related to health and nutrition.

2.2 Mechanisms

The HCB evaluation asked a rich set of survey questions on parental investments. I use this information to construct a set of measures that represent potential mechanisms through which violence could affect child outcomes:

(1.) *Parental investments* in the form of i) the use of prenatal care, ii) the duration of breastfeeding (in months), iii) child vaccination status[9], and iv) number of protein servings in the last week.

(2.) *Parenting quality* is measured by the quantity of time a mother spends with her child, how maternal time is spent in activities of personal childcare, active stimulation, and whether a mother is often aggressive with her child. The list of parenting measures includes i) a continuous measure of hours per week a mother spends with her child, ii) the frequency of routines associated with a child's personal care (mother's time investments in keeping the child safe, fed, clothed, and sheltered) iii) the frequency of active stimulation routines (mother's time spent reading books to the child; talking with the child; playing games inside and outside the house; singing songs to the child; teaching letters, colors and numbers; caressing the child; watching television with the child; and running errands with the child), and v) the frequency a mother adopts physical (pushing the child, hitting or spanking, etc.) and psychological aggression (shouting, scaring, etc.) against her child. These parenting measures (except for the mother's time use) are coded according on a four-point scale: 0 = *never*, 0.5 = *some times a week*, 2 = *several times a week*, 5 = *every day* (Bernal, Fernández and Pena, 2011).

2.3 Identification

My identification strategy starts by identifying the level of violence to which a child was exposed in each trimester of pregnancy and during childhood. To do this, I require information on the children's dates of birth, municipalities of birth, and municipalities in which they lived throughout their life. The date of birth allows me to identify *when* a child was in-utero, and the municipalities of birth and residence, indicates *where* a child was in-utero and in childhood. To identify each trimester of pregnancy I simply count back nine months from the date of birth.[10]

The HCB data includes information on the date of birth but not on the municipality of birth (or municipality of residence during childhood). While the municipality of birth is not available in the data, it can be inferred from other survey questions asked to the mother. Using information on household migration history and on reports for whether the

[9]The full list includes: BCG, DPT (1, 2, and 3), Polio (1, 2, and 3), and measles.

[10]Since I do not have information on the duration of pregnancy (i.e., gestation weeks), I also test my results assuming that children were born prior to completing their nine months of pregnancy (i.e., 8 months). Results are substantially similar to assuming a nine-month gestation.

household was living in the municipality of residence (the location of the interview) at childbirth, I can identify those children who were in-utero and were born in the current municipality, and who have lived in that municipality ever since. Using this information, I know the exact municipality of birth and all subsequent places of residence for 89% of the total sample (20,936 children out of a total of 23,624 children), representing the analytic sample of this study. The remaining 11% of the sample is therefore excluded from the analysis. Comparing the observable characteristics of mover and nonmover households, I find that the nonmovers tend to be a more advantaged group of families as shown in Appendix B Table 1. For example, mothers in nonmover households tend to be older, more educated, and more likely to be married than other mothers. Thus, excluding children of migrant families from my analyses may bias towards zero the estimate of the impact of violence on child development.

2.4 Data on Violence

Information on massacres was obtained from the violence dataset from the Center of Research on Economic Development of University of Los Andes (Bogotá, Colombia). This dataset includes the number of massacres and the number of victims killed in each massacre, by municipality, and by month/year in Colombia since 1993.[11]

I construct several measures of violence exposure for both the prenatal and postnatal periods. In particular, I create a measure of violence exposure for each trimester of pregnancy (three measures in total) and a measure of violence exposure for the period that starts in the month of child's birth and ends in the month of the interview (childhood exposure). So consider, for instance, a child born in February 2005. At the time of the interview (January 2007), the child would be two years of age and so his or her violence exposure in early childhood would be whether a massacre occurred during those two years, the number of massacres that occurred in this period, and the total number of victims of massacres that took place in this period. These measures are defined using i) dummies for any massacre, ii) the number of massacres, and iii) the number of victims killed in massacres. These variables are merged with the HCB based on each child's municipality, month, and year of birth. My preferred measure of violence is the number of victims of massacres since it captures to a higher degree the intensity of the shock (i.e., a massacre with four victims has a lower impact, on average, than a massacre of nine victims).

3 Methods

I estimate the effect of the violence on children's developmental outcomes using two models, one that controls for a rich set of covariates and one that accounts for time-

[11]I want to thank Ana Maria Ibanez at University of Los Andes for generously sharing the data on massacres.

invariant mother fixed-effects. Equation 1 describes the first model:

$$
\begin{aligned}
Y_{i,j,m,t} = \beta_1\, \mathit{Violence}_{\mathit{trim1}_{i,j}} + \beta_2\, \mathit{Violence}_{\mathit{trim2}_{i,j}} + \beta_3\, \mathit{Violence}_{\mathit{trim3}_{i,j}} \\
+ \beta_4\, \mathit{Violence}_{\mathit{childhood}_{i,j}} + \beta_i X_{i,j} + \alpha_j + \alpha_t + \alpha_m + \mathit{Trend}_{j,t} + \varepsilon_{i,j,d,m,t}, \quad (1)
\end{aligned}
$$

where the variable $\boldsymbol{Y}$ denotes child i's outcome and the subscript j refers to the municipality, m the month, and t the year of birth, respectively. $\mathit{Violence}_{\mathit{trim1}}$ is an indicator for whether a child was exposed to violence during the first trimester and $\mathit{Violence}_{\mathit{childhood}}$ represents the level of violence a child experienced during childhood. $\boldsymbol{X}$ includes a set of child characteristics such as gender and age in months dummies (<25, 25–36, 37–48, 49–60, 60+) and an indicator for HCB participation, as well as dummies for mother's age in years (<23, 23–26, 27–33, 33+), education (completed primary or less education, less than a high school degree, high school or more, and unknown), and marital status (married, cohabiting, single, unknown). The terms α_j, α_t, and α_m are fixed effects for the municipality, year, and month of the child's birth. These terms will absorb time-invariant differences in these dimensions. For example, a financial crisis affecting the whole economy at a given moment would be captured with the year fixed effects. The term trend represents municipality linear time trends (interactions between the child's municipality and year of birth) that absorb differences in economic development across municipalities that change linearly over time (e.g., investments in health services) and that could affect a child's development. They also allow me to account for differential linear trends in child development across municipalities over the time period of analysis. ε is the random error term. Errors are clustered at the municipality level to account for within-municipality serial correlation in the observations. The key coefficients of interest are $\beta_1 - \beta_4$ as they describe the impacts of violence on child development in each trimester while in-utero and during childhood.

The second model I employ controls for mother fixed effects and is estimated using equation 2. The only covariates included in this model are child's gender and age (in matrix $\boldsymbol{X}$), and year and month of child's birth dummies (vectors α_t and α_m, respectively), and trends.

$$
\begin{aligned}
Y_{i,j,m,t} = \beta_1\, \mathit{Violence}_{\mathit{trim1}_{i,j}} + \beta_2\, \mathit{Violence}_{\mathit{trim2}_{i,j}} + \beta_3\, \mathit{Violence}_{\mathit{trim3}_{i,j}} \\
+ \beta_4\, \mathit{Violence}_{\mathit{childhood}_{i,j}} + \beta_i X_{i,j} + \alpha_t + \alpha_m + \mathit{Trend}_{j,t} + \varepsilon_{i,j,d,m,t} \quad (2)
\end{aligned}
$$

This model exploits the small sample of siblings in the HCB evaluation (3.800 siblings out of the 20.900 children) to control for observed and unobserved time-invariant characteristics of the mother and family, which may be correlated with both the probability of residing in a municipality with high violence and with experiencing worse developmental outcomes.

4 Results

Table 1 presents summary statistics for all the children and their mothers in the sample, and by whether they were exposed to zero (29% of the sample), low (22%), or high (49%) violence in early-life (from in-utero through early childhood). Low violence is defined as whether a child was exposed to 1 or 2 massacres (between four and nine victims of massacres) in early-life, while high violence is defined as whether a child was exposed to more than 2 massacres (or more than nine massacre victims of massacres) in early-life.[12]

Table 1 shows that 20% of mothers are younger than 23 years of age, 23% are between 23 and 26, and a fifth of the sample is over 33. In terms of education, 31% of mothers have primary or less, a third has less than a high school diploma, and a third has high school or more. More than half of mothers cohabitate, 17% are married, and 11% are single. Overall, Table 1 shows very little differences in maternal characteristics by violence exposure. For example, 32% of women with children exposed to no violence have primary of less, while 31% and 30% of mothers of children exposed to low or high violence report primary or less. This suggests that mothers of children exposed to little or high violence in early-life are similar accross observable dimensions.

In terms of child characteristics, Table 1 shows that 48% of the sample is female, the average age is 41 months, and 50% of children participate in HCB. The average HAZ is -1.0, 16% of the sample is stunted, and 3% is severely stunted. Cognitive and socio-emotional outcomes have been standardized with mean zero. Differences by violence exposure show that children exposed to violence tend to be older, likely due to the fact that older children have had more time to be exposed to at least one massacre than younger children. Thus, I include controls for child's age in months in all specifications to account for the correlation between higher age and higher likelihood of experiencing more massacres. In terms of outcomes, children exposed to high violence are more likely to have higher HAZ than children exposed to no violence. For example, children exposed to more than 9 massacre victims over the period from in-utero to current age have an average height-for-age score of -0.99, while those who were unexposed have a HAZ of -1.05. High-violence affected children are also less likely to be stunted compared to unexposed children (by 3 percentage points), and they are more likely to have higher PPVT scores and math ability than other children (by at least 5 points); however, these children also tend to have lower verbal ability and higher levels of aggression. In general, these differences are small and in most cases are not statistically significant. These differences in the raw data point to the importance of controlling for geographical and temporal sorting in order to identify the effects of violence on children and families.

[12]The cut-off of 2 massacres represents the median number of massacres in the full sample. Conclusions derived from Table 1 are robust to other cutoffs of high and low violence exposure.

4.1 Effects of Violence on Physical Health

Table 2 presents the impacts of violence exposure in-utero and during childhood on child's HAZ. I only report the coefficients of interest, but the models include all covariates as described in equation 1. Columns 1–5 show estimates of violence using the number of victims of massacres (preferred measure), and columns 6 and 7 show estimates using the number of massacres and dummies for any massacre in each trimester of pregnancy and in childhood, respectively. The bottom of Table 2 also reports the effect of exposure to the average level of violence in terms of a standard deviation.[13]

Results show the negative effect of violence exposure in early life on HAZ. I start by estimating the effect of violence using equation 1 with a focus on the exposure a child experienced while in-utero. Columns 1 and 2 present estimates with and without municipality-linear time trends. Including these controls to account for potential trends in child's health status over time does not change the violence coefficient substantially and it actually makes it larger. The estimate suggests that exposure to violence while in-utero reduces HAZ by 0.0013 SD. Conditional on being exposed to the average level of violence – 27 massacre victims in utero–, HAZ declines by 0.03 SD.

In column 3, I disaggregate the effect of violence during pregnancy to each individual trimester and find that exposures in the second and third trimesters reduce HAZ significantly. Conditional on an average exposure of nine massacre victims in each trimester, the HAZ falls by 0.04 SD. These results are consistent with the medical literature: Children's physical growth is particularly sensitive to nutritional deficits in the second half of pregnancy (Gluckman and Hanson, 2005). Studies in economics have also shown that nutritional deprivation in late pregnancy is associated with lower birth weight. For example, Painter, Roseboom and Bleker (2005) argued that the cohort exposed to the Dutch famine in the third trimester had lower average birth weight and worse health outcomes than cohorts exposed earlier in pregnancy.

In column 4, I control for exposure to violence during childhood and find that the coefficients of violence exposure while in-utero increase. Exposure to an average of nine massacre victims during each trimester of pregnancy and of 36 victims of massacres during childhood, I find that the net decline in HAZ is approximately 0.09 SD. Although not shown in Table 2 due to space limitations, results in Table 3 indicate that a few covariates are significantly associated with children's HAZ. Children with young mothers low education, or with mothers who cohabit or are divorced, are more likely to have lower nutritional status than those living in more advantaged households.

Comparing the effects of violence on HAZ to those found in the literature, it is evident that my estimates are significantly lower. Previous studies have identified that children exposed to war events are likely to experience nutritional setbacks on the order of 0.2–0.5 SD

[13]The focal child is exposed to an average level of violence during pregnancy of 27 massacre victims (9 massacre victims in each trimester on average) and 36 massacre victims during childhood. The intensity of violence declines remarkably over time as shown in Figures 1 and 2.

in HAZ, compared to similar-aged children not affected by these events (Akresh, Lucchetti and Thirumurthy, 2012; Minoiu and Shemyakina, 2012; Bundervoet, 2012; Bundervoet, Verwimp and Akresh, 2009). Two factors might explain the difference in magnitude between my estimates and those in the literature. First, previous studies have focused on massive violence episodes such as civil wars or genocides that usually last just a few years, whereas the Colombian conflict distinguishes from the rest by its long duration and low intensity, in which civilians have, to some extent, learned how to live under the threat of armed groups. Second, most previous research has analyzed these impacts in African countries, in which children, even in the absence of wars or high violence, start from a lower nutritional baseline, making them more vulnerable to adverse environmental conditions. Compared to studies on the effects of adverse shocks in early life, Rosales (2013) found that children in Ecuador exposed to the 1998 El Niño weather shock experienced an average decline in HAZ of 0.09 SD and the negative effect came from exposure during the third trimester in-utero.

4.1.1 Violence Prior to Conception

In column 5, I include controls for exposure to violence in the two years before conception. I find little impact of these prior exposures on HAZ that could suggest that preexisting trends in violence are not driving the results, and thus providing some support for the validity of the identification strategy.

4.1.2 Changing the definition of violence exposure

In columns 6 and 7, I show results measuring violence using the number of massacres and dummies for any massacre. Results are remarkably similar to those found in column 4; however, the magnitude of the effect is smaller. Given that the number of victims of massacres provides greater precision in the intensity of the violence shock than that captured by the number of massacres or by the dummies for any massacre, I focus the discussion on this measure in what follows.

4.2 Effects of Violence on Cognitive Outcomes

Table 3 shows estimates of the effect of violence on child cognitive development for those aged three years and above (sample for whom these outcomes were measured). The results show that massacre exposure in the first and third trimesters of pregnancy and in childhood reduce PPVT by 0.15 SD as shown in the bottom row of the Table. Woodcock–Munoz tests also fall significantly. Verbal ability, math reasoning, and general knowledge decline by 0.28, 0.19, and 0.16 SD, respectively. Of note is the large effect of violence in the first trimester of pregnancy, which is consistent with the medical, psychological, and epidemiological studies that have found that brain development is particularly sensitive to maternal stress or maternal malnutrition during the first trimester of pregnancy (see discussion in Almond, Mazumder and van Ewijk, 2011; Poggi Davis and Sandman, 2010; Gluckman and Hanson, 2005). I also find that violence exposure in the second half of pregnancy has a negative impact on PPVT, verbal ability, and general knowledge, suggesting that changes in the in-utero environment during late pregnancy (e.g., changes in maternal nutrition) could contribute to these declines. Moreover, the fact that violence during childhood has a negative impact could be associated with changes in household dynamics due to the shock.

