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**Ecological Factors Associated to Social and Emotional Skill Development: Chronic exposure to violence in the context of the Colombian Civil Conflict**

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# **Ecological Factors Associated to Social and Emotional Skill Development: Chronic exposure to violence in the context of the Colombian Civil Conflict<sup>1</sup>**

*Arturo Harker<sup>2</sup>, Andrés Molano<sup>3</sup>, Juan-Camilo Cristancho<sup>4</sup>*

## **Abstract**

Cognitive, social, and emotional development throughout life is contingent to affordances of the environments in which individuals develop. These abilities are the result of multiple interactions with our ecosystem and the people that surround us. Namely, chronic exposure to violence has been shown to tamper positive human development. These potential negative consequences are particularly challenging in Colombia, a country stricken by more than five decades of civil conflict. In this paper, we evaluate the extent in which chronic exposure to violence —measured at the municipality level— affects children and adolescent’s social and emotional development. Our findings indicate that exposure to violence —particularly homicides— has an important negative association with unique measures of: (i) empathy, (ii) subjective beliefs on the acceptability of the use of violence, and (iii) non-confrontational reactions when provoked, all measured in a national standardized test. Additionally, we observe that the schools in the most violent municipalities are precisely the ones that have less resources that moderate the association between skill development and violence.

**Key words:** Social and Emotional Learning, Mental Health, Exposure to Violence, Adverse Childhood Experiences, Child Development

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## **Resumen**

El desarrollo cognitivo, social y emocional a lo largo de la vida es contingente a elementos del entorno en el cual los individuos se desarrollan. Así, estas habilidades son el resultado de múltiples interacciones con nuestro ecosistema y las personas que nos rodean. En particular, se ha demostrado cómo la exposición crónica a violencia dificulta el desarrollo positivo. Las consecuencias potenciales son especialmente importantes en Colombia, país que ha estado sumergido en más de cinco décadas de conflicto armado. En el presente artículo evaluamos cómo la exposición a violencia –a nivel municipal– afecta las habilidades sociales y emocionales de niños y adolescentes. Identificamos que la exposición a violencia –especialmente los homicidios– tiene un efecto negativo sobre: (i) la empatía, (ii) la justificación sobre el uso de la violencia, y (iii) las respuestas pacíficas ante provocación, aspectos medidos en una prueba estandarizada nacional. Adicionalmente, observamos que las escuelas en los municipios más violentos son justamente las que cuentan menos con algunos recursos que moderan la relación entre violencia y el desarrollo de habilidades sociales y emocionales de los estudiantes.

**Palabras clave:** Desarrollo social y emocional, salud mental, violencia, experiencias adversas durante la niñez, desarrollo infantil.

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## 1. Introduction

Education systems in modern societies have been trusted with an important share of the responsibility to provide children and youth with the tools required to meet and surpass the needs of a competitive world. Although, for a long time, these systems have emphasized the development of cognitive and academic skills, recently the focus has broadened to contributing to the social and emotional development of children and adolescents (Heckman & Kautz, 2013; Jones & Bouffard, 2012). Social and emotional skills, also known in the literature as non-cognitive skills (Reeves, Venator, & Howard, 2014), have been conceptualized as crucial tools to succeed on several dimensions of an individual's personal and social life (Dweck, 2006); contributing not only to the construction of good relations between members of a community, but also as individual protective factors for social and environmental risks factors.

Empirical work suggests that social and emotional development throughout life is contingent to affordances of the environments in which individuals develop (Durlak et al., 2011; Gershoff & Aber, 2006; Jones, Brown & Aber, 2011). As such, our current understanding characterizes these abilities as the result of multiple interactions with our environment and the people that surround us. Similarly, it has been documented that the prolonged or chronic exposure to stressful situations poses important challenges to the positive human development (Shinn & Yoshikawa, 2010). For instance, the work of Sharkey et al. (2012) shows how chronic and acute exposure to neighborhood violence can hinder the development of social and emotional skills during the childhood and adolescence.

The need to understand how chronic exposure to crime and violence affects the development of social and emotional learning is particularly salient in Colombia, a country stricken by more than five decades of civil war. In this country, children and youth have been chronically exposed to these contextual stressors. By 2013, more than 5 million Colombians were violently displaced from their hometown, from which approximately 450 thousand were children on their early childhood (United Nations High Commissioner for Refugees, 2015). Forced migration patterns are the result of an internal armed conflict between left-wing guerrilla groups, right-wing paramilitary armies, and the Colombian military, but also of the

violence surrounding illegal drug production and international trafficking, all of which seem to have been surpassed with the recent peace accords. According to official data, the rate of violent deaths per 100.000 persons between 2010 and 2015 oscillated between 39.4 and 24.0, which surpasses by far the figures in other countries amidst civil conflicts, such as Afghanistan (6.5) and South Sudan (13.9) (UNODC, 2014).

In this paper, we evaluate the extent in which chronic exposure to violence –measured at the municipality level– affects children (fifth graders) and adolescent’s (ninth graders) social and emotional development. To achieve this goal, we use a unique nation-wide dataset on *citizenship competences* to build direct measures of social and emotional skills.<sup>5</sup> We also explore the role that school characteristics play in mitigating or potentially exacerbating these estimated environmental effects. Our findings indicate that exposure to homicides has a negative association with novel measures on: (i) empathy, (ii) subjective beliefs on the acceptability of the use of violence, and (iii) non-confrontational reactions when provoked, all measured in a national standardized test. Additionally, we find a negative association with two cognitive development measures: performance in the mathematics and Spanish language components of the same national standardized test.

Our results show that the schools in the most violent municipalities are precisely the ones that have fewer resources that moderate the association between skill development and violence. We observe that higher teacher-student ratios and number of teachers with higher credentials and experience are associated with resilient development and higher student skill measures. These findings should be useful to design and implement policies to address the impact of violence on child development, as well as to explore the role of schools in promoting resilience.

The remainder of the paper is organized as follows. In Section 2, we present the literature review. Section 3 describes the data we use when implementing our empirical

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<sup>5</sup> Led by academics and government agencies, this country has made important efforts to characterize and measure some of the non-cognitive skills needed to restore peace and prosocial behaviors. These skills have been labeled as *citizenship competences* (Chaux, Molano, & Podlesky, 2009), and are defined as the set of knowledge, skills and attitudes required to construct peaceful relationships, participate democratically, and value individual differences.

strategy (Section 4). We finish with sections 5 and 6, where we present our main findings and discuss public policy recommendations.