4.3 Effects of Violence on Socio-emotional Outcomes

Table 4 shows impacts on children's aggressiveness, withdrawn behavior, and adequate interaction. The results suggest that violence is associated with higher aggression and more withdrawn behavior (a positive coefficient of violence on these two outcomes implies worse child conditions), although the coefficients are not statistically significant at the 0.95 level; I do find, however, a statistically significant and negative relationship between massacre exposure in early childhood and adequate interaction (the coefficient is -0.04 SD). This effect is smaller than that in Sharkey et al. (2012), who found that children assessed within a week of a homicide occurring near their home exhibited 0.33 SD lower levels of attention and impulse control. It is possible that the smaller effects are due to the timing in the shock (I consider a much longer time frame, from the prenatal period up to a maximum of age 7) and the fact that this study considers indirect exposure to violence at the municipality level.

4.4 Heterogeneous results

4.4.1 Results by Gender

Studies investigating the impacts of early-life shocks on child outcomes have found that girls tend to suffer more than boys (Rose, 1999; Shemyakina, 2011; Akresh, Lucchetti and Thirumurthy, 2012). In this study, I explore differences in the effects of massacre exposure by gender and find that, consistent with previous studies, girls are more likely to experience larger physical and socio-emotional developmental setbacks than boys. The results presented in Table 5 show that girls who are exposed to violence in early life achieve 0.013 SD lower height and a 0.05 SD worse adequate interaction than similarly exposed boys (although this last coefficient is not statistically significant at the 0.95 level). Boys, in contrast, experience no change in these outcomes. In terms of cognitive development, I do find a stronger decline on PPVT among boys (-0.17 versus -0.07 SD among girls) which is mainly driven by childhood exposure to violence. Although not shown here due to space limitations, I also find that girls experience a more negative impact on other cognitive outcomes such as math reasoning (-0.35 SD versus no effect on boys) and general knowledge about the world (-0.37 SD versus no effect on boys).

Based on these results, a reasonable question to ask would be, Can these impacts be driven by child (i.e., male) selective mortality? I examine the possibility of this threat in the robustness-checks section and find little evidence that violence is endogenously affecting mortality. Hence, the fact that I find differential impacts across boys and girls could reflect, to some extent, endogenous parental investments within households that may be favoring boys over girls.

4.4.2 Results by Household Socioeconomic Status

A recurring empirical finding is that low-socioeconomic (SES) families are more likely to experience more and more persistent shocks (Currie and Hyson, 1999; Currie and Vogl, 2013). If the effects of violence differ across family SES, this could suggest that some families are more or less likely to protect their children from them. Table 6 shows results by mother's education. I estimate models in which I split the sample by whether the mother has less than a secondary education (the median schooling in the sample) versus secondary or more. I find that children of less and more educated mothers experience a similar decline in HAZ (the overall decline is approximately 0.5 SD and the differences are not statistically significant across samples). Violence, however, exerts a larger toll on cognitive and socio-emotional development among children of less educated mothers: PPVT and adequate interaction fall by 0.23 and 0.05 SD, respectively, whereas no change is observed among children in more affluent families.

4.4.3 Results by Violence Exposure

I now estimate results by the magnitude of the shock: small versus large massacres. I first exclude children who had not experienced massacres in early-life (29% of the sample), and then I split the sample by those who experienced low violence (less than 3 masscres or between 4 and 9 massacre victims) and high violence (more than 2 massacres or more than 9 massacre victims). Table 7 shows results and these suggest that the effects of violence on child‘s HAZ are exclusively driven by those who were exposed to large massacres. This result is consistent with the idea that only shocks that are more impactfull are likely to have significant effects on children.

4.5 Sibling Fixed-Effects Models

One potential threat to my empirical specification occurs if mothers of certain characteristics are more likely to be impacted by violence and are also more likely to have children with worse developmental outcomes. If this were the case, the estimates of violence obtained using equation 1 could be overestimating the true impact. To explore whether the results could be driven by a mother's unobserved characteristics, I exploit the small sample of siblings in the HCB data (there are 3,816 siblings among the 20,936 children) using equation 2.

Table 8 shows sibling fixed effects of violence on HAZ. Column 3 indicates that an increase in violence in the third trimester of pregnancy reduces children's HAZ by 0.05 SD; this result is smaller to that obtained in column 2 using the linear specification for the sample of siblings (N = 3,816) (0.05 versus 0.17 SD, respectively), but it describes a similar pattern. In other words, the fact that I obtain similar results with and without mother fixed effects suggests that violence does not seem to be correlated with a mother's time-invariant unobserved characteristics, providing support for the identification strategy.

Column 3 in Table 9 shows fixed-effects estimates on children's PPVT and these show that, exposures in the first and third trimester are negatively associated with this outcome. The overall effect of violence is actually twice the size of that in the full sample (estimate in 3 is 0.032 SD and in column 1 is 0.017 SD). Similarly, Column 3 in Table 10 shows estimates of violence on child's adequate interaction. I find that although the estimate of violence in childhood is similar in magnitude (-0.0010), this coefficient did not reach statistical significance likely due to a power issue.

4.6 Fetal Health

Health at birth is a key input in the production of human capital (Heckman, 2008). Birth weight is a summary measure of initial endowments that may capture prenatal investments (Bharadwaj, Eberhard and Neilson, 2013; Rosenzweig and Zhang, 2009), and is a strong predictor of future outcomes such as educational attainment and health (Black, Devereux and Salvanes, 2007; Currie and Hyson, 1999).

Previous studies have shown that violence exposure during pregnancy negatively affects health at birth outcomes. Camacho (2008) found that pregnant mothers exposed to landmine explosions in Colombia give birth to babies who are 8.7 grams less heavy. Using data from Palestine, Mansour and Rees (2012) found a small increase in the incidence of low birth weight (Brown, 2014), for the case of Mexico, found that exposure to the average increase in local homicide rates was associated with a decline in birth weight of 75 grams and a 40% increase in in the probability of low birth weight. These authors found the strongest impacts of violence shocks in the first trimester of pregnancy. I examine whether the measure of violence used in this study provides estimates consistent with those found in the literature. I do so by regressing the baseline specification[14] and using data from Vital Statistics Birth Records, which has been widely used in previous studies of fetal health and provides a large sample of births.[15]

[14]In addition to basic characteristics (child's gender and mother's age, education, and relationship status), models control for multiple birth, parity, urban household, whether the baby was delivered at a hospital, and whether the mother had medical insurance (public, private, other). They also include the child's month, year, and municipality of birth fixed effects.

[15]HCB does not provide health at birth outcomes. Unfortunately, I do not have access to mother's identifiers to estimate mother fixed-effects models by comparing siblings. I pool years 1998–2001 and 2005–2006. Years 2002–2004 were not included since they were not available to the author when these analyses were performed. The total sample includes approximately 4 million births across all municipalities

Table 11 shows a small but negative effect of violence on birth weight in the first trimester of pregnancy. Conditional on an average exposure to nine massacre victims in the first trimester, birth weight falls by 1.3 grams. This effect is larger for less educated mothers (those with primary education or less) than for the more educated (2.4 versus 1.4 grams, respectively) and provides some evidence consistent with the idea that maternal stress could be an important channel through which violence impacts child outcomes (Aizer, Stroud and Buka, 2012; Denckel-Schetter, 2011).

4.7 Potential Mechanisms: Parental Investments

In this section, I explore whether violence shocks affect parental investments. Table 12 presents summary statistics on these measures for the full sample and by whether children were exposed to high versus low violence in early life (as defined in Table 1). Overall, I find little differences in prenatal care, breastfeeding, child vaccinations, and protein servings across children exposed to high and low violence. In terms of parenting, however, differences suggest that those more likely to have experienced high violence tend to receive less maternal time and more physical and psychological aggression. Interestingly, these children are also more likely to have mothers who invest more time in activities that stimulate their cognitive potential.

I use equation 1 to investigate the associations between in-utero and childhood violence and parental investments and results are shown in Tables 13 and 14.[16] Results show little evidence that changes in violence are associated with changes in parental investments. For instance, I find no significant association between changes in violence and changes in prenatal care, breastfeeding, child vaccination, or protein consumption. Moreover, results show that higher violence (in-utero and in childhood) is associated with more frequent psychological aggression but little change in other measures.

4.8 Heterogeneous results

4.8.1 Results by Child's Age

Given that parental investments can vary considerably depending on a child's age and that younger children are more likely to have been exposed to more recent violence shocks (i.e., the in-utero period for younger children is closer to the interview date than that for older children), I show associations separately for young (up to three years) versus older children (three or more years).

The second and third panel of Table 13 show differences by age. I find that younger children are less likely to receive prenatal care (by 3.3% with the average exposure to massacres) while older children experience a mild reduction in breastfeeding (-0.4%) and in

in Colombia.

[16]Due to the small variation in siblings in the HCB data, I do not estimate sibling fixed-effects models to investigate the effects of violence on potential mechanisms.

the number of protein servings received in the last week (-1%). Given the small magnitude in the coefficients and the fact that results are only significant for young kids, these results suggest that violence is not related to the provision of medical services at the local level.

Turning to parenting indicators, Table 14 reveals that among children under three years old there is a decline in the number of hours a mother spends with her child (by almost one hour per week which is equivalent to an 11% decline with respect to the mean) and a decline in the frequency of routines that stimulate a child's cognitive development (0.12 SD or 10.4%); I also find that violence-exposed mothers are more likely to be psychologically aggressive with their children (0.12 SD or 18.2%). The findings for the older cohorts show little impacts of violence on parenting outcomes, which could be due to parents responding to violence in the short-term but not necessarily changing their behavior in the long-term. In sum, Tables 13 and 14 suggest that parents whose children are exposed to massacre shocks in their early life are more likely to reinforce the negative impacts of the shock by reducing the quantity and quality of their investments; however, this result is rather consistent with the hypothesis that parents may prefer equality across children.

4.9 Potential for Remediation

A growing body of evidence documents the persistent effects of early-life shocks on socioeconomic outcomes; but whether these effects can be mitigated with interventions remains largely unexplored (Almond and Mazumder, 2013). From a policy perspective this question is of great interest considering that resources are often limited and shocks are more frequent among disadvantaged subpopulations. Few studies have provided empirical findings on whether social programs can compensate for early-life shocks and the evidence is so far mixed.[17]

In this section, I explore whether HCB can help remediate the negative effects of violence on children. In principle, one would expect that HCB would have mitigating impacts on children since HCB helps promote their physical, cognitive, and social development and supports healthy parenting.[18] But, the extent to which the program helps overcome the deficits between children exposed and unexposed to violence is *a priori* not clear.

A credible evaluation of the potential for remediation of HCB would ideally use a ran-

[17] Aguilar and Vicarelli (2012) found that Progresa, the Mexican conditional cash transfer program available for low-income households, was unable to mitigate the effects of extreme weather shocks on children's health and cognitive development. In contrast, Adhvaryu et al. (2014) focusing on rainfall shocks and on the mitigating role of Progresa, actually found that cash transfers helped remediate the effect of extreme rainfall on educational outcomes, by almost 60 percent. Gunnsteinsson, Snaebjorn, Adhvaryu, Christian, and Labrique (2014) found that a maternal and newborn vitamin A supplementation program reduced the effects of a tornado in Bangladesh. They found that not only were babies who receive vitamin A more robust after the tornado in terms of their anthropometric indicators as compared to exposed babies who did not receive vitamin A, but there was also full catch-up.

[18] Each HCB center serves up to 15 children between the ages of 6 months to 7 years in part-time or full-time schedules during weekdays. These centers are led by a communitarian mother who is a home-based childcare provider in the same community, and parents contribute with a maximum monthly fee of 25 percent of the daily minimum wage (Bernal et al., 2009).

domized control trial that randomly assigns children to a treatment and a control group. However, this is challenging because HCB is by now so widespread.[19] One way to address the potential problem of selection into the program is through instrumental variables. Attanasio, Di Maro, and Vera-Hernandez (2013) instrumented HCB participation and HCB exposure with indicators for the availability of HCB in the local community. In particular, one of their instruments was the distance from a household to the closest HCB center.[20]

I build on Attanasio et al., (2013) by using distance and distance squared from the residence to the nearest HCB (in kilometers) as instrumental variables for HCB exposure.[21] Appendix Table B8 shows that distance is an important determinant for children‘s participation in HCB and children‘s duration into the program, but not so among non-participant children. Therefore, I conduct the IV analysis on the sample of children who participate in HCB (and exludes the non-participants) and I focus on program exposure (duration) rather than on program participation. I create a dummy variable that takes the value of one for children who have been in the program for more than the median program exposure, 13 months, and zero for children who have participated 13 months or less. Since I am interested in the heterogenous effect that HCB could have on children who were exposed to different levels of violence in their lives (i.e., remediation potential), I include an interaction term between HCB exposure and violence. I also estimate a first stage regression for this interaction term. Equations 3, 4, and 5 describe the first and second stages of my instrumental variables approach that I estimate using a two-stage least squares (2SLS):

First stages:

$$\begin{aligned} HCB\_exposure_{i,j,m,t} &= \beta_0 + \beta_d Distance_{i,t} + \beta_{d2} Distance2_{i,t} + \\ +\beta_{dv} Distance_{i,t} \times Violence_{i,t} &+ \beta_{d2v} Distance2_{i,t} \times Violence_{i,t} + \\ &\beta_v Violence_{,i,t} + \gamma X_{i,j} + \alpha_j + \alpha_m + \alpha_t + \varepsilon_{i,j,m,t} \end{aligned} \tag{3}$$

$$\begin{aligned} HCB\_exposure \times Violence_{i,j,m,t} &= \beta_0 + \beta_d Distance_{i,t} + \beta_{d2} Distance2_{i,t} + \\ +\beta_{dv} Distance_{i,t} \times Violence_{i,t} &+ \beta_{d2v} Distance2_{i,t} \times Violence_{i,t} + \\ &\beta_v Violence_{,i,t} + \gamma X_{i,j} + \alpha_j + \alpha_m + \alpha_t + \varepsilon_{i,j,m,t} \end{aligned} \tag{4}$$

[19] Bernal and Fernández (2013) showed that HCB participants were more disadvantaged in terms of household income, having an absent father, and mothers age than non-participants.

[20] This study used distance as an instrumental variable in their analysis with rural households, those for whom distance to the nearest HCB can be a more important determinant of HCB exposure. Using this IV approach, they found that HCB participation and HCB exposure increased a child's HAZ by 0.8 to 1.2 SD.

[21] Instrumenting HCB exposure with distance and distance squared I find that HCB has a positive impact on child‘s HAZ of 0.49 SD whereas Attanasio et al., (2013) found effects between 0.8 and 1..2 SD.

Second stage:

$$
\begin{aligned}
Y_{i,j,m,t} =& \beta_0 + \beta_h H C B\_\hat{exposure}_{i,j,m,t} + \beta_{hv} H C B\_exposure \hat{\times} Violence_{i,j,m,t} \\
&+ \beta_v Violence_{i,t} + \gamma X_{i,j} + \alpha_j + \alpha_m + \alpha_t + \varepsilon_{i,j,m,t}
\end{aligned} \tag{5}
$$

The term Violence refers to the total number of massacres a child experienced in utero and in childhood.[22] The coefficient of interest is β_{hv} and it indicates the mitigating role of HCB given an exposure to violence in early life. A positive coefficient would suggest that HCB helped mitigate the negative impact of the shock.

As shown in Appendix Table B8, the average distance from a household to the nearest HCB is 0.4 Km and there is a large variation accross children exposed to different levels of violence. Table 15 shows the first stage for this regression. Results suggest that distance and distance squared are important drivers of HCB exposure and of HCB exposure * Violence. The F-statistic in both cases is quite large (>20). Table 16 shows the second stage results. Overall, I find little evidence that HCB helps remediate the negative effects of violence on children: the coefficient on the interaction between HCB exposure and violence is not statistically significant across child outcomes. OLS estimates provide similar results (as shown in the bottom panel). The lack of evidence on potential for remediation is consistent with the idea that violence-exposed children are at a higher risk of experiencing developmental delays and may require a more nurturing environment (than perhaps a one-year exposure to a community nurseries) to catch-up with unexposed children.

4.10 Event Time Study

The effects shown in Tables 2–9 are identified from the "jump" or occurrence of a massacre at a given time (month) t in municipality j. If the identification were rather from trends in outcomes at the municipality–month level, then I would not find differences in the timing of the effects on child outcomes. However, it would be possible that the estimated impacts were driven by some other trend correlated with the "jump" in violence that is unaccounted for in the regression models with the linear time trends. I investigate the potential presence of these unobserved trends using an event time study.

To show that massacres capture spikes in violence and that they are uncorrelated with other aggregate measures that could potentially drive changes in child development, I analyze changes in these aggregate measures during the period before and after a massacre (i.e., a year before and after a massacre). To do this, I first select the sample of municipalities that have had a massacre in month t and no massacre 12 months before or after this episode. Then, I link this municipality–month–year subsample with eight aggregate measures correlated with violence shocks and child outcomes: i) municipality–GDP per capita; ii) a proxy for the local provision of public goods (i.e., expenditure in education);[23] iii)

[22] For ease of interpretation, I do not disaggregate violence in utero versus in childhood.

[23] I create the proxy of investments in education using Census 2005 data that captures the average years

the (aggregate) unemployment rate; iv) municipality–monthly–year - homicide rates;[24] vi) other measures of violence associated with the dynamics of the armed conflict such as the municipality–monthly–year proportion of forcefully displaced population;[25] vii) measures of institutional quality;[26] and viii) rainfall shocks.[27] Figure 3 shows results suggesting an absence of a trend in aggregate variables with respect to the occurrence of a massacre from 12 months before to 12 months after t. In other words, these results suggest that the occurrence of a massacre does not seem to be correlated with other factors.

Now I investigate whether the occurrence of a massacre at time t is associated with changes in child outcomes. I focus on birth weight for two reasons. First, a large number of studies have found effects of exposure to violence in utero on birth weight, thus, by exploring changes in birth weight before and after a massacre represents an interesting opportunity to test my identification strategy. Second, due to data requirements I need to employ a large dataset that provides sufficient power: Vital Statistics Birth Records provides a large sample of infants (more than four million observations) with rich information on birth outcomes, mother characteristics, and date and place of birth. After selecting my subsample of children who were born in a municipalities that experience a massacre at time t and no massacre 12 months before or after the massacre, my subsample includes 9,300 children.[28]

Results are shown in Figure 5. I find that babies of mothers who were exposed to a massacre at time t while they were pregnant, have on average lower birth weight than babies born, a year before, to mothers who were not exposed to violence during their pregnancy. This result is illustrated by comparing the average birth weight of the "treatment" group, infants born in months $t+1$ to $t+6$, versus the average birth weight of the "control" group, infants born in months $t-11$ to $t-6$. By focusing on the same months one year before and after, I eliminate the possibility that results are driven by seasonality in birth weight. The bottom Figure in Figure 5 shows similar results on the probability of being low birth weight (<2,500 grams) that increases after the occurrence of a massacre. For these relationships to be driven by a potential confounder, the confounder would have to mimic the jump in violence associated with the massacre. Although not shown, these result are robust to controlling for fixed effects as in the baseline specification.

of schooling of the adult population (those of age 30) in each municipality and year in Colombia. I focus on the adult population since adults are assumed to have finished the schooling cycle.

[24]To account for more systematic crime as opposed to random and unexpected violence shocks.

[25]I also test the lagged and lead proportion of forcefully displaced populations in a given municipality since the decision to migrate due to violence may not be an immediate response of the conflict.

[26]My institutional proxies are i) a measure for justice or state capacity which is the capture rate of homicide criminals (the number of captured criminals/total homicides × 1,000 in a given department and year) and ii) measures of political participation such as the proportion of the local population that votes in elections and the number of political parties that have representation in the local government.

[27]I use indicators for whether rainfall in a given month–municipality exceeds the historical rainfall in that month and municipality since 1980 by more than a standard deviation. Previous studies have shown that weather shocks experienced in early life can have negative impacts on child health and cognitive development (Aguilar and Vicarelli, 2012; Rosales, 2013).

[28]Unfortnunately I only have access to Vital Statistics from 1998-2001.

5 Robustness Checks

5.1 Omitted-Variable Bias

In this section, I explore whether controlling for other early-life shocks that might be correlated with massacre shocks diminishes my main results. I focus on the effects of violence on children's HAZ and include controls for more aggregate measures (i.e., the same measures analyzed in the event time study: economic variables, investments in education, other indicators of the dynamic of the violent conflict). Appendix Table 1 shows the stability in the coefficients of massacres after accounting for other early-life shocks or aggregate trends: Exposure to violence in the second and third trimesters of pregnancy and exposure during childhood have a negative and significant impact on HAZ, and the effect is on average -0.09 SD. In sum, these findings provide some evidence that massacres capture sudden changes in local violence and that they are uncorrelated with changes in other potential factors affecting a child's development.

5.2 External Validity of my Results

While the HCB offers important adavantages versus other household surveys such as, providing rich quality data on a child‘s developmental outcomes, parenting practices, and information on a child‘s geographic location over the life-course, which are not available in other datasets, two features of HCB may limit the external validity of my results: (i) HCB samples children who are eligible to participate in the childcare program, hence, it only includes children and families in the lowest income quartile, and is therefore not representative of the Colombian population; (ii) only a small proportion of siblings are included in HCB (3,816 siblings of a total of 20,936 children), which could limit the generalizability of my findings. I explore the external validity of my results with two supplementary datasets that are more nationally representative and which provide a larger number of siblings. These datasets are the DHS—which includes information on children's heights—and the ELCA—which contains child PPVT scores. The DHS and ELCA are described in detail in Appendix B.[29]

Results on the external validity of the effects of violence on child outcomes are shown in columns 4 and 5 in Tables 8 and 9. These results are also interesting *per se*, as they refer to a sample that is different from HCB, which is predominantely urban. Results reveal similar patterns across datasets. The sibling fixed-effects estimates of violence in DHS are substantially similar in magnitude to those in the HCB data (the coefficient of massacres is -0.006 in HCB vs. -0.004 in DHS, which would transalate into an approximate decline of 0.05 SD) and confirm that HAZ is particularly sensitive to violence in the third trimester of pregnancy (although this coefficient did not reach statistical significance in the DHS sample). Estimates from the ELCA data also show that violence exposure in

[29] DHS nor ELCA datasets contain information on a child‘s socio-emotional development.

the first trimester significantly reduces a child's PPVT and the overall effect of violence is much larger than that found in the HCB data (-0.53 SD in ELCA vs. -0.21 SD in HCB). In general, the effects of violence found in Tables 8 and 9 suggest that estimates are not specific to a certain subpopulation of children and that they are in fact highly consistent across specifications with and without a mother fixed-effect, which may suggest that the occurrence of massacres at the monthly, year, and municipality levels is uncorrelated with household characteristics.

5.3 Potential Sources of Selection Bias

A complicating factor in the study of the impacts of violence on child outcomes is that violence may not only have a scarring effect on affected cohorts, but may also induce selection through sorting, migration, fertility, or mortality (Almond, 2006; Valente, 2013; Bozzoli, Deaton and Quintana-Domeque, 2009). In this paper, I carefully explore whether the effects of violence on children are driven by these potential sources of selection bias. For this purpose, I complement some of these analyses in the HCB data with several waves of the DHS and the Colombian population Census 2005 that provide a much larger sample of births at the municipality level, allowing me to explore these concerns in more detail.[30]

5.4 Geographic Sorting

Families living in conflict-prone municipalities may also be disadvantaged in other dimensions. For instance, they may be less educated compared to families in municipalities unaffected by violence. To account for these differences across municipalities, I include birth municipality, year, and month fixed effects. However, if these differences are likely to change over time, or if there are differences in terms of who is affected by violence within municipalities, then, even after controlling for fixed effects, there will be selective sorting within areas. Since violence often leads to disruption in the local conditions, this issue may be particularly important.

To test for the presence of selective sorting within Colombian municipalities, I compare the characteristics of mothers who were exposed to violence during pregnancy and during their child's early childhood to mothers who were not exposed. In the presence of selective sorting, the association between a mother's characteristics and the occurrence of massacres should be significant even after accounting for municipality fixed effects. To

[30]The Census 2005 (N = 4 million individuals, accounting for 10% of the total population) has the virtue that it reports the municipality and date of birth for each individual, and the municipality where a mother lived when she was pregnant. This information enables me to identify the level of violence to which each individual was exposed in each trimester of pregnancy. I obtain Census 2005 data from IPUMS-International.

test for selective sorting within municipalities I use equation 7,

$$X_{i,t} = \beta_0 + \beta_1 \, Violence_{in\text{-}utero_{i,j}} + \beta_2 \, Violence_{childhood_{i,j}} + \alpha_j + \alpha_t + \alpha_m + \varepsilon_{i,j,m,t}, \quad (6)$$

where $\boldsymbol{X}$ represents a set of dummy variables for mother's age, education, and marital status as described in equation 1. I estimate equation **??** with and without municipality fixed effects. Results are shown in Table A2 and they offer little evidence of selective sorting in terms of mother characteristics. In fact, young mothers (aged up to 33 years) and those who are single are less likely to be exposed to violence shocks. In contrast, those who are married are more likely to be exposed to these shocks. These findings suggest that selective sorting is not a big issue in my analyses. To the extent that there is selective sorting, women in better conditions (i.e., more likely to be married, less likely to be single, and more likely to report their educational attainment) are less likely to be exposed to violence, which may lead to an underestimate of the effect of the massacres on child outcomes.

5.5 Migration

Migration can be an important concern for my empirical analysis if households who migrate differ from those who do not, in ways that affect child development. For instance, if migrant families are more educated or wealthier than nonmigrant households, we could expect that children in migrant families would have better developmental outcomes than children of less educated and less wealthy nonmigrant families. If this is the case, and if these differences are not accounted for in the empirical strategy, the effects of violence on child outcomes may overestimate the true impact of the shock.

I start the analysis of endogenous migration by exploring the factors that motivate families to migrate from their place of residence. Table A3 shows that the primary motivation is family reasons (11%) followed by violence (1.5%) and searching for better conditions in general (0.25%). The small number of cases that report moving due to violence provides the first piece of evidence that selective mobility is likely to be low in the HCB sample. The second piece of evidence comes from the fact that those who move are actually more disadvantaged that those who stay (nonmovers represent my my sample of interest), as shown in Table B8. For example, children in migrant families have mothers who are younger, less educated, and less likely to be married, and they have worse developmental outcomes themselves. These differences are statistically significant.

I now turn to a more formal analysis of the presence of selective migration by estimating the effects of violence for the sample of movers and nonmovers. The hypothesis is that, if selective migration is likely to be an important issue in my analyses, then I should find that the impacts of violence on child outcomes differ significantly across subsamples. Table A4 shows results for movers and nonmovers, which suggest that this is actually not the case; the effect of violence is almost identical in the two cases.

5.6 Fertility

Violence may also affect fertility decisions in terms of family size or pregnancy timing. If violence has a differential impact on fertility across women's characteristics, then, it is likely that the estimates of violence on child outcomes may be biased, as the sample of children (on whom I estimate these effects) could be a selected sample. For instance, if violence reduces fertility incentives only for the most educated, wealthy, and healthy women, then, those women more likely to become pregnant would tend to be a more disadvantaged group and their children would be, on average, more likely to have worse developmental outcomes even in the absence of violence.

To test for the presence of selective fertility, I examine whether violence shocks are associated with a woman's fertility decisions across observable characteristics, and I use DHS data that provides rich information on both family size and timing of fertility.[31] I measure total fertility using the number of children that have been born after a given child (focal child), and the timing of fertility is measured using both the succeeding birth interval (in months) after the focal child and the preceding birth interval (in months) before the focal child. I use equation 7 describes to test for this type of selection,

$$Y_{m,t} = \beta_0 + \beta_1 \, Violence_{in\text{-}utero_{i,j}} + \beta_2 \, Violence_{in\text{-}utero_{i,j}} * X_{i,j} + \beta_3 X_{i,j} + \alpha_j + \alpha_t + \alpha_m + \varepsilon_{i,j,m,t}, \quad (7)$$

where $\boldsymbol{Y}$ is the outcome measured as a continuous variable; $\boldsymbol{X}$ represents the mother's characteristics; the term Violence indicates the number of massacre victims to which the mother's focal child was exposed to in early life; the interactions between violence and mother characteristics capture whether fertility was selective on a specific maternal characteristic.

The results shown in Table A5 offer little evidence for selective fertility on observable mother characteristics. The associations between violence in-utero and up to age three years, and total fertility and timing of fertility are not statistically significant and most of the interaction terms between violence and mother controls are zero.