## **2. Literature Review**

Recent evidence has motivated a shift on how child development and education is understood. These changes have popularized a new educational approach where individual and personal development is presented as the center around which education should gravitate (Tough, 2012). From this shift, *cognitive skills* measured by traditional achievement tests – which education systems used to solely rely on– have been re-interpreted; not as a perfect proxy for the capacities of children to succeed in life, but because of multiple interactions with various aspects in their lives. This paradigm shift relies on a basic premise: People are not born proficient on any topic. Hence, education should focus on a set of skills that enables children to develop expertise and skills, such as motivation, self-regulation, curiosity, grit, among others (Dweck, 2006). These characteristics have been labeled in the literature as non-cognitive or social and emotional skills (Jones & Bouffard, 2012).

Rigorous studies, particularly in the United States, have documented how social and emotional skills are positively associated not only with higher scores in traditional achievement tests (Duckworth, Quinn & Tsukayama, 2012; Friedman & Streicher, 1985), but also directly contribute to future socioeconomic success. In fact, these characteristics are important in almost every dimension of life. In the labor market, these social and emotional skills are documented as reliable predictors of higher earnings and job stability (Heckman & Kautz, 2013). In social spheres, the skills listed above are associated with smaller chances of participating in criminal and illicit activities (Abram, 2004). Regarding health, it is more likely to have longer life expectancy, less propensity to suffer heart diseases, obesity, and depression, to consume cigarettes and other drugs for individual who have previously developed these skills (Felitti, 2002). These findings highlight the important role these social and emotional skills have in predicting individual outcomes in the short run (e.g. school performance and behavioral development) as well as in long run (e.g. health and employment).



Additionally, evidence suggests that social and emotional development throughout life is contingent to the context in which individuals develop (Durlak et al., 2011; Gershoff & Aber, 2006; Jones, Brown & Aber, 2008). For instance, a child raised in a household where her parents care for her needs, is not a victim of abuses by peers, and is not exposed to environmental risks, is likely to develop the skills discussed above. However, exposure to adverse experiences, such as parental negligence, physical or verbal abuse, or community violence can hinder the positive development of children and adolescents (Center of Developing Child, Harvard University, 2014); (Felitti, 2002). Within this framework, one of the main risk factors affecting children comes from the chronic exposure to adverse experiences.

Humans, as any other mammal, have a stress-response system, which derives internal automatic responses to survive before threats. When faced with environmental risks, this system sends extra energy to the muscles, halts non-essential functions, diminishes the perception of pain and sharpens sensory skills, to help us implement fight-or-flight responses (Sapolsky, 2004). The problem is that, for humans, these responses are the same regardless of the physical and psychological proximity of the situation that triggers them. Sapolsky (2004) documents how humans, unlike other mammals, not only activate their stress-response system by imminent threats, but also by fear produced by the anticipation of events—that may or may not occur. Thus, a child who constantly faces adverse experiences in his household, school or community, is more likely feel stressed regularly. The result of the constant use of the stress-response system --triggered by impending threats or in anticipation to these threats— ends up developing undesirable traits and behaviors, such as a greater propensity to aggression, shyness, pessimism and apathy (Heckman & Kautz, 2013). Moreover, in addition to the direct impact on child development, adverse experiences can indirectly foster disparities in skill accumulation by impairing protective buffers that can ultimately generate resilience. For instance, there is evidence that suggests that exposure to crime and violence can worsen parenting quality, a key protective factor (Cuartas, Harker, & Moya, 2016).

With this background, it is surprising that relatively few papers have aimed to respond to the specific question of how exposure to violence takes a toll on children's cognitive and non-cognitive skills development. Sharkey, Tirado-Strayer, Papachristos & Raver (2012) tackle this question by identifying the number of homicides occurred in zones near the household of a sample of children from Chicago, and exploring the effect on children's social, emotional and cognitive performance. They define proximity as geographic circumferences around the household for several radii. Exploiting the variability of both timing and location of homicides, this study identifies a causal and negative effect of violence exposure on social and emotional skills (self-regulation and attention) and cognitive skills (performance on a language proficiency test).

Similarly, Monteiro and Rocha (2013) examine the effects of exposition to armed conflict between gangs in Rio de Janeiro's *favelas* (slums) on children's performance on cognitive-achievement tests. To identify this effect, the authors explore the variation in time and location of battles over territories, showing how students in schools located near these unexpected shocks, in average have lower scores in math than their unexposed peers. Moreover, this effect increases as battles between gangs intensify, as their duration increases and if they occur closer to the exam date.

In Colombia, even though the national standardized academic achievement test (called SABER) includes measures of social and emotional development (Chaux, Molano & Poddlesky, 2009; Molano, Torrente & Jones, 2015), the use and analysis of these results are only incipient. Using the results of SABER, Chaux et al. (2009) explore how contextual factors may explain observed associations between 5<sup>th</sup> and 9<sup>th</sup> grade students' reports of bullying and their levels of social and emotional development. This study reports how students in municipalities exposed to violence during several decades report more bullying than their counterparts on less exposed municipalities. Similarly, the authors document how indices of inequality, rather than levels of poverty predict higher levels of bullying among 9<sup>th</sup> graders.

Likewise, Molano et al. (2015) explore the results of the same test and evaluate how exposure to family and neighborhood violence is associated with attitudes of victimization and endorsement toward aggressiveness, supporting violent behaviors. Their results suggest

that these two sources of exposure to violence modify children and adolescent's perceptions about their roles in peer conflicts, as well as increases children's willingness to support the use of aggression as a legitimate way to solve interpersonal conflicts.

Building from this evidence, and noting the dearth of research exploring these effects in the Colombian context, in this paper we attempt to contribute to closing this gap. Specifically, we explore the association between children's reports of social and emotional skills and the levels of municipal violence. Considering the work of Sharkey et al. (2012), Monteiro (2013) and Molano et al., (2015) we hypothesize that higher levels of municipal violence is associated with lower average scores in social and emotional development measures among the population of 5<sup>th</sup> and 9<sup>th</sup> grade students in Colombia, even after accounting for social and demographic factors that characterize important differences across households, schools and municipalities.