5.7 Survival

The estimates of early-life shocks may also be affected by selection on survival both at birth and during childhood: Violence is likely to increase the chances of dying for those with weaker health endowment (see, for example, Almond, 2006). To test how massacres affect survival, I provide some evidence on how changes in violence affect a child's mortality in the first month, year, and three years of life. I use DHS data and

[31] Unfortunately, the HCB data do not include information on fertility.

I estimate a model similar to equation 7. Table A6 shows that neither the associations between violence and child's mortality nor the interactions between violence and mother's characteristics are statistically significant. Of note, however, is that these results are conditional on both child and mother survival in 2000 and 2005, and on children living in the same household with their mothers.

Lastly, I investigate how violence in-utero affects the cohort size and the sex ratio using census data. I examine the relationship between violence and the sex ratio because several studies have indicated that boys are biologically weaker and more susceptible to diseases and premature death than girls (Naeye et al., 1971; Waldron, 1985), and that they are more vulnerable to environmental factors (Pongou, 2013). Hence, looking at how violence affects the sex ratio is also informative of the presence of selective survival.

If violence is increasing the chances of dying at birth or later, I expect to find a negative association between violence and the cohort size and sex ratio. Cohort size is defined as the total number of births born in each municipality–year for those who, by year 2005, were between three and six years of age.[32] Sex ratio is defined as the number of boys divided by the number of girls born in each municipality–year.

$$Y_{j,t} = \beta_0 + \beta_t \, Violence_{in\text{-}utero_{i,j}} + \alpha_j + \alpha_t + \varepsilon_{j,t} \tag{8}$$

I regress municipality–year cohort size on the violence that children experienced in-utero as shown by equation 8. Table A7 shows the associations between violence and the cohort size and sex ratio for all the municipalities in Colombia and for those sampled in the HCB evaluation. These results indicate that neither the cohort size nor the sex ratio is significantly associated with changes in violence, suggesting that these estimates of violence on child outcomes are not driven by selective mortality. These findings are consistent with a number of studies documenting no effect of in-utero violence on the sex ratio (Polasek et al., 2005).

6 Concluding Remarks

The foundations of later-life success are mostly built in the early years. Children exposed to adverse conditions in-utero and in childhood start behind and in the absence of interventions that help even out opportunities, inequality in the future will be reinforced. This paper contributes to the literature by estimating the effects of early-life shocks on three dimensions of human capital formation—child's health and cognitive and socio-emotional development, three strong predictors of future socioeconomic outcomes. I focus on violence that represents a significant shock to the well-being of many households, reaching beyond direct victims through its effects on stress, health, and economic resources. Results

[32] Results are robust to focusing on the period of childhood exclusively or on the period that combines in-utero and in childhood. I focus on the in-utero period here for presentation purposes.

show that violence shocks in early life significantly reduce a child's nutritional status and cognitive and non-cognitive development. The evidence on potential mechanisms suggests that violence reduces parental investments such as the duration of breastfeeding and food consumption. Lastly, I explore changes in parental quality and find that violence is associated with a decline in the time mothers spend with their child, a decrease in the frequency of routines that stimulate a child's cognitive development, and an increase in psychological aggression, which could reflect the presence of maternal stress. To my knowledge, this is the first paper to provide evidence on parenting as a potential pathway by which community violence affects children.

The declines in child's health and cognitive development can be translated into future wage declines. Following the discussion in Vogl (2012) for nutritional status[33] in Mexico, in Alderman et al. (1996) for cognitive ability[34] in Pakistan, and in Heckman, Stixrud and Urzua (2006) for socio-emotional skills in the United States, I find that children in Colombia are likely to experience a 2.4%, a 3.4%, and a 0.4% decline in their wages due to the effects of violence on HAZ and on cognitive and non-cognitive development, respectively.

My results have important implications for public policy. First, while children can be permanently damaged in the early ages, if adequate interventions are adopted, these effects could be mitigated. One example of such policies would be to ensure adequate nutrition for women of childbearing age and for young children. Second, social protection programs that have been shown to improve poor families' coping strategies against many adversities could also help improve violence-exposed families' financial, physical, and psychological well-being. Third, policies that foster children's potential—for example, high-quality early childhood education or interventions that help promote positive parenting practices or home-visiting policies—could also have important benefits for children and families.[35]

This study faced several limitations. First, as in many developing countries, the data available are cross-sectional and so scientists face multiple challenges in providing convincing evidence of a causal relationship. For example, one particular concern in this study is whether the age patterns between ages one to three years and ages four to seven years may in part be driven by differences in the two age-group samples rather than by violence exposure. Second, although this paper provided some evidence on potential pathways through which a violence shock could have affected child outcomes, I was not able to test whether violence was associated with changes in household income, an important pathway that is likely to be associated with parenting behavior and child investments. Third, the socio-emotional measures (Penn Interactive Peer Play Scale for agression, isolation, and adequate interaction) are designed to evaluate a child's socio-emotional development while

[33] The author finds that an extra centimeter of height is associated with 2.5% higher wages.

[34] The authors find that a one-standard deviation increase in cognitive achievement implies an increase in wages of over 20%.

[35] Recent research has shown that psychosocial stimulation provided to poor families with young children significantly improved children's psychosocial skills (Gertler et al., 2013).

peer play and not more genrally or in other contexts. Future research should examine the role of potential channels of transmission in more detail. While this study provides some evidence that violence deteriorates parenting practices, which is consistent with a high incidence of maternal stress and depression, I do not test this association. The relationship between violence and mothers' mental health represents an important mechanism due to the high prevalence of violent conflicts around the world and the well-established negative link between mothers' depression and child development. Moreover, studies that further explore whether violence affects parental child-gender preferences is an important area of research as it could represent a new pathway through which violence reinforces gender inequality.

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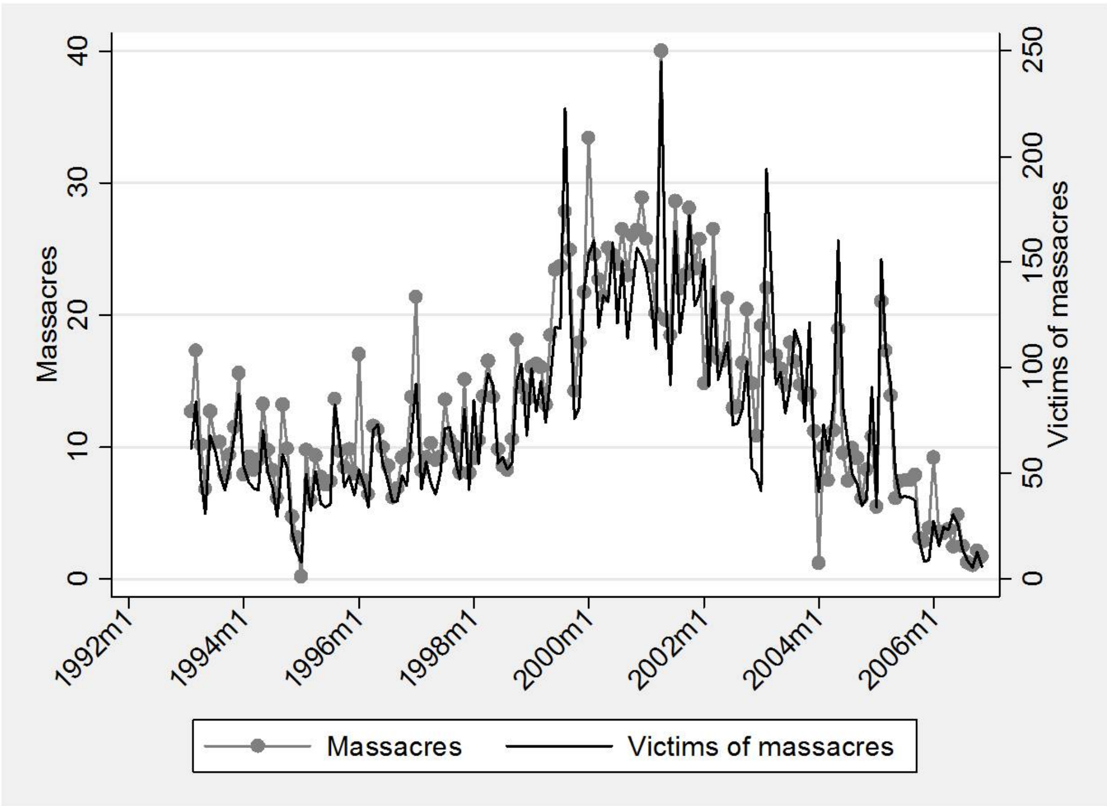
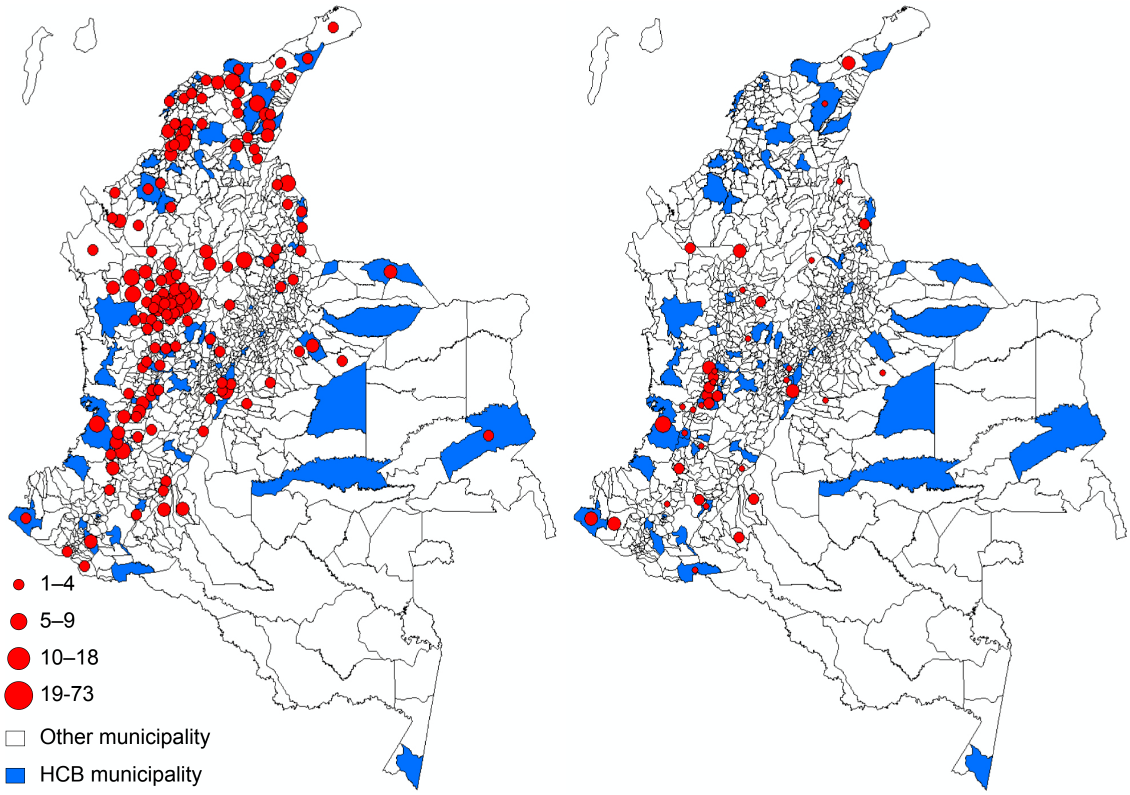
FIGURE 1: Monthly Number and Victims of Massacres in Colombia 1993–2009.



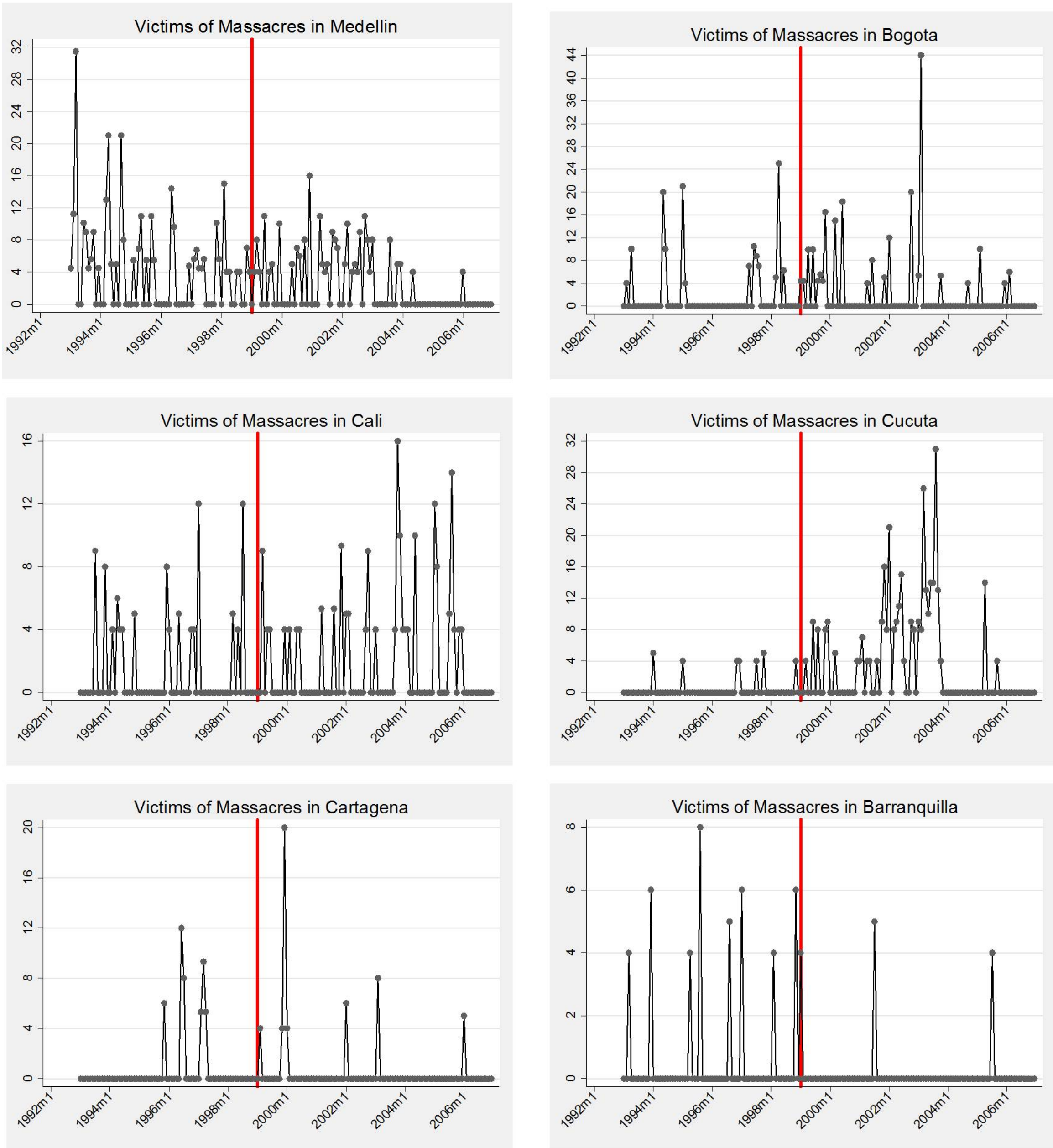
Source: Violence dataset CEDE, University of Los Andes (Bogota, Colombia).