Additionally, we also explore the role that school-level factors may have in moderating this association. Building from the work of Monteiro (2013) and Durlak et al. (2012), we expect that school-level characteristics describing the internal efficiency and quality of the educational system may moderate this negative association between exposure to violence and social, emotional and cognitive development. In the following sections, we describe our data, empirical strategy and results.

### **3. Data**

We use four data sources that allow us to measure: (1) Student level cognitive and socio-emotional development and socio-demographics; (2) exposure to criminal and violent events at a municipality level; and (3) school level characteristics. The first source is an administrative dataset containing the results of the Colombian standardized national tests SABER 5 and SABER 9. These tests are designed and implemented by the Colombian Institute of Educational Evaluation (ICFES). The tests were taken by approximately 1.2 million Colombian children in 5<sup>th</sup> and 9<sup>th</sup> grades during 2012. Each test is divided in three sections: a cognitive component, which assesses student's aptitude on language and mathematics; a non-cognitive component, where children report what they would do in specific situations that

involve or require exhibiting social and emotional skills<sup>6</sup>; and a component that gathers information regarding children's personal and socio-economic status, such as age, gender, parents education, materials of floors, walls and roof of their household, people that live with them and frequency of recreational activities engaged by them.

The second data source comes from an administrative dataset collected by the Colombian Police Department, which has detailed information on reported criminal and violent events: exact date and location, number of victims and alleged motives. This dataset contains a wide range of crimes, such as homicides, personal injuries, armed groups actions, theft against people, vehicles and commercial establishments. We employ the number of homicides per 10,000 inhabitants in each municipality as a measure of chronic exposure to violence.

The third source is the Colombian National Administrative Department of Statistics (DANE, by its acronym in Spanish), which collects administrative information for each school. Specifically, the dataset we constructed using this source includes information on the number of teachers by grade, teacher's educational level, tuition cost, and number of students, among others. This data allows us to statistically control by observed school characteristics, but also to determine how these characteristics moderate the association between skills development and environmental stressors.

Finally, our fourth source of information is a dataset that collects yearly information for every Colombian municipality on a wide range of characteristics measured by diverse official sources.<sup>7</sup> This information allows us to account for observed sources of variation at the municipality level, thus to obtain a more precise estimation of our parameters of interest. Again, we can analyze municipality characteristics that seem to moderate the relationship between violence and child development.

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<sup>6</sup> An example of question for this section is "When someone is annoying you, you feel so angry that you hit him/her?" response options are (1) Yes. (2) Sometimes. (3) No. Using this information, we construct an index that is used as a proxy of social and emotional skills development.

<sup>7</sup> This dataset is compiled by the Economic Development Study Center (CEDE, by its acronym in Spanish) of Universidad de los Andes.

Table 1 contains descriptive statistics for our 5<sup>th</sup> and 9<sup>th</sup> grade student samples respectively. In these two samples are divided according to the level of exposure to violence, measured by the homicide rate (i.e. violent deaths per 10.000 habitants) at the municipality level: the least exposed sample is presented in the first column (regarding the municipalities below the 90<sup>th</sup> percentile of the distribution of homicide frequency) and the most exposed in the second column (regarding the municipalities above the 90<sup>th</sup> percentile of the distribution of homicide frequency). As shown, these preliminary results indicate that students belonging to the most violent municipalities are very different in other important ecological factors: student's average age, mother's level of education, and the size, rurality and remoteness of the municipality.

Thus, this simple descriptive analysis allows us to confirm our initial intuition: exposure to violence is not exogenous to children and families, and therefore it cannot be assumed as an exogenous shock. In other words, evidence suggests that there are potentially important self-selection processes of families across more and less victimized municipalities. Hence, to correctly identify the association between violence and social and emotional skills reports, we must include all these characteristics in our empirical model to statistically control for alternative explanations. If we ignored alternative factors that play a role in understanding the observed variability on skill development measures across municipalities, then our empirical estimates would be severely affected by omitted variable biases.

#### **4. Empirical Strategy**

As mentioned before, our main objective is to identify the association between exposure to violence on the development of social and emotional skills. In addition, we aim to evaluate the role of school characteristics to mitigate this hypothesized adverse effect of exposure. To do this, we start by describing a theoretical framework where the relationship between adverse childhood experiences (such as exposure to community violence) and skill development is explicitly represented. Following (Cunha & Heckman, 2007) and (Cunha, Heckman, & Schennach, 2010), our theoretical framework is based on a formal specification of a skill-generating function, such as:

$$\theta_{i,k,t+1} = f_k(\theta_{i,t}, I_{k,t}, \pi_t) \quad (1)$$

In this specification,  $\theta_{k,t+1}$  is the level skill  $k$  of child  $i$ , on period  $t + 1$ , and  $\theta_{i,t}$  is the complete vector of skills (cognitive and socio-emotional) of child  $i$  in period  $t$ . As shown in equation (1),  $\theta_{i,k,t+1}$  is a function of: her complete set of skills on period  $t$ <sup>8</sup>, her school characteristics on  $t$  ( $I_{k,t}$ ), and ecological stressors or shock  $\pi_t$ .

To empirically test the relationship between child development and exposure to community violence, and evaluate how schools have the potential to contribute to promote resilience toward ecological stressors, in the Colombian context, we estimate an analytic model that explores the association between the frequency of a set of crimes (aggregated at the municipality level), and standardized test scores of children used as skill measures. Particularly, we use the observed frequency of crimes as a proxy of children's exposure to environmental stressors –which shape the context of communities in Colombia. We include violent crimes related to the internal armed conflict to account for the consequences of the long-standing Colombian civil conflict. Likewise, we include in our analysis a set of variables that serve as approximate measures of school quality. Since students' development may be affected by both sources of variation –i.e. crime and school characteristics–, it is indispensable to consider school-level variables.

We estimate a linear regression model given by the following equation<sup>9</sup>:

$$Y_{i,s,m} = +\beta_0 + \beta_1 V_m + \beta_3 X_i + \beta_4 S_s + \beta_5 M_m + \varepsilon_{i,s,m} \quad (2)$$

Where  $Y_{i,s,m}$ , the dependent variable, represents the skill development measure of student  $i$ , studying at school  $s$ , located in municipality  $m$ . The dependent variable in this model is solely available for the year 2012. To create our social and emotional skill measures we used the individual responses to a set of questions where each student gave answers that displayed “favorable” skill development, during the same year. Specifically, we constructed measures of

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<sup>8</sup> We control by the skills on period  $t$  ( $\theta_t$ ) using the observed performance of the child on the cognitive test. This is important given the dynamic nature of skill development.

<sup>9</sup> This reduced form model is a linear representation of the skill-generating function presented before.

three socio-emotional skills: (i) “Empathy”, (ii) “Normative Beliefs about Aggression”, and (iii) “Avoidance Behavior”.

The “Empathy” measure is calculated using 5 questions that aim to show the students empathy, an example question is the following “How do you feel if someone that you dislike falls in to the ground and hurt him/herself?”. The “Normative Belief about Aggression” variable measures the student’s subjective beliefs about the justifications and reasons to use aggression in interpersonal situations. This measure is calculated with 6 questions that aim at identifying a child’s perspective toward the use of violence as a valid response to inter-personal problems. For example, one item is: “Is aggressiveness useful to get what you want?”. Finally, we define “Avoidance Behavior” as conducts where a student reacts in a manner as to avoid further problems when facing any provocation from peers. This measure is available only for fifth graders, and is constructed using 6 questions that pretend to capture how students tackle provocations by peers. An example of these items is: “When someone in the classroom is laughing at you, is it better to keep your head down and continue doing what you were doing?”

The variables are constructed by counting the number of “appropriate” answers to each set of items. Thus, the maximum value of a variable indicates that in all the questions the student gave an answer aligned with “mastery” on the particular skill (i.e. a score of 5 for empathy, 6 for normative beliefs about aggression and 6 for avoidance behavior). As a complementary exercise, we estimate the same model using as dependent variables two cognitive skills measures: the scores in the mathematics and language chapters of standardized test.<sup>10</sup>

In this empirical model specification,  $V_m$  is a measure of crime and violence at the municipality level. According to our hypothesis, this variable quantifies chronic exposure to this ecological stressors or adverse experiences. We use two measures. The first one is the total homicide rate (i.e. number of homicides per 10.000 habitants) at the municipality level on 2012, which we would expect is the most reliable signaling instrument regarding exposure to

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<sup>10</sup> It is important to note that not every student responded the same set of questions, therefore ICFES calculated a score for both Mathematics and Language using IRT (Item Response Theory). This score is comparable among students regardless the set of questions they responded. It is constructed estimating the response, a student would have answer in a question his exam did not include based on the questions he did responded. For each student, the reported scores take both positive and negative values. We perform a parametric transformation to shift the median of the distribution by adding a constant value to the score of all students, thus setting the minimum possible score to zero. Additionally, we divide each score by the sample’s standard deviation. Afterwards we multiply by 100 each score to ease the interpretation.

violence. However, due to the dynamics and history of the civil conflict in Colombia, there are municipalities where illicit armed groups have had a historically uncontested rule. This phenomenon results in a context where, even if homicide rates are relatively low, these environments are still violent, because of the diverse strategies illegal armed groups use violence to maintain their sovereignty (Arjona, 2016).

Thus, as an alternative way to identify violent environments, we created a *Violent Actions Index*. This measure is constructed combining the following variables: number of violent actions orchestrated by subversive armed groups, number of massacres, number of terrorist attacks and the number of kidnapping cases<sup>11</sup> (Ramírez, 2015; Vanegas, 2014). This index is calculated a Principal Component Analysis (PCA) methodology. We expect that through the *Violent Actions Index* we can capture average exposure to the violence generated illegal armed groups driving the internal civil conflict, which in some local contexts is not necessarily strongly correlated to violent deaths.

As mentioned before, to avoid potential biases in our estimates (resulting from omitting relevant explanatory variables), we include student, household, school and municipality characteristics that may be strongly correlated with skill development. Namely, our linear regression model includes a set of school characteristics (represented by vector  $S_s$  in equation 2) which includes: The *School Human Capital Index*, a measure constructed using the number of teachers in the school and their tenure level; the Teacher-Student Ratio, defined as the number of teachers per student; a dichotomous variable that indicates if the school is public or private; and a dichotomous variable that indicates if it is located on a rural area. Also, vector  $X_i$  contains the following characteristics at the student and household level: student's age and gender, and the student's mother education level. Finally,  $M_m$  is a vector that contains the following control variables at the municipality level: population, rurality index, average altitude, linear distance to the capital of the Department and to the Country's capital (Bogotá).

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<sup>11</sup> All these variables are total rates per 10.000 habitants at the municipality level, for the year 2012.



## 5. Results

### 5.1 Social and emotional skills

Given that our three measures of socio-emotional skill development are count variables that only take a small number of positive values, in our regression analysis we use a Poisson regression model, where one assumes the response variable  $Y_{i,s,m}$  has a Poisson distribution.<sup>12</sup> A Poisson regression model lets us use a count type variable as dependent variable and is estimated with a pseudo-likelihood procedure. Tables 2 and 3 present the parameter estimates of equation (2) to explore the association of our predictors of interest on the levels of socio-emotional skill measures reported by 5<sup>th</sup> and 9<sup>th</sup> graders. As mentioned before, our results are estimated using two different measures of exposure to violent context, both at the municipality level: Homicide Rate (Table 2) and the *Violent Actions Index* (Table 3).

The results presented in column 2 of Table 2 show that a statistically significant negative association between the homicide rate and empathy levels. Particularly, after controlling by student, household characteristics, school and municipality characteristics, our estimates indicate that a one standard deviation increase in the homicide rate is associated with an average decrease in our empathy measure of approximately 2% (for both 5<sup>th</sup> and 9<sup>th</sup> graders). Likewise, there is a negative and statistically significant relationship between the *Violent Actions Index* and empathy levels (column 2 of Table 3): an additional unit of the index is associated with a reduction of about 1% on empathy reports for 5<sup>th</sup> grade students – again, after controlling by student, household, school, and municipality characteristics.