Figure 2: Victims of Massacres in Colombia in 2000 and 2005.



Source: Author's calculations.

Figure 3: Monthly Victims of Massacres by City.



Source: Violence dataset CEDE, University of Los Andes (Bogota, Colombia).

FIGURE 4: Event Time Study - Massacres and Aggregate Measures of Economic Development, Violence, and Weather Shocks.

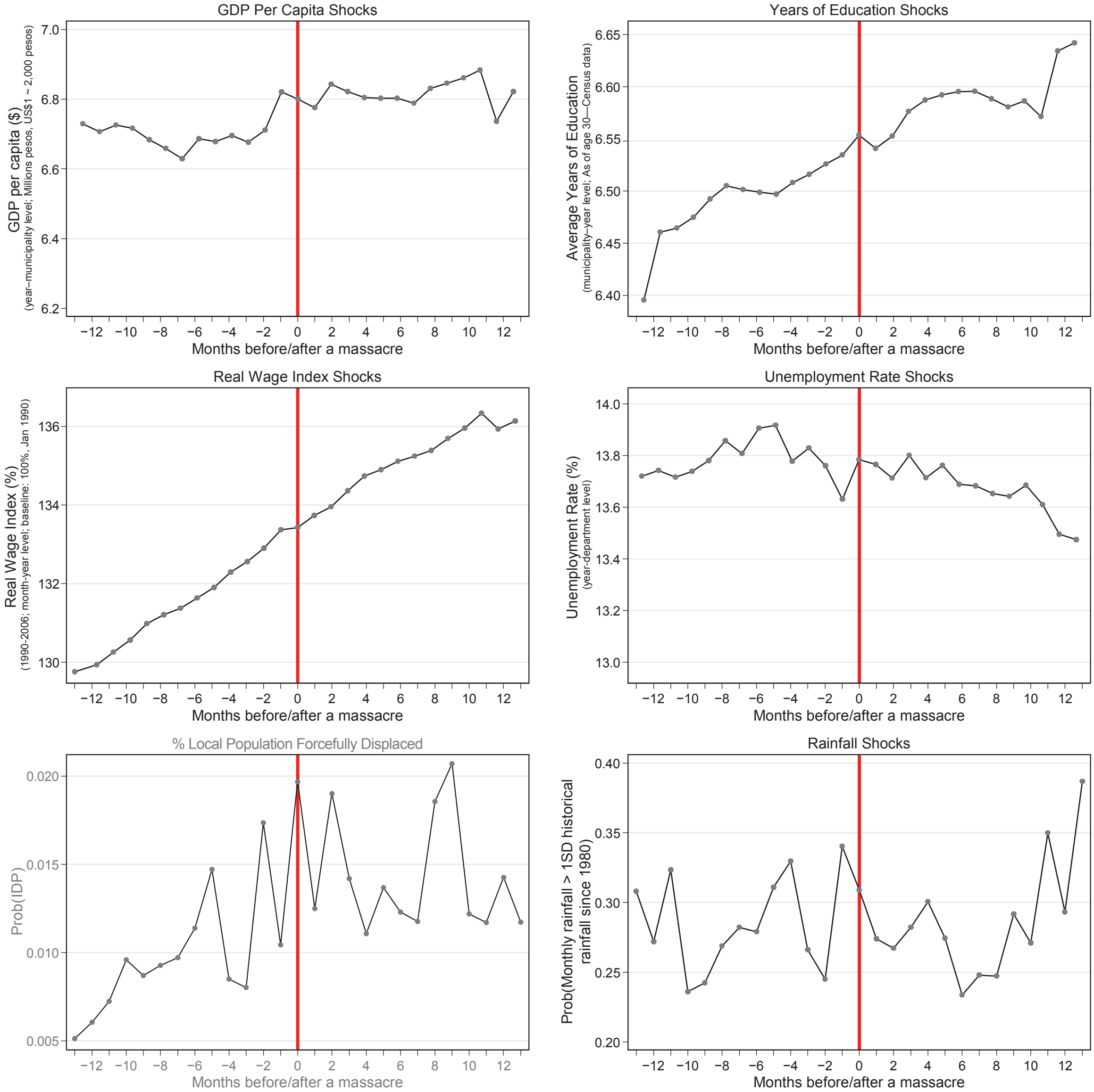


Figure 5: Event-Time Study - Massacres and Birth Weight.

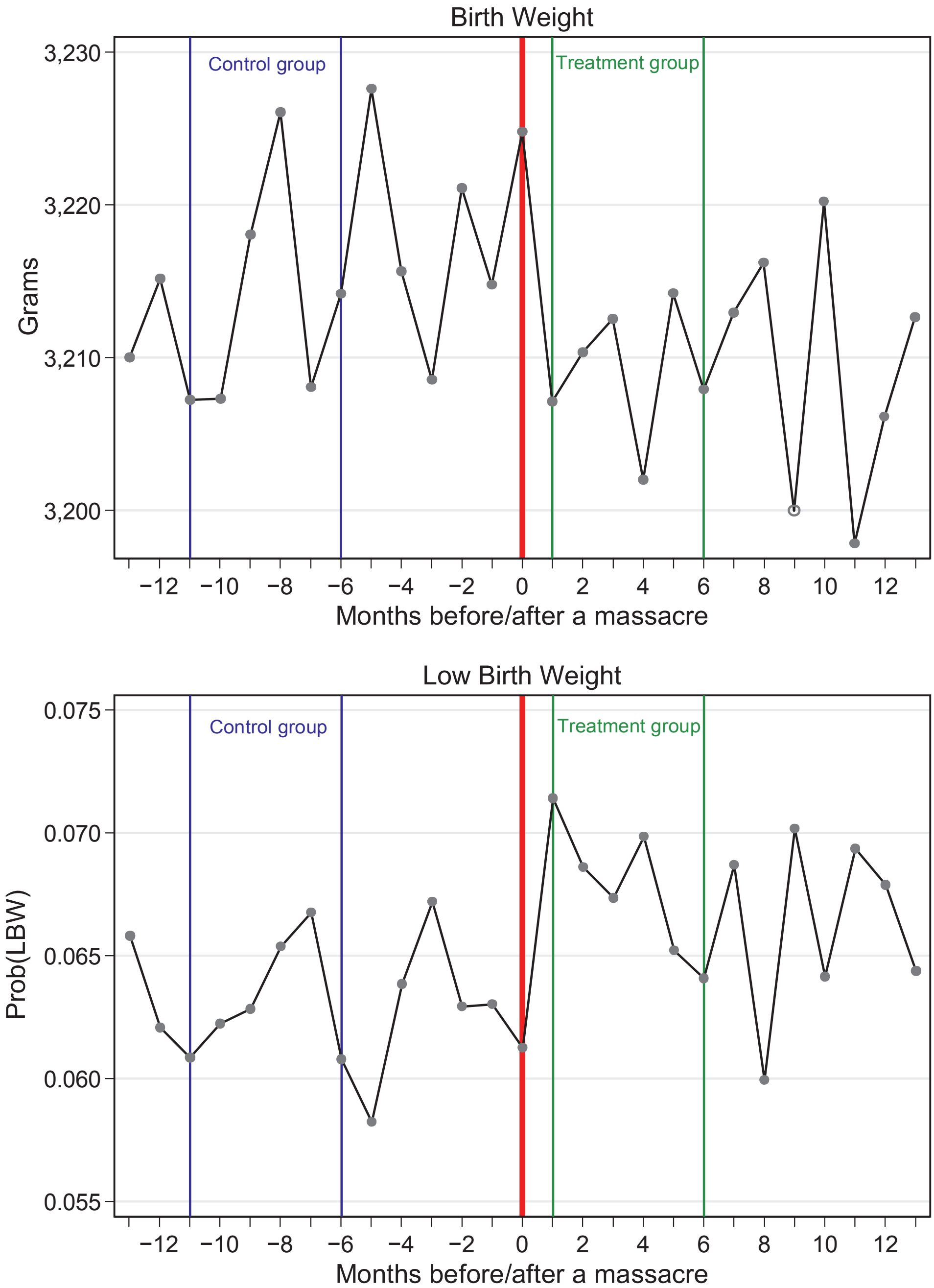


Table 1. Descriptive Statistics by Violence Exposure

	Full sample	No violence	Violence: Low $4-9$ victims	Violence: High >9 victims
Mother's age:				
<23	0.20	0.22	0.21	0.19
23–26	0.23	0.23	0.23	0.23
27–33	0.36	0.35	0.36	0.35
>33	0.21	0.20	0.20	0.22
Mother's education:				
Primary or less	0.31	0.32	0.31	0.30
Less than HS	0.29	0.28	0.30	0.30
HS or more	0.34	0.34	0.33	0.34
Unknown	0.06	0.06	0.06	0.06
Mother's relationship status:				
Married	0.17	0.16	0.15	0.15
Cohabiting	0.55	0.52	0.53	0.52
Single	0.11	0.11	0.09	0.11
Other	0.16	0.15	0.17	0.15
Child characteristics:				
Female	0.48	0.48	0.49	0.48
Age (months)	41.22	35.84	40.52	44.68
	(13.83)	(12.91)	(14.16)	(13.68)
Participates in HCB	0.50	0.50	0.50	0.51
Child outcomes:				
Height-for-age	−1.00	−1.05	−0.98	−0.99
	(1.08)	(1.12)	(1.07)	(1.06)
% stunted	0.16	0.18	0.16	0.15
% severely stunted	0.03	0.03	0.03	0.03
Peabody Picture Vocabulary Test	0.00	0.00	−0.03	0.05
Verbal ability	0.00	0.01	0.01	−0.03
Math ability	0.00	−0.08	0.05	0.02
Knowledge about the world	0.00	0.01	−0.02	0.00
Aggression	0.00	−0.07	0.00	0.04
Isolation	0.00	0.00	−0.03	0.00
Adequate interaction	0.00	−0.12	0.14	−0.02
N	20,936	5,985	4,692	10,259

Note: HCB = Hogares Comunitarios de Bienestar. N = 20,936. Robust standard errors are shown in brackets. Sample includes all children 1–7 years of age in the HCB data for whom a full municipality-lived-in set could be determined. Cognitive and socio-emotional outcomes are only available for those 3 years and older (the N varies by outcome measured). No violence refers to the sample of children exposed to zero massacres (0 massacre victims) in-utero and during childhood. Low violence is defined as whether a child was exposed to 1 or 2 massacres (between four and nine massacre victims) in early life, and high is defined as whether a child was exposed to more than 2 massacres (more than nine massacre victims) in early life.

Table 2. The Effect of Violence on Children's Health

	Height-for-age						
						N of	Dummy for
Measure of	Victims of massacres					massacres	massacres
violence	(1)	(2)	(3)	(4)	(5)	(6)	(7)
2 yrs before					0.0001		
conception					(0.0006)		
1 yr before					−0.0003		
conception					(0.0008)		
In-utero	−0.0009**	−0.0013**			−0.0018**		
	(0.0004)	(0.0004)			(0.0006)		
Trimester 1			0.0004	0.0001		−0.0014	−0.0114
			(0.0014)	(0.0015)		(0.0073)	(0.0239)
Trimester 2			−0.0025***	−0.0028***		−0.0131*	−0.0382**
			(0.0004)	(0.0004)		(0.0078)	(0.0194)
Trimester 3			−0.0024*	−0.0027**		−0.0154**	−0.0133
			(0.00130)	(0.0013)		(0.0077)	(0.0202)
Childhood				−0.0010**	−0.0014*	−0.0075**	−0.0453
				(0.0005)	(0.0008)	(0.0033)	(0.0438)
N	20,936	20,936	20,936	20,936	20,936	20,936	20,936
R^2	0.0821	0.0886	0.0868	0.0871	0.0882	0.0884	0.0882
Controls							
Indiv/mother	Y	Y	Y	Y	Y	Y	Y
Municipality FE	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y
Month FE	Y	Y	Y	Y	Y	Y	Y
Trends	N	Y	Y	Y	Y	Y	Y
Mean (SD)	−1.00 (1.08)						
Effect (SD)	−0.02	−0.03	−0.04	−0.11	−0.11	−0.08	−0.02

Note: N = 20,936. HCB = Hogares Comunitarios de Bienestar. Robust standard errors are shown in brackets. Sample includes all children 1–7 years of age in the HCB data for whom a full municipality-lived-in set could be determined. All regressions include controls for child's gender, age in months, and HCB participation; mother's age, education, and marital status; and child's birth municipality, year, and month fixed effects. Errors are clustered at the municipality level. Models in columns 6 and 7 measure violence exposure using the number of massacres and dummies for any massacre, respectively. Levels of significance: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 3. The Effect of Violence on Children's Cognitive Development

	PPVT	Verbal ability	Math reasoning	General knowledge
	(1)	(2)	(3)	(4)
Trimester 1	-0.0046^{**}	-0.0041^{***}	-0.0030^{*}	-0.0036^{**}
	(0.0019)	(0.0010)	(0.0016)	(0.0015)
Trimester 2	-0.0028	-0.0042^{*}	-0.002	-0.0012
	(0.0021)	(0.0022)	(0.0018)	(0.0015)
Trimester 3	-0.0038^{***}	-0.0033^{*}	-0.0014	-0.0020^{*}
	(0.0014)	(0.0018)	(0.0014)	(0.0012)
Childhood	-0.0025^{**}	-0.0052^{***}	-0.0044^{***}	-0.0030^{***}
	(0.0012)	(0.0012)	(0.0009)	(0.0010)
N	4,669	4,711	4,648	4,703
R^2	0.270	0.332	0.253	0.201
Indiv/mother controls	Y	Y	Y	Y
Municipality FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Month FE	Y	Y	Y	Y
Mean (SD)	0.00 (1.00)			
Effect (SD)	-0.17	-0.29	-0.19	-0.16

Note: HCB = Hogares Comunitarios de Bienestar. Robust standard errors are shown in brackets. Sample includes all children aged three or more years in the HCB data for whom a full municipality-lived-in set could be determined. Models include controls for child (age in months, gender, and an indicator for whether the child participates in HCB) and mother characteristics (age, education, and marital status); and municipality, year, and month of child's birth fixed effects, and municipality linear time trends. Violence is measured using the number of massacre victims. Errors are clustered at the municipality level. Levels of significance: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 4. The Effect of Violence on Children's Socio-emotional Development

	Aggression	Withdrawn behavior	Adequate interaction
	(1)	(2)	(3)
Trimester 1	0.0000	0.0006	−0.0010
	(0.0008)	(0.0005)	(0.0013)
Trimester 2	0.0000	0.0006	0.0002
	(0.0008)	(0.0006)	(0.0009)
Trimester 3	0.0015	0.0006	−0.0007
	(0.0009)	(0.0004)	(0.0010)
Childhood	0.0000	0.0004	-0.0010^{**}
	(0.0005)	(0.0003)	(0.0004)
N	4,711	4,711	4,711
R^2	0.086	0.122	0.237
Indiv/mother controls	Y	Y	Y
Municipality FE	Y	Y	Y
Year FE	Y	Y	Y
Month FE	Y	Y	Y
Mean	1.89	1.40	3.02
SD	0.46	0.33	0.58
Effect (SD)			−0.04

Note: $N = 4{,}711$. HCB = Hogares Comunitarios de Bienestar. Robust standard errors are shown in brackets. Sample includes all children aged three or more years in the HCB data for whom a full municipality-lived-in set could be determined. Models include controls for child (age in months, gender, and an indicator for whether the child participates in HCB) and mother characteristics (age, education, and marital status); and municipality, year, and month of child's birth fixed effects, and municipality linear time trends. Violence is measured using the number of massacre victims. Errors are clustered at the municipality level. Levels of significance: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 5. The Effect of Violence on Children's Cognitive Development by Child's Gender

	Health—HAZ		Cognitive—PPVT		Socio-emotional—Adequate interaction	
	Boys	Girls	Boys	Girls	Boys	Girls
	(1)	(2)	(3)	(4)	(5)	(6)
Trimester 1	0.0013*	−0.0016	−0.0049	−0.0052**	0.0009	−0.0027
	(0.0007)	(0.0024)	(0.0037)	(0.0023)	(0.0013)	(0.0016)
Trimester 2	−0.0022	−0.0034***	−0.0025	−0.0032	0.00	0.00
	(0.0014)	(0.0013)	(0.0025)	(0.0024)	(0.0014)	(0.0010)
Trimester 3	−0.0021	−0.0037***	−0.0057**	−0.0024*	0.0014	−0.0025
	(0.0019)	(0.0010)	(0.0027)	(0.0013)	(0.0015)	(0.0015)
Childhood	−0.0005	−0.0017**	−0.0034**	−0.0016	−0.0005	−0.0015
	(0.0007)	(0.0009)	(0.0015)	(0.0013)	(0.0008)	(0.0011)
N	10,789	10,147	2,379	2,291	2,407	2,306
R^2	0.100	0.09	0.281	0.320	0.255	0.266
Indiv/mother controls	Y	Y	Y	Y	Y	Y
Municipality FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Month FE	Y	Y	Y	Y	Y	Y
Mean	0.0	0.0	0.0	0.0	3.0	3.1
SD	1.0	1.0	1.0	1.0	0.6	0.6
Effect (SD)	0.01	−0.13	−0.17	−0.07		

Note: HAZ = Health-for-age Z-score. Robust standard errors are shown in brackets. HAZ models include children 1–7 years of age; models on cognitive and socio-emotional outcomes include children aged three or more years. Models include controls (dummies) for child (age in months, gender, and an indicator for whether the child participates in Hogares Comunitarios de Bienestar) and mother characteristics (age, education, and marital status); municipality, year, and month of child's birth fixed effects, and municipality linear time trends. Violence is measured using the number of massacre victims. Errors are clustered at the municipality level. Levels of significance: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

TABLE 6. The Effect of Violence on Children's Development by Mother's Education

	Health—HAZ		Cognitive—PPVT		Socio-emotional—Adequate interaction	
	Low	High	Low	High	Low	High
Trimester 1	−0.0002	−0.0003	−0.0062**	−0.0017	−0.0020	−0.0003
	(0.0021)	(0.0011)	(0.0024)	(0.0015)	(0.0012)	(0.0012)
Trimester 2	−0.0014*	−0.0036***	−0.0035	−0.0004	−0.0008	0.0000
	(0.0008)	(0.0012)	(0.0039)	(0.0024)	(0.0010)	(0.0015)
Trimester 3	−0.0028*	−0.0032**	−0.0038**	−0.0027	−0.0009	−0.0014
	(0.0015)	(0.0016)	(0.0014)	(0.0035)	(0.0013)	(0.0012)
Childhood	−0.0014	−0.0005	−0.0038**	0.0003	−0.0014*	−0.0011
	(0.0012)	(0.0009)	(0.0018)	(0.0021)	(0.0001)	(0.0008)
N	10,347	9,362	2,405	1,954	2,439	1,960
R^2	0.0780	0.0890	0.2750	0.2720	0.2600	0.2500
Indiv/mother controls	Y	Y	Y	Y	Y	Y
Municipality FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Month FE	Y	Y	Y	Y	Y	Y
Mean	−0.9000	−1.2000	−0.2000	0.1000	3.0000	3.1000
SD	1.0000	1.0000	0.9000	1.0000	0.6000	0.6000
Effect (SD)	−0.0400	−0.0600	−0.2300		−0.0500	

Note: HAZ = Health-for-age Z-score. Robust standard errors are shown in brackets. HAZ models include children 1–7 years of age; models on cognitive and socio-emotional outcomes include children aged three or more years. Models include controls (dummies) for child (age in months, gender, and an indicator for whether the child participates in Hogares Comunitarios de Bienestar) and mother characteristics (age, education, and marital status); municipality, year, and month of child's birth fixed effects, and municipality linear time trends. Violence is measured using the number of massacre victims. Errors are clustered at the municipality level. Levels of significance: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 7. The Effect of Violence on Children's HAZ by Small and Large Massacres

	Full sample	Any massacre (massacres>0)	Small massacres (mass. victims<10)	Large massacres (mass. victims>=10)
	(1)	(2)	(3)	(4)
Trimester 1	0.0001	-0.00013	-0.00316	0.00002
	[0.0015]	[0.00155]	[0.01676]	[0.00174]
Trimester 2	-0.0028***	-0.00317***	-0.01003	-0.00336***
	[0.0004]	[0.00049]	[0.01334]	[0.00046]
Trimester 3	-0.0027**	-0.00326***	-0.01312	-0.00302**
	[0.0013]	[0.00121]	[0.01807]	[0.00145]
Childhood	-0.0010**	-0.00152***	0.00974	-0.00154**
	[0.0005]	[0.00056]	[0.01859]	[0.00058]
N	20,936	14,713	4,565	10,148
R^2	0.0871	0.0833	0.0925	0.0866
Indiv/mother controls	Y	Y	Y	Y
Municipality FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Month FE	Y	Y	Y	Y
Municipality trends	Y	Y	Y	Y
Mean (SD)	-1.00 (1.08)	-1.00 (1.09)	-1.02 (1.10)	-0.99 (1.06)
Effect (of a SD)	-0.09	-0.11		-0.11

Table 8. Fixed-Effects Estimates of Violence on Children's Health in HCB and DHS

	HCB			DHS	
	OLS full sample	OLS sibling sample	Sibling FE	OLS	Sibling FE
	(1)	(2)	(3)	(4)	(5)
Trimester 1	0.0001	−0.0024	0.0008	−0.0016	−0.0111
	(0.0015)	(0.0024)	(0.0031)	(0.0039)	(0.0102)
Trimester 2	−0.0028***	−0.0021	−0.0021	−0.0077**	0.0026
	(0.0004)	(0.0018)	(0.0030)	(0.0038)	(0.0081)
Trimester 3	−0.0027**	−0.0063**	−0.0058**	−0.0007	−0.0040
	(0.0013)	(0.0028)	(0.0029)	(0.0022)	(0.0069)
Childhood	−0.0010**	−0.0030**	−0.0021	−0.0013**	0.0003
	(0.0005)	(0.0013)	(0.0017)	(0.0006)	(0.0024)
N	20,936	3,816	3,816	8,023	3,081
R^2	0.087	0.128	0.096	0.201	0.095
Indiv/mother controls	Y	Y	Y	Y	Y
Municipality FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
Month FE	Y	Y	Y	Y	Y
Municipality trends	Y	Y	Y	Y	N
Mean	−1.0	−1.3		−1.08	−1.4
SD	1.1	1.1		1.1	1.1
Effect (SD)	−0.09	−0.16	−0.05	−0.12	

Note: HCB = Hogares Comunitarios de Bienestar. DHS = Demography and Health Survey. Robust standard errors are shown in brackets. Sample includes children between aged 12 or more months in the HCB data for whom a full municipality-lived-in set could be determined and 24 or more months in DHS. Models in columns 1, 2, and 4 control for child (age in months, gender, and in the case of HCB, an indicator for whether the child participates in the program) and mother characteristics (age, education, and marital status); municipality, year, and month of child's birth fixed effects, and municipality linear time trends. Errors are clustered at the municipality level. Models in columns 3 and 5 control for mother fixed effects and include controls for children's gender and age in months and for the child's birth month and year. Levels of significance: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 9. Fixed-Effects Estimates of Violence on Children's Cognitive Development in HCB and ELCA

	PPVT			ELCA	
	OLS full sample	OLS sibling sample	Sibling FE	OLS	Sibling FE
	(1)	(2)	(3)	(4)	(5)
Trimester 1	−0.0045**	−0.0043*	−0.0096	−0.0184**	−0.0585**
	(0.0018)	(0.0025)	(0.0091)	(0.0088)	(0.0249)
Trimester 2	−0.0024	−0.0043	−0.0119	−0.0062	−0.0318
	(0.0021)	(0.0042)	(0.0123)	(0.0065)	(0.0247)
Trimester 3	−0.0034*	−0.0031	−0.0237**	0.0049	−0.0101
	(0.0018)	(0.0030)	(0.0094)	(0.0094)	(0.0286)
Childhood	−0.0021*	−0.0006	−0.0009	0.0115	0.0232
	(0.0012)	(0.0025)	(0.0056)	(0.0313)	(0.0183)
N	4,669	740	740	1,099	887
R^2	0.274	0.38	0.52	0.36101	0.349
Indiv/mother or HH controls	Y	Y	Y	Y	Y
Municipality FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
Month FE	Y	Y	Y	Y	Y
Municipality trends	Y	Y	Y	Y	N
Mean	0.0	−0.3		0.0	
SD	1.0	1.0		1.0	
Effect (SD)	−0.15	−0.04	−0.21	−0.17	−0.53

Note: ELCA = Colombian Longitudinal Survey conducted by Universidad de los Andes. Robust standard errors are shown in brackets. Sample includes children aged 36 or more months in the Hogares Comunitarios de Bienestar data for whom a full municipality-lived-in set could be determined. Models in columns 1 and 2 control for child (age in months, gender, and an indicator for whether the child participates in the program) and mother characteristics (age, education, and marital status); municipality, year, and month of child's birth fixed effects, and municipality linear time trends. Errors are clustered at the municipality level. Model in column 3 controls for mother fixed effects and include controls for child's gender and age in months and fixed effects for the child's birth month and year. . Levels of significance: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 10. Fixed-Effects Estimates of Violence on Children's Socio-emotional Development in HCB

	Adecuate Interaction		
	OLS Full sample (1)	OLS Sibling sample (2)	Sibling FE (3)
Trimester 1	-0.001	0.0011	0.0012
	(0.0013)	(0.0027)	(0.0060)
Trimester 2	0.0002	-0.0031	-0.0101
	(0.0009)	(0.0030)	(0.0062)
Trimester 3	-0.0007	0.0001	0.0063
	(0.0010)	(0.0025)	(0.0072)
Childhood	-0.0010**	-0.0009	-0.0010
	(0.0004)	(0.0023)	(0.0031)
N	4,711	764	764
R2	0.237	0.377	0.454
Indiv/mother or HH controls	Y	Y	Y
Municipality FE	Y	Y	Y
Year FE	Y	Y	Y
Month FE	Y	Y	Y
Municipality trends	Y	Y	Y
Mean (SD)	0.0 (1.0)	-0.07	
Effect (SD)	-0.04		

Note: Dataset used: HCB. Robust standard errors are shown in brackets. Sample includes children aged 36 or more months for whom a full municipality-lived-in set could be determined. Models in columns 1 and 2 control for child (age in months, gender, and an indicator for whether the child participates in the program) and mother characteristics (age, education, and marital status); municipality, year, and month of child's birth fixed effects, and municipality linear time trends. Errors are clustered at the municipality level. Model in column 3 controls for mother fixed effects and include controls for child's gender and age in months and fixed effects for the child's birth month and year. . Levels of significance: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 11. Vital Health Statistics at Birth

	Birth weight		
	Full	Low education	High education
	(1)	(2)	(3)
Trimester 1	-0.1435^{**}	-0.2000^{**}	-0.1588^{**}
	(0.0651)	(0.0993)	(0.0793)
Trimester 2	0.0816	−0.0629	0.1011
	(0.1219)	(0.1884)	(0.1018)
Trimester 3	−0.0335	−0.1748	−0.0160
	(0.1124)	(0.1630)	(0.1113)
N	3,873,065	1,287,347	2,585,718
R^2	0.094	0.098	0.094
Indiv/mother or HH controls	Y	Y	Y
Municipality FE	Y	Y	Y
Year FE	Y	Y	Y
Month FE	Y	Y	Y
Municipality trends	N	N	N
Mean	3,155	3,164	3,151
SD	506	513	501
Effect in grams	−1.3	−2.3	−1.4

Note: Pooled data from Vital Statistics, years 1998–2001 and 2005–2006. Robust standard errors are shown in brackets. All regressions use a linear specification. Models control child's gender; and mother's age, education, and relationship status; multiple births parity; urban household; whether the baby was delivered at a hospital; whether a mother had medical insurance (public, private, other); and municipality, year, and month of child's birth fixed effects. Errors are clustered at the municipality level. Less educated mothers are those with primary or less education (includes mothers with no education). More educated mothers are those with some secondary education or more. Birth weight coefficients for less and more educated mothers are statistically different at the 0.99 level. Levels of significance: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 12. Descriptive Statistics for Parental Investments by Violence Exposure