Column 4 of both table 2 and 3 summarize the estimates of the Poisson regression models exploring the correlation between our “Normative Beliefs about Aggression” scores and exposure to violence. Our findings suggest that in violent environments, on average Colombian 5<sup>th</sup> and 9<sup>th</sup> graders tend to justify belligerence as a valid response to inter-personal issues. Specifically, we find that there is a statistically significant and positive relationship

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<sup>12</sup> There are several reasons why the classical linear model is inadequate for the analysis of how a variable depends on a set of – continuous or categorical- explanatory variables. (Gourieroux & Klassen, 2000) mention that at least four reasons. First, given that the response variable takes a small number of positive numbers, the assumption of Normally-distributed errors seems unjustified. Second, the estimated classical linear model will yield predictive values which the response variable cannot assume. Third, given the categorical nature of the response variable, in most cases a linear fit will not be appropriate.

between the homicide rate and the frequency of reports of subjective beliefs about the validity of violent behavior. The results of the model specification presented in column 4 of Table 2 indicate that a one standard deviation increase on the homicide rate is accompanied by a 2.5% and 2.3% increase in the frequency of reports of justification of violent behavior among 5<sup>th</sup> and 9<sup>th</sup> grades, respectively. Results from the model specification using the *Violent Actions Index* corroborate these results (table 3, column 4): the greater the values of this index, the higher the reports of justification of using violence (for students of both 5<sup>th</sup> and 9<sup>th</sup> grades).

Finally, the Poisson regression model estimates predicting the frequency of reports of “Avoidance Behavior” among 5<sup>th</sup> grade students are presented in column 6 of Table 2. Results indicate that the homicide rate is associated with less frequent student reports of non-confrontational responses to provocation by peers. These results suggest that in violent municipalities, children on average tend to react more to aggravation, leaving aside less confrontational strategies to mitigate additional potential threats.

### ***5.2 Cognitive skills***

As mentioned before, as a complementary exercise, we evaluate the association between exposure to violence and two measures of cognitive skills development: a parametric transformation of student scores on the Spanish Language and Mathematics sections of the standardized test SABER. In this case, we use an Ordinary Least Squares (OLS) regression model to estimate the parameters of equation (2). The set of independent variables is the same as in the models presented above.

Column 4 of tables 2 and 3 summarize the estimates of the model predicting Spanish Language scores for 5<sup>th</sup> and 9<sup>th</sup> graders. Focusing on Table 2, our results show that homicide rates are negatively associated with Spanish Language scores: a one-unit difference in the homicide rate in the year of the test is associated with a reduction of 0.012 and 0.01 standard deviations on Spanish Language scores for 5<sup>th</sup> and 9<sup>th</sup> graders, respectively. We also find that, after controlling by student, school and municipality characteristics, the *Violent Actions Index* is negatively associated with Spanish Language scores, though it is only statistically different from zero for 5<sup>th</sup> graders.

Columns 5 of tables 2 and 3 present OLS estimates of the model using Mathematics scores as our outcome variable. We observe a negative association between math scores and homicide rates (Table 2), and when we use the *Violent Actions Index* as exposure measure (Table 3). Specifically, results indicate that -after controlling for a broad set of student, household, school and municipality characteristics- 5<sup>th</sup> and 9<sup>th</sup> grade students living at a municipality with an additional standard deviation in the homicide rate have on average math scores that are 0.020 and 0.022 standard deviations lower, respectively. We observe similar results when using the *Violent Actions Index*: an increase of one unit of the index is associated with a reduction of 0.015 and 0.016 standard deviations on the math score 5<sup>th</sup> and 9<sup>th</sup> graders, respectively.

### ***5.3 Role of School Characteristics***

School characteristics have the potential to moderate the adverse effects associated with community violence. This virtuous effect can be explained by two mechanisms. First, schools may promote resilience by providing students with additional cognitive and emotional tools to repair the impact of negative shocks, such as exposure to violence. Secondly, schools can directly mitigate negative effects by shielding their students (Monteiro & Rocha, 2013). Given that we cannot identify a causal relationship between violence and skill development, we do not attempt to evaluate how school features could potentially lessen this negative impact. Namely, we focus on analyzing the heterogeneity in the association between exposure to violence and socio-emotional skill development measures, across different types of schools: rural and urban, public and private, with different teacher-student ratios, and with different human capital levels.

Tables 4 to 7 present alternative specifications of the original empirical model, each including an additional interaction effect term capturing the heterogeneous association between the homicide rate and the proposed skill measures. In each table, we present diverse model specifications, including different interaction terms between the homicide rate and a school level feature, to estimate the differential in the association between exposure and skill development for: urban schools (Table 4), public schools (Table 5), schools with different teacher-student ratios (Table 6) and schools with different human capital levels (Table 7).

Each column presents a model using a different dependent variable. The tables display the interaction effects coefficient, which quantifies the differential in the association levels.

The results of the models including interaction effects suggest that school features indeed have a moderation effect on the association between violence and social emotional skill development. For instance, results indicate that, only for 9<sup>th</sup> graders, at urban schools the negative association between exposure to violence and “Empathy” is exacerbated. When compared to the results for rural schools, the interaction coefficient is relatively large, negative and statistically significant (see Table 4). On the contrary, at urban settings the negative association of chronic exposure to violence and fifth graders’ report on “Avoidance Behavior” is weaker: the interaction coefficient (0.011) has the contrary sign and a similar magnitude as the coefficient associated with the homicide rate (-0.012). In addition, for both 5<sup>th</sup> and 9<sup>th</sup> graders the association between scores on the Mathematics and Language tests and violence is stronger at rural schools.

For public schools, we find a similar exacerbation effect on the negative association between “Normative Beliefs about Aggression” and exposure to violence: the interaction coefficient of the Public-School indicator variable and homicide rates is statistically significant and negative for both 5<sup>th</sup> and 9<sup>th</sup> graders. However, regarding “Empathy”, at public schools we observe a smaller but significant exacerbation effect only for fifth graders. An interesting result is that the relationship between chronic exposure and the scores on the two cognitive tests is almost completely neutralized for the children attending private schools. For instance, when using math scores (see column 5, Table 5), the interaction coefficient of the Private-School indicator variable and homicide rate (10.10 and 11.41 for 5<sup>th</sup> and 9<sup>th</sup> graders, respectively) has the opposite sign and a similar magnitude in absolute value, when compared to the coefficient of homicide rates (-11.19 and -12.81 for 5<sup>th</sup> and 9<sup>th</sup> graders, respectively).

Contrary to what we expected, results suggest that, at schools with higher Teacher-Student Ratios (TSR), the negative association between chronic exposure to violence and the measures of socioemotional skill development is not mitigated (given that interaction coefficients are not statistically different from zero). Yet, the results do suggest that a higher

TSR partially counterbalances the negative association between chronic exposure and scores on the cognitive tests (Table 6). Finally, it is important to highlight that, on average, schools with more teachers per student have higher measures of “Empathy”, and “Normative Beliefs about Aggression” and “Avoidance Behavior” are less frequent.

Similarly, to the differential results by the TSR, for 9<sup>th</sup> graders we find that the *School Human Capital Index* moderates the negative relationship between exposure to violence and the scores in Language and Mathematics tests (Table 7). However, we observe the following counter-intuitive result: schools with higher levels of human capital- i.e. with a broader and more educated teaching staff-, display a marginally stronger relationship between chronic exposure to violence and our measure of “Empathy”. Yet, even if this differential is statistically significant, the interaction coefficient is very small (and close to zero), specially when compared to the coefficient associated with the homicide rate.

## **6. Discussion**

Using a unique dataset with social and emotional skill measures for a nationally representative sample of Colombian 5<sup>th</sup> and 9<sup>th</sup> grade students, we explore how community violence affects child development. Both, in the long and short run, human development is contingent to ecological risk factors. Literature has established how, a person exposed to threats regularly, is less able to develop and express desirable social and emotional skills such as self-control, empathy and trust, among others. These negative impacts on the development processes can be explained through the “physiology of stress” and the adverse effects of toxic stress: for example, constant triggering of our stress response system has not only consequences on a person’s behavior, but also on the brain architecture and gene expression process. In the very long run, this adverse effect of violence can potentially create a cycle of violence.

Our results show that, in Colombia and for this particular sample of children, the expression of socio-emotional skills is associated to chronic exposure to violence. Namely, we find that at municipalities with higher rates of violence 5<sup>th</sup> and 9<sup>th</sup> grade students report having less empathy, justify the use of violence more frequently, and similarly do not react

peacefully before provocations by their peers. Regarding the expression of cognitive skills, we find similar results on cognitive measures: after controlling by a broad set of student, household, school and municipality level characteristics, we observe that students from historically violent municipalities score less on Spanish language and mathematic standardized tests.

In addition, in this study we evaluate how school characteristics moderate the adverse effects associated with community violence. In particular, we analyze the heterogeneity in the association between violence and skill development measures at rural schools, public schools, schools with a greater proportion of teachers per student, and with different human capital levels (i.e. schools with a broader and more educated teaching staff). Our results suggest that school features are important moderator variables: the association between exposure to violence and empathy is stronger at rural and public schools; the association of exposure and reports favoring normative beliefs about aggression is stronger at public schools; and the association between exposure and reports on avoidance behaviors is stronger at rural schools. Finally, we find that the negative relationship between chronic exposure to violence and cognitive skill development measures is partially counterbalanced by higher Teacher-Student Ratios (TSR) and higher levels of human capital.

There are, however, at least two limitations to our results and thus, should be careful when interpreting them. The first methodological limitation is that our measures of exposure to violence carry an important load of measurement error. When we use a municipality-level measure, we assume that every person at a municipality is subject to the same (average) level exposure. This means that all the variability within a municipality is ignored and assumed to be trivial. Thus, our model underestimates exposure for the people exposed the most, and overestimates the exposure for the less exposed. Yet, even when using municipality-level measures, our results offer valuable initial evidence on the relationship between skill development and exposure to a violent context. To advance in answering this question, our short-term research agenda is to construct better measures of exposure to crime and violence.

The second limitation is that we do not identify a causal relationship between violence and skill development, neither attempt to evaluate how much could school features lessen

this negative impact. Still, from this analysis of the association between children's reports of social, emotional and cognitive skills and the levels of municipal violence we can derive an urgent public policy recommendation: there is a dire need to develop a public policy agenda that focuses on mitigating the effects of exposure to chronic violence and the resulting toxic stress to promote child and youth development outcomes at the most vulnerable contexts of Colombia.

The construction of this agenda should start by identifying local programs and strategies that have proven to be effective and scalable, and then revising international experiences that could potentially be adapted to improve what is being done in Colombia. For instance, the findings of Verbitsky-Savitz et al. (2016) and Hargreaves et al. (2016) provide important lessons for the design and implementation of programs that aim at building community capacity to promote resilience by measuring, preventing and mitigating the effects of adverse childhood experiences.

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## 8. Tables and Figures

**Table 1.** Descriptive statistics of the 5<sup>th</sup> and 9<sup>th</sup> grade student samples, by the level of exposure to violence

Variables	Fifth Grade Students			Ninth Grade Students		
	Sample <sup>a</sup>		Mean Difference	Sample <sup>a</sup>		Mean Difference
	90% Least exposed	10% Most exposed		90% Least exposed	10% Most exposed	
Observations	605,422	73,243		461,076	54,495	
<b>I. Student Level:</b>						
Student age	10.91	11.05	-0.141***	14.91	15.01	-0.100***
Female (=1)	0.51	0.50	0.0029	0.47	0.47	0.0016
Mothers education (years)	3.73	3.70	0.035***	3.63	3.61	0.020**
<b>II. School Level</b>						
Urban School (=1)	0.750	0.748	0.0017	0.832	0.835	-0.0032
Public School (=1)	0.793	0.710	0.083***	0.778	0.684	0.0938***
<b>III. Municipality Level:</b>						
Total population	1,665,323	938,755	726,568***	1,904,521	1,097,285	807,236***
Rurality Index <sup>b</sup>	0.22	0.24	-0.0143***	0.19	0.19	-0.0028**
Average Land Altitude (mts)	1223.66	891.14	332.5***	1307.87	926.77	381.1***
Linear distance to Department Capital (km)	39.93	52.62	-12.7***	33.54	43.43	-9.89
Linear distance to Bogotá (km)	313.63	306.17	7.5***	295.74	293.70	2.05*

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Notes: (a) Samples are divided according to the level of exposure to violence, measured by the homicide rate (i.e. violent deaths per 10.000 habitants) at the municipality level: the least exposed sample is defined by the municipalities below the 90th percentile of the distribution of homicide frequency and the most exposed is defined by the municipalities above the 90th percentile of the distribution of homicide frequency. (b) The Rurality Index measures the proportion of population residing at rural zones of the municipality.