		Violence		
	Full sample	No violence	Low	High
Prenatal care	0.87	0.86	0.89	0.87
Prenatal care visits (N)	6.56	6.51	6.51	6.64
	(2.14)	(2.15)	(2.04)	(2.21)
Breastfeed duration (months)	14.57	14.48	14.42	14.81
	(8.65)	(8.55)	(8.37)	(8.94)
Child vaccination (complete)[1]	0.21	0.21	0.20	0.22
Protein servings last seven days[2]	7.00	7.00	7.07	6.97
	(3.91)	(3.67)	(3.82)	(3.90)
Quantity of mothers time (hrs/wk)	34.37	35.99	36.54	32.41
	(18.86	(18.40)	(18.11)	(19.27)
Quality of mothers time				
Personal care routines	19.81	20.12	19.85	19.75
	(6.03)	(5.65)	(5.97)	(6.27)
Active stimulation routines	24.93	24.79	24.8	25.08
	(7.96)	(7.89)	(7.83)	(8.05)
Physical aggression	1.12	0.98	1.12	1.19
	(1.79)	(1.53)	(1.61)	(1.98)
Psychological aggression	1.07	0.97	1.02	1.14
	(1.61)	(1.47)	(1.49)	(1.73)
N	20,936	5,985	4,692	10,259

Note: Sample includes children 1–7 years of age except for the outcomes prenatal care, prenatal care visits, and breastfeeding duration that include children $\geq$ 36 months. Robust standard errors are shown in brackets. Data used: Hogares Comunitarios de Bienestar. High and low violence are defined by whether a child was exposed to more than two massacres versus two or fewer massacres over the life course (in-utero and in childhood). [1] Includes complete set of vaccinations (polio, pentavalente: tetanus, hepatitis B, measles, and rubella) [2] Number of servings of meat/poultry/fish in the last seven days. Significance levels: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 13. The Effect of Violence on Parental Investments

	Prenatal care (y/n)	Prenatal care visits (N)	Breastfeed (y/n)	Breastfeed duration (mths)	Child vaccination[1]	Protein servings in last seven days[2]
	(1)	(2)	(3)	(4)	(5)	(6)
Full sample, ages one through seven years, $N = 20{,}934$						
In-utero	0.0002	0.0006	−0.00002	0.0017	0.00	−0.0023
	(0.0001)	(0.0012)	(0.0001)	(0.0088)	(0.0002)	(0.0015)
Childhood			−0.00006	0.0038	0.0001	0.0005
			(0.00004)	(0.0030)	(0.0001)	(0.0011)
Mean	0.9	6.6	0.97	20.4	0.2	7.0
SD	0.4	2.1	0.18	17.4	0.4	4.1
Effect (%)						
Ages under three years, $N = 8{,}032$						
In-utero	0.0004	−0.0079**	0.00	−0.0031	0.0012**	−0.0023
	(0.0008)	(0.0034)	(0.0005)	(0.0251)	(0.0005)	(0.0126)
Childhood			0.0001	−0.0183	−0.0015**	−0.0039
			(0.0002)	(0.0119)	(0.0006)	(0.0074)
Mean	0.9	6.6	0.97	14.5	0.2	7.0
SD	0.3	2.1	0.18	8.7	0.4	4.0
Effect (%)		−3.3		−4.9	16.2	
Ages three years and over, $N = 12{,}902$						
In-utero	0.0001	−0.0003	−0.0001	−0.001	−0.0002	−0.0026*
	(0.0002)	(0.0012)	(0.0001)	(0.0150)	(0.0003)	(0.0014)
Childhood			−0.0001**	0.0027	0.0001	−0.0004
			(0.0001)	(0.0054)	(0.0001)	(0.0015)
Mean	0.9	6.6	0.97	23.9	0.2	7.1
SD	0.4	2.1	0.18	20.4	0.4	4.1
Effect (%)			−0.4			−1.0

Note: Robust standard errors are shown in brackets. Models include children 1-7. Models include controls for child (age in months, gender, an indicator for whether the child participates in the Hogares Comunitarios de Bienestar) and mother characteristics (age, education, and marital status), as well as municipality, year, and month of child's birth fixed effects. [1] Includes complete set of vaccinations (polio, pentavalente: tetanus, hepatitis B, measles, and rubella) [2] Number of servings of meat/poultry/fish in the last seven days. Significance levels: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 14. The Effect of Violence on Parenting

	Time use mother w/child (hrs) (1)	Personal care routines (2)	Active stimulation routines (3)	Physical aggression (4)	Psychological aggression (5)
Full sample, ages one through seven years, $N = 20{,}934$					
In-utero	−0.0050	−0.0008	0.0001	0.00	0.0004*
	(0.0137)	(0.0007)	(0.0004)	(0.0006)	(0.0002)
Childhood	0.0027	−0.0007	0.0001	0.00	0.0004***
	(0.0044)	(0.0012)	(0.0004)	(0.0004)	(0.0001)
Mean	34.4	0.0	0.0	0.0	0.0
SD	18.9	1.0	1.0	1.0	1.0
Effect (%)					2.5
Ages under three years, $N = 8{,}032$					
In-utero	−0.0595**	−0.0017	−0.0016	0.0014	0.0026***
	(0.0289)	(0.0012)	(0.0013)	(0.0021)	(0.0010)
Childhood	−0.0633**	0.0016	−0.0030**	−0.0011	0.0031*
	(0.0260)	(0.0013)	(0.0012)	(0.0012)	(0.0017)
Mean	36.0	0.2	0.1	−0.1	−0.1
SD	19.4	1.0	1.0	−0.8	−1.0
Effect (%)	−10.8		−10.4		18.2
Ages three years and over, $N = 12{,}902$					
In-utero	0.0065	0.0003	−0.0003	−0.0004	0.0001
	(0.0109)	(0.0010)	(0.0012)	(0.0006)	(0.0006)
Childhood	0.0029	−0.0008	0.00	−0.0003	0.0002
	(0.0080)	(0.0009)	(0.0010)	(0.0004)	(0.0003)
Mean	33.4	−0.1	−0.1	0.0	0.0
SD	18.6	−1.0	−1.0	1.0	1.0
Effect (%)					

Note: HCB = Hogares Comunitarios de Bienestar. Robust standard errors are shown in brackets. Models include children 1-7 years of age. N varies by outcome measured. Data used: HCB. Models include controls for child (age in months, gender, an indicator for whether the child participates in the HCB) and mother characteristics (age, education, and marital status), as well as municipality, year, and month of birth fixed-effects. Significance levels: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 15: First Stage: The Effect of Distance on Dummy for Long vs Short Duration in HCB

	HCB exposure	HCB exposure x Violence
	Tobit	
	(1)	(2)
Distance HH to HCB	-0.01283	2.06543**
	(0.02139)	91.02087)
Distance HH to HCB 2	0.00000	-0.00000*
	(0.00000)	(0.00000)
Distance x Violence	-0.00052	-0.07971***
	(0.00035)	(0.02567)
Distance 2 x Violence	0.00000	0.00000***
	(0.00000)	(0.00000)
Violence	-0.00081	0.72508***
	(0.00058)	(0.04889)
N	8,744	8,744
F-stat	26.2	214.35

Note: HCB = Hogares Comunitarios de Bienestar. First-stage regressions use a Tobit model (using an OLS model provides consistent estimates). Robust standard errors are shown in brackets. Models include children 1-7 years of age who participate in HCB. Models include controls for child (age in months, gender, an indicator for whether the child participates in the HCB) and mother characteristics (age, education, and marital status), as well as municipality, year, and month of birth fixed-effects. Significance levels: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 16: Second Stage: The Mitigating Impact of HCB on Child Outcomes

	HAZ	PPVT	Verbal ability	Math ability	General knowledge	Aggression	Isolation	Adequate interaction
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
OLS								
HCB x Violence	-0.00026	-0.0017	-0.0247*	-0.0164	-0.0181	0.00020	-0.00034	0.00086
	[0.00031]	[0.0190]	[0.0139]	[0.0185]	[0.0144]	[0.00023]	[0.00026]	[0.00072]
HCB	-0.0245	1.1435	1.9605	3.580***	1.3262	0.06051**	-0.0534**	0.07986*
	[0.0282]	[1.0848]	[1.1802]	[1.0938]	[0.9646]	[0.03016]	[0.0257]	[0.04160]
Violence	-0.00197*	-0.0385*	-0.0585*	-0.0287	-0.0073	0.00042	0.00094**	-0.00029
	[0.00106]	[0.0213]	[0.0333]	[0.0295]	[0.0214]	[0.00070]	[0.00045]	[0.00097]
N	8,744	1,941	1,956	1,932	1,953	1,964	1,964	1,964
R2	0.101	0.315	0.376	0.311	0.226	0.162	0.192	0.298
2SLS								
HCB x Violence	0.00558	0.2259	0.00943	-0.1102	-0.0656	0.005	0.0074*	-0.0059
	[0.0081]	[0.1862]	[0.1623]	[0.1979]	[0.1679]	[0.0048]	[0.0040]	[0.0071]
HCB	-0.187	-11.742	-10.391	19.603	-2.003	0.0089	-0.8831**	1.560**
	[0.7548]	[16.455]	[14.181]	[18.545]	[14.205]	[0.5549]	[0.3909]	[0.692]
Violence	-0.0046	-0.1541	-0.0439	0.0795	0.0451	-0.00307	-0.0060*	0.00508
	[0.0063]	[0.1487]	[0.1304]	[0.1585]	[0.1326]	[0.0037]	[0.0032]	[0.0056]
N	8,744	1,941	1,956	1,932	1,953	1,964	1,964	1,964
R2	0.09	0.275	0.347	0.272	0.193	0.131	0.145	0.271

A Selection Tests

Table A1. Confounding Variables for the Effect of Violence on Child's Health (HAZ)

	Baseline model	Homicide rate	% Pop. forcefully displaced	Rainfall shocks	Proxy for education investments	Unemp. rate	Municipality GDP per capita	Institutions
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Trimester 1	0.0001	0.0002	0.0001	−0.0002	0.0001	−0.0002	−0.0001	−0.0007
	(0.0015)	(0.0016)	(0.0016)	(0.0015)	(0.0015)	(0.0016)	(0.0015)	(0.0016)
Trimester 2	−0.0028***	−0.0028***	−0.0030***	−0.0029***	−0.0030***	−0.0031***	−0.0028***	−0.0036***
	(0.0004)	(0.0004)	(0.0012)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0005)
Trimester 3	−0.0027**	−0.0027**	−0.0030**	−0.0027**	−0.0030**	−0.0034***	−0.0027**	−0.0025
	(0.0013)	(0.0012)	(0.0012)	(0.0012)	(0.0012)	(0.0011)	(0.0013)	(0.0016)
Childhood	−0.0010**	−0.0009	−0.0013**	−0.0012**	−0.0013**	−0.0011*	−0.0010**	−0.0020***
	(0.0005)	(0.0006)	(0.0006)	(0.0006)	(0.0005)	(0.0005)	(0.0005)	(0.0007)
N	20,936	20,936	20,936	20,007	20,282	18,094	20,936	16,762
R^2	0.087	0.089	0.089	0.089	0.088	0.089	0.087	0.085
Geogr. unit	Muni	Muni	Muni	Muni	Muni	Dept	Muni	Muni
Time unit	Trim	Trim	Trim	Trim	Year	Year	Year	Year
Controls								
Indiv/mother	Y	Y	Y	Y	Y	Y	Y	Y
Municipality FE	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Month FE	Y	Y	Y	Y	Y	Y	Y	Y
Trends	Y	Y	Y	Y	Y	Y	Y	Y

Table A2. Violence Exposure and Maternal Characteristics

	Age (1)	Age over 33 years (2)	Primary Education or Less (3)	Less than HS (4)	More than HS (5)	Married (6)	Cohabiting (7)	Single (8)
Without municipality FE								
In-utero	−0.0012	−0.0002	0.0004	0.0002	−0.0003	0.0002	0.0000	0.0000
	(0.0020)	(0.0001)	(0.0008)	(0.0002)	(0.0007)	(0.0002)	(0.0005)	(0.0004)
Childhood	−0.0040**	−0.0002	−0.0003	0.0003	0.0001	−0.0002	0.0002	0.0001
	(0.0018)	(0.0001)	(0.0004)	(0.0002)	(0.0002)	(0.0001)	(0.0002)	(0.0002)
N	20,936	20,936	20,936	20,936	20,936	20,936	20,936	20,936
R^2	0.0326	0.0108	0.0051	0.0014	0.0076	0.0017	0.0021	0.0038
With municipality FE								
In-utero	−0.0018	−0.0004*	0.0000	0.0002	−0.0001	0.0002*	−0.0001	−0.0003***
	(0.0019)	(0.0002)	(0.0001)	(0.0002)	(0.0001)	(0.0001)	(0.0002)	(0.0001)
Childhood	−0.0011	0.0000	0.0001	0.0000	0.0001	0.0000	0.0001	−0.0001
	(0.0011)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
N	20,936	20,936	20,936	20,936	20,936	20,936	20,936	20,936
R^2	0.0391	0.0175	0.0520	0.0126	0.0380	0.0221	0.0260	0.0326
Birth year FE		Y	Y	Y	Y	Y	Y	Y
Birth month FE		Y	Y	Y	Y	Y	Y	Y

Note: $N = 20{,}936$. Hogares Comunitarios de Bienestar data. Robust standard errors are shown in brackets. Each column (in each panel) was obtained from a separate regression. Models include year and month of child's birth fixed effects. The regressions in the second panel also include municipality of child's birth fixed effects. Robust standard errors are clustered at the municipality level. Levels of significance: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

TABLE A3. Reasons for Migrating in HCB

Reason	N	%
Nonmovers	20,540	86.95
Family	2,584	10.94
Violence	343	1.45
Searching for better conditions in general	59	0.25
Labor market/job	30	0.13
Other	29	0.12
Health	16	0.07
Education	10	0.04
Poverty	9	0.04
Natural disaster	4	0.02
Total	23,624	100

Note: N = 23,624. HCB = Hogares Comunitarios de Bienestar. Robust standard errors are shown in brackets. The sample includes all children in the HCB data, movers and nonmovers. A family is classified as mover if it was interviewed in 2007 in a municipality different from where the focal child was born (see more details in Table B8). The sample of interest in this the study (N = 20,936) includes mostly nonmovers (n = 20,540) and some movers who migrated prior their child's conception (n = 396).

Table A4. Selective Migration

	Height-for-age	
	Movers and Nonmovers	Nonmovers
	(1)	(2)
Trimester 1	0.0004	0.0001
	(0.0012)	(0.0015)
Trimester 2	−0.0026***	−0.0028***
	(0.0004)	(0.0004)
Trimester 3	−0.0025**	−0.0027**
	(0.0010)	(0.0013)
Childhood	−0.0005	−0.0010**
	(0.0004)	(0.0005)
N	23,624	20,936
R^2	0.083	0.087
Indiv/mother controls	Y	Y
Municipality FE	Y	Y
Year FE	Y	Y
Month FE	Y	Y
Municipality trends	Y	Y
Mean	−1.0	−1.0
SD	1.1	1.1
Effect (SD)	−0.05	−0.11

Note: HCB = Hogares Comunitarios de Bienestar. Sample in column 1 includes children aged one or more years from migrant and nonmigrant households in the HCB data. Robust standard errors are shown in brackets. Migration is defined as whether a household reports to have been living in the municipality of interview for a shorter period (months) than a child's age. Models include controls (dummies) for child (age in months, gender, an indicator for whether the child participates in the HCB) and mother characteristics (age, education, and marital status); municipality, year, and month of child's birth fixed effects; and for municipality linear time trends. Violence is measured using the number of massacre victims. Errors are clustered at the municipality level. Levels of significance: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table A5. Selective Fertility

	N of children born after focal child		Succeeding birth interval (months) after focal child		Preceding birth interval (months) before focal child	
	In-utero	In-utero to age 3	In-utero	In-utero to age 3	In-utero	In-utero to age 3
Violence	0.0000	−0.0001	0.1255	0.0615	0.0587	0.0583
	(0.0008)	(0.0008)	(0.0842)	(0.0500)	(0.0828)	(0.2115)
Violence × Mom's	−0.0002	−0.0002	−0.1087***	0.0025	0.001	−0.0445
age < 23	(0.0010)	(0.0003)	(0.0389)	(0.0143)	(0.0317)	(0.0739)
Violence × Mom's	−0.0001	−0.0002	−0.0108	0.0012	−0.0014	−0.0466
age 23–2	(0.0007)	(0.0004)	(0.0367)	(0.0099)	(0.0316)	(0.0665)
Violence × Mom's	−0.0007	−0.0004	−0.1035***	−0.0113	0.0213	−0.0552
age 27–33	(0.0006)	(0.0002)	(0.0393)	(0.0129)	(0.0313)	(0.0735)
Violence × Mom's	0.00	−0.0001	0.0439	0.000	−0.0370	−0.0586
educ. primary or less	(0.0006)	(0.0004)	(0.0765)	(0.0230)	(0.0668)	(0.1391)
Violence × Mom's	−0.0005	0.0003	0.0061	−0.0183	−0.0614	−0.0276
education < HS	(0.0005)	(0.0003)	(0.0678)	(0.0285)	(0.0733)	(0.1239)
Violence × Mom's	0.0002	0.0007***	−0.0796	−0.0459**	−0.0937	−0.0301
education HS	(0.0005)	(0.0003)	(0.0805)	(0.0229)	(0.0623)	(0.1534)
Violence × Mom is	0.0001	−0.0003	0.0154	0.0094	−0.0313	0.0529
Cohabiting	(0.0003)	(0.0003)	(0.0417)	(0.0115)	(0.0370)	(0.0644)
Violence × Mom is	0.0009**	0.0001	−0.0391	0.0104	−0.0044	0.0757
Single	(0.0004)	(0.0005)	(0.0655)	(0.0210)	(0.0495)	(0.0626)
Violence × Rural	0.0023	−0.0011*	0.0196	0.0148	0.0439	−0.2001
HH	(0.0016)	(0.0011)	(0.0652)	(0.0220)	(0.0275)	(0.2062)
N	16,086	6,403	3,148	2,309	3,450	355
R^2	0.236	0.217	0.353	0.263	0.331	0.834
Controls						
Indiv/mother	Y	Y	Y	Y	Y	Y
Municipality FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Month FE	Y	Y	Y	Y	Y	Y
Municipality trends	Y	Y	Y	Y	Y	Y

Note: Sample includes children aged less than 60 months in the Demography and Health Survey data (years 2000 and 2005). Robust standard errors are shown in brackets. The outcome is defined as the number of children born after the focal child, the succeeding birth interval (in months) after the focal child, and the preceding birth interval (in months) before the focal child. "Early-life Violence" is defined as the level of violence to which the child was exposed while in-utero (columns 1, 3, and 5) and similarly for violence up to age 3 (columns 2, 4, and 6, including in-utero). All regressions include controls (dummies) for child (gender and age in months) and mother characteristics (age, education, marital status) and whether the household is rural or urban. Regressions also include municipality, year, and month of child's birth fixed-effects, and municipality linear time trends. Errors are clustered at the municipality level. Level of significance: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table A6. Selective Survival

	Child died in 1st mth		Child died before age 1		Child died before age 3	
	(1)	(2)	(3)	(4)	(5)	(6)
Violence	0.0000	−0.0002	0.0001	0.000	0.000	0.0002
	(0.0001)	(0.0002)	(0.0001)	(0.0001)	(0.0003)	(0.0002)
Violence ×		0.0003		0.0002		0.0002
Mom's age < 23		(0.0003)		(0.0003)		(0.0002)
Violence ×		0.0002		0.0002		-0.0002^{*}
Mom's age 23–26		(0.0003)		(0.0003)		(0.0001)
Violence ×		0.0004^{**}		0.0002^{**}		−0.0001
Mom's age 27–33		(0.0001)		(0.0001)		(0.0001)
Violence ×		−0.0003		−0.0002		-0.0003^{*}
Mom's education $\leq$ primary		(0.0003)		(0.0002)		(0.0002)
Violence ×		−0.0002		−0.0002		-0.0004^{**}
Mom's education $<$ HS		(0.0002)		(0.0001)		(0.0002)
Violence ×		−0.0003		−0.0002		0.00
Mom's education $>$ HS		(0.0002)		(0.0001)		(0.00002)
Violence ×		0.0000		0.0000		0.0001
Mom is cohabiting		(0.0001)		(0.0001)		(0.0001)
Violence ×		0.0003		0.0003^{**}		0.0003^{***}
Mom is single		(0.0002)		(0.0001)		(0.0001)
Violence × Rural HH		0.0002		0.0002		0.0009^{*}
		(0.0005)		(0.0004)		(0.0005)
N	16,070	16,070	12,693	12,693	6,190	6,190
R^2	0.031	0.033	0.036	0.036	0.063	0.068
Indiv/mother controls	Y	Y	Y	Y	Y	Y
Municipality FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Municipality trends	Y	Y	Y	Y	Y	Y
Mean (%)	1.4		2.1		2.4	
SD	11.7		14.2		15.3	

Note: Sample includes children under 60 months in the Demography and Health Survey data (years 2000 and 2005). Robust standard errors are shown in brackets. The outcome is defined as whether a child survived the first month, first year, or third year of life. Sample in columns 1 and 2 is restricted to those children aged one or more months, those aged 12 or more months in columns 3 and 4, and aged 36 or more months in columns 5 and 6. "Early-life Violence" is defined as the level of violence to which the child was exposed while in-utero (columns 1 and 2); violence while in-utero and during the first year of life (columns 3 and 4); violence while in-utero and during the first three years of life (columns 5 and 6). All regressions include controls (dummies) for child (gender and age in months) and mother characteristics (age, education, marital status) and whether the household is rural or urban. Regressions also include municipality, year, and month of child's birth fixed effects, and municipality linear time trends. Errors are clustered at the municipality level. Level of significance: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table A7. The Effect of Violence on the Cohort Size and Sex Ratio

	Census (All municipalities)	Census (HCB municipalities)	HCB
Cohort size (N)			
Massacre shock in pregnancy	-0.987	-6.651	14.902
	(0.775)	(4.912)	(10.292)
N	167,952	21,923	12,996
R^2	0.998	0.999	0.886
Sex Ratio			
Massacre shock in pregnancy	-0.010	0.0043	-0.0367
	(0.0053)	(0.0140)	(0.0389)
N	167,952	21,923	12,996
R^2	0.177	0.526	0.329
Municipality of birth FE	Y	Y	Y
Year of birth FE	Y	Y	Y
Month of birth FE	Y	Y	Y

Note: Census data 2005. HCB = Hogares Comunitarios de Bienestar. Sex ratio is defined as the number of boys divided by the number of girls born in each municipality and year in Colombia, between ages 3 and 6. Robust standard errors are shown in brackets; errors are clustered at the municipality level. Levels of significance: $^{***}p < 0.01$, $^{**}p < 0.05$.

B Additional Tables and Figures

As discussed in the data section, the sample of interest in this study comes from children of families who have not migrated prior to the birth of the child. The reason for selecting the nonmovers and excluding the mover sample is that the HCB does not provide information on the municipality of birth for children of migrant families. Table B8 shows summary statistics for both children and mothers in the mover and nonmover samples, which indicate that nonmover households tend to be a more advantaged group of families than those who migrated at some point since child's birth. Nonmigrant mothers are significantly older and more educated than migrant mothers. They are also more likely to be married or to be single. Children of nonmigrant families also report higher cognitive outcomes. These differences suggest that, since the nonmover sample is a positively selected group in terms of mother and child characteristics, it is likely that the estimates of violence on child outcomes for this group may result in a downward biased coefficient of the true impact of violence.

Table B8: Factos Affecting the Decision of Who Takes Care of the Child

	HCB Attendance					
	No		HCB Exposure (Months)			
			<13		>=13	
	N	%	N	%	N	%
Cost	381	3.66	166	3.48	207	3.6
Flexible schedule	57	0.55	46	0.96	52	0.9
Location	326	3.13	594	12.45	572	9.95
Quality of the service	4,358	41.86	3,197	67.02	3,992	69.41
Prefers family member to take care of child	896	8.61	114	2.39	291	5.06
Appearance of CC center	154	1.48	176	3.69	142	2.47
N children in the CC center	71	0.68	53	1.11	50	0.87
Have never looked for an CC option	3,645	35.01	16	0.34	15	0.26
Other	522	5.01	408	8.55	430	7.48
Total	10410		4770		5751	

Table B8. The Effect of Violence on the Cohort Size and Sex Ratio

		Migration		
		Nonmovers	Movers	Diff
Child outcomes:	Height-for-age	−1.00	−1.04	0.04
		(1.08)	(1.05)	
	Proportion stunted	0.16	0.16	0.00
	Proportion severely stunted	0.03	0.03	0.00
	Peabody Picture Vocabulary Test	0.01	−0.08	0.09**
	Verbal ability	0.02	−0.06	0.08*
	Math ability	0.03	−0.11	0.14***
	Knowledge about the world	0.02	−0.10	0.12***
	Aggression	1.89	1.89	0.0
	Withdrawn behavior	1.40	1.43	−0.03*
	Adequate interaction	3.02	2.94	0.06**
Child characteristics:	Female	0.48	0.5	−0.02
	Age (months)	41.22	43.38	−2.16***
		(13.83)	(13.36)	
	Participates in HCB	0.50	0.49	0.01
Mother age:	< 23	0.20	0.21	−0.01
	23–26	0.23	0.27	−0.04***
	27–33	0.36	0.37	−0.01
	> 33	0.21	0.14	0.07***
Education:	Primary or less	0.31	0.40	−0.09***
	Less than HS	0.29	0.31	−0.02
	HS or more	0.34	0.29	0.05***
	Unknown	0.06	0.11	−0.05***
Relationship status:	Married	0.17	0.13	0.04***
	Cohabiting	0.55	0.53	0.02
	Single	0.11	0.07	0.04***
	Other	0.17	0.17	0.00
N		20,936	2,688	

Note: HCB = Hogares Comunitarios de Bienestar. N = 23,624. Robust standard errors are shown in brackets. Sample includes all children aged one to seven years in the HCB data. Cognitive and socio-emotional outcomes are only available for those aged three or more years. N varies by the outcome measured. Migration status is defined by whether a household migrated (or not) from its place of residence after the child's birth. Level of significance: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table B9. Sample Descriptive Statistics in HCB, DHS, and ELCA

		HCB	DHS	ELCA
Child Outcomes:	Height-for-age	−1.00	−1.08	—
		(1.08)	(1.11)	
	Proportion stunted	0.16	0.17	—
	Proportion severely stunted	0.03	0.04	—
	Birth weight	—	3,265	—
			(610)	
Peabody Picture Vocabulary Test		0.01	—	—
Child characteristics:	Female	0.48	0.49	0.49
	Age (months)	41.2	28.3	54.0
		(13.8)	(17.3)	(10.7)
Mother age:	< 23	0.20	0.24	0.22
	23–26	0.23	0.23	0.34
	27–33	0.36	0.32	0.25
	> 33	0.21	0.22	0.19
Education:	Primary or less	0.31	0.42	0.51
	Less than HS	0.29	0.28	0.13
	HS or more	0.34	0.20	0.02
	Unknown	0.06	0.10	0.34
Relationship status:	Married	0.17	0.26	0.55
	Cohabiting	0.55	0.51	0.28
	Single	0.11	0.22	0.11
	Other	0.17	—	—
N		20,936	8,023	1,099

Note: HCB = Hogares Comunitarios de Bienestar. ELCA = Colombian Longitudinal Survey conducted by Universidad de los Andes. DHS = Demography and Health Survey. Robust standard errors are shown in brackets. Column 1 includes children aged one to seven years in the HCB data. Column 2 includes those below age five years in the DHS data. Column 3 includes those aged between three and seven years in the ELCA data

C Other Microdata Sets

In addition to the HCB evaluation, this study uses other sources of microdata to provide additional evidence of the pervasive effects of violence on child development. These other datasets constitute an important contribution to this study for several reasons. First, because the HCB data was collected in 2007, year in which violence in Colombia had decreased substantially, I employ other sources of data that allow me to measure child outcomes and potential mechanisms more closely to the period of more intense violence and to the years in which my sample of children were born. Second, these datasets contain a much larger sample of siblings compared to the HCB data. I am, therefore, able to calculate models that account for mother time-invariant fixed effects, providing more compelling evidence of the impacts of violence on human capital. Third, since these datasets have more national representation than the HCB data, they also help me address the issue of external validity.

(1.) Demography and Health Survey (DHS): Standardized nationally representative (cross-sectional) household surveys conducted in many developing countries. Interview women aged 15–49 years on their health status, birth histories, fertility and use of family planning, and their demographic and socioeconomic characteristics. The DHS also includes child anthropometric indicators (for those below age of 5). I pool data from waves 1995, 2000, and 2005 to cover the most intense years of the conflict.

(2.) Colombian Longitudinal Survey (ELCA by its Spanish acronym):[36] First longitudinal survey in Colombia with a sample of 4,000 rural and 6,000 urban households in different regions of the country. The ELCA includes detailed modules on household characteristics such as health, education, labor-market participation, wealth, and assets and provides information on child cognitive development. I use the urban sample of the baseline wave (the only wave available), collected in 2010.

[36] Conducted by Universidad de los Andes in Bogotá, Colombia.