**Table 2.** Regression model estimates: Association between Homicide Rate and skill development measures, for 5<sup>th</sup> and 9<sup>th</sup> graders

Variables <sup>a</sup>	Dependent Variable									
	Empathy <sup>c</sup>		Normative Beliefs about Aggression <sup>d</sup>		Avoidance Behavior <sup>e</sup>		Spanish Language		Mathematics	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<b>Fifth Grade Students</b>										
Homicide Rate <sup>b</sup>	-0.0100*** (0.00168)	-0.0198*** (0.00241)	0.0147*** (0.00288)	0.0254*** (0.00421)	-0.00720*** (0.00175)	-0.00738*** (0.00251)	-1.627*** (0.233)	-1.205*** (0.328)	-2.442*** (0.235)	-1.938*** (0.332)
Constant	1.942*** (0.0184)	1.967*** (0.0241)	-2.265*** (0.0354)	-2.400*** (0.0464)	0.538*** (0.0193)	0.584*** (0.0253)	649.1*** (2.665)	683.3*** (3.394)	669.3*** (2.697)	698.1*** (3.452)
Control Variables	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	278,354	174,745	271,354	170,267	261,530	164,166	319,876	201,216	318,845	200,018
<b>Ninth Grade Students</b>										
Homicide Rate <sup>b</sup>	-0.0176*** (0.00247)	-0.0212*** (0.00333)	0.0185*** (0.00295)	0.0229*** (0.00412)	n.a.	n.a.	-0.499* (0.279)	-1.026*** (0.376)	-1.340*** (0.277)	-2.248*** (0.37)
Constant	0.592*** (0.0338)	0.700*** (0.0427)	-0.333*** (0.0409)	-0.341*** (0.0517)	n.a.	n.a.	712.5*** (3.797)	735.0*** (4.68)	659.1*** (3.753)	697.6*** (4.606)
Control Variables	No	Yes	No	Yes	n.a.	n.a.	No	Yes	No	Yes
Observations	233,691	153,157	229,514	150,535	n.a.	n.a.	245,291	161,789	244,377	160,969

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Notes: (a) Controls for age and gender of the student, mother education; municipality total population, rurality index, municipality altitude, distance to the capital of the Department and to Bogotá, and Department fixed effects. (b) Homicide Rate defined as the number of violent deaths per 10.000 habitants (on standard deviation units) during 2012. (c) The “Empathy” measure is calculated using 5 questions that aim to show the students empathy. (d) The “Normative Beliefs about Aggression” measure is calculated with 6 questions that aim at identifying a child’s perspective toward the use of violence as a valid response to problems. (e) We define “Avoidance Behavior” as conducts where a student reacts in a manner as to avoid further problems when facing any provocation from peers.

**Table 3.** Regression model estimates: Association between *Violent Actions Index* and skill development measures, for 5<sup>th</sup> and 9<sup>th</sup> graders

Variables <sup>a</sup>	Dependent Variable									
	Empathy <sup>c</sup>		Normative Beliefs about Aggression <sup>d</sup>		Avoidance Behavior <sup>e</sup>		Spanish Language		Mathematics	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<b>Fifth Grade Students</b>										
Violent Actions Index <sup>b</sup>	-0.00584** (0.00255)	-0.0110*** (0.00330)	0.0221*** (0.00454)	0.0280*** (0.00574)	-0.0107*** (0.00273)	-0.00833** (0.00351)	-1.459*** (0.366)	-1.945*** (0.454)	-0.991*** (0.37)	-1.513*** (0.461)
Constant	1.928*** (0.0183)	1.940*** (0.0239)	-2.239*** (0.0352)	-2.360*** (0.0460)	0.526*** (0.0191)	0.573*** (0.0251)	646.6*** (2.646)	681.4*** (3.366)	665.7*** (2.678)	695.3*** (3.425)
Control Variables	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	278,354	174,745	271,354	170,267	261,530	164,166	319,876	201,216	318,845	200,018
<b>Ninth Grade Students</b>										
Violent Actions Index <sup>b</sup>	-0.00417 (0.00441)	-0.00804 (0.00540)	0.0170*** (0.00586)	0.0178** (0.00725)	n.a.	n.a.	-0.639 (0.538)	-0.669 (0.644)	-0.897* (0.533)	-1.631** (0.635)
Constant	0.566*** (0.0336)	0.671*** (0.0425)	-0.302*** (0.0406)	-0.305*** (0.0514)	n.a.	n.a.	711.6*** (3.772)	733.5*** (4.649)	656.9*** (3.729)	694.2*** (4.58)
Control Variables	No	Yes	No	Yes	n.a.	n.a.	No	Yes	No	Yes
Observations	233,691	153,157	229,514	150,535	n.a.	n.a.	245,291	161,789	244,377	160,969

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Notes: (a) Controls for age and gender of the student, mother education; municipality total population, rurality index, municipality altitude, distance to the capital of the Department and to Bogotá, and Department fixed effects. (b) The *Violent Actions Index* is constructed using a PCA methodology, combining the following variables: number of violent actions orchestrated by subversive armed groups, number of massacres, number of terrorist attacks and the number of kidnap cases. (c) The “Empathy” measure is calculated using 5 questions that aim to show the students empathy. (d) The “Normative Beliefs about Aggression” measure is calculated with 6 questions that aim at identifying a child’s perspective toward the use of violence as a valid response to problems. (e) We define “Avoidance Behavior” as conducts where a student reacts in a manner as to avoid further problems when facing any provocation from peers.

**Table 4.** Urban Schools: Moderation effects on the association between Homicide Rate and skill development measures, for 5<sup>th</sup> and 9<sup>th</sup> graders

Variables	Empathy	Normative Beliefs about Aggression	Avoidance Behavior	Language	Mathematics
	(1)	(2)	(3)	(4)	(5)
<b>Fifth Grade Students</b>					
Homicide Rate <sup>b</sup>	-0.0222*** (0.00302)	0.0256*** (0.00513)	-0.0124*** (0.00314)	-0.431 (0.41)	-1.103*** (0.416)
Urban School (=1)	-0.0129* (0.00662)	-0.000232 (0.0124)	-0.0379*** (0.00694)	1.878** (0.929)	-0.468 (0.945)
Urban School (=1) x Homicide Rate	0.00507 (0.0039)	-0.000331 (0.007)	0.0111*** (0.00408)	-1.682*** (0.537)	-1.820*** (0.545)
Constant	1.970*** (0.0242)	-2.400*** (0.0465)	0.590*** (0.0254)	682.4*** (3.407)	697.1*** (3.465)
Control variables <sup>a</sup>	Yes	Yes	Yes	Yes	Yes
Observations	174,745	170,267	164,166	201,216	200,018
<b>Ninth Grade Students</b>					
Homicide Rate <sup>b</sup>	-0.00961** (0.00449)	0.0199*** (0.00583)	n.a. n.a.	-0.0235 (0.527)	-1.598*** (0.522)
Urban School (=1)	-0.0793*** (0.00913)	0.0788*** (0.0121)	n.a. n.a.	4.091*** (1.068)	-1.319 (1.050)
Urban School (=1) x Homicide Rate	-0.0203*** (0.00537)	0.00498 (0.00686)	n.a. n.a.	-1.671*** (0.617)	-1.075* (0.608)
Constant	0.686*** (0.0429)	-0.337*** (0.052)	n.a. n.a.	733.9*** (4.699)	696.8*** (4.627)
Control variables <sup>a</sup>	Yes	Yes	n.a.	Yes	Yes
Observations	153,157	150,535	n.a.	161,789	160,969

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Notes: (a) Controls for age and gender of the student, mother education; municipality total population, rurality index, municipality altitude, distance to the capital of the Department and to Bogotá, and Department fixed effects. (b) Homicide Rate defined as the number of violent deaths per 10.000 habitants (on standard deviation units) during 2012. (c) The “Empathy” measure is calculated using 5 questions that aim to show the students empathy. (d) The “Normative Beliefs about Aggression” measure is calculated with 6 questions that aim at identifying a child’s perspective toward the use of violence as a valid response to problems. (e) We define “Avoidance Behavior” as conducts where a student reacts in a manner as to avoid further problems when facing any provocation from peers.

**Table 5.** Public Schools: Moderation effects on the association between Homicide Rate and skill development measures, for 5<sup>th</sup> and 9<sup>th</sup> graders

Variables	Empathy	Normative Beliefs about Aggression	Avoidance Behavior	Language	Mathematics
	(1)	(2)	(3)	(4)	(5)
<b>Fifth Grade Students</b>					
Homicide Rate <sup>b</sup>	-0.00659 (0.00483)	0.0484*** (0.00891)	-0.00837* (0.005)	-11.36*** (0.689)	-11.19*** (0.695)
Public School (=1)	-0.0372*** (0.00596)	0.183*** (0.0119)	-0.0954*** (0.0061)	-80.47*** (0.87)	-73.10*** (0.881)
Public School (=1) x Homicide Rate	-0.0144*** (0.0046)	-0.0251*** (0.0087)	0.00108 (0.00476)	11.05*** (0.66)	10.10*** (0.667)
Constant	1.954*** (0.0245)	-2.423*** (0.047)	0.585*** (0.0256)	693.6*** (3.446)	707.5*** (3.504)
Control variables <sup>a</sup>	Yes	Yes	Yes	Yes	Yes
Observations	174,745	170,267	164,166	201,216	200,018
<b>Ninth Grade Students</b>					
Homicide Rate <sup>b</sup>	-0.0284*** (0.00713)	0.0521*** (0.0075)	n.a.	-11.92*** (0.737)	-12.81*** (0.725)
Public School (=1)	-0.0524*** (0.00943)	0.0457*** (0.01)	n.a.	-66.76*** (0.96)	-81.37*** (0.945)
Public School (=1) x Homicide Rate	0.00764 (0.00668)	-0.0325*** (0.00707)	n.a.	11.75*** (0.684)	11.41*** (0.674)
Constant	0.708*** (0.0433)	-0.373*** (0.0522)	n.a.	747.6*** (4.732)	709.6*** (4.656)
Control variables <sup>a</sup>	Yes	Yes	n.a.	Yes	Yes
Observations	153,157	150,535	n.a.	161,789	160,969

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Notes: (a) Controls for age and gender of the student, mother education; municipality total population, rurality index, municipality altitude, distance to the capital of the Department and to Bogotá, and Department fixed effects. (b) Homicide Rate defined as the number of violent deaths per 10.000 habitants (on standard deviation units) during 2012. (c) The “Empathy” measure is calculated using 5 questions that aim to show the students empathy. (d) The “Normative Beliefs about Aggression” measure is calculated with 6 questions that aim at identifying a child’s perspective toward the use of violence as a valid response to problems. (e) We define “Avoidance Behavior” as conducts where a student reacts in a manner as to avoid further problems when facing any provocation from peers.

**Table 6.** Teacher-Student Ratio: Moderation effects on the association between Homicide Rate and skill development measures, for 5<sup>th</sup> and 9<sup>th</sup> graders

Variables	Empathy	Normative Beliefs about Aggression	Avoidance Behavior	Language	Mathematics
	(1)	(2)	(3)	(4)	(5)
<b>Fifth Grade Students</b>					
Homicide Rate <sup>b</sup>	-0.0198*** (0.00253)	0.0276*** (0.00447)	-0.00656** (0.00265)	-1.704*** (0.345)	-2.409*** (0.35)
Teacher-Student Ratio (TSR)	0.00494*** (0.00147)	-0.0115*** (0.00315)	-0.00370** (0.00163)	-0.00789 (0.22)	-0.323 (0.22)
TSR x Homicide Rate	-0.00002 (0.00087)	-0.00267 (0.00186)	-0.00096 (0.00098)	0.600*** (0.129)	0.544*** (0.125)
Constant	1.967*** (0.0241)	-2.404*** (0.0464)	0.583*** (0.0253)	684.2*** (3.399)	699.0*** (3.457)
Control variables <sup>a</sup>	Yes	Yes	Yes	Yes	Yes
Observations	174,745	170,267	164,166	201,216	200,018
<b>Ninth Grade Students</b>					
Homicide Rate <sup>b</sup>	-0.0234*** (0.0036)	0.0261*** (0.00467)	n.a. n.a.	-1.730*** (0.435)	-3.025*** (0.416)
Teacher-Student Ratio (TSR)	0.0325*** (0.00473)	-0.0199** (0.00998)	n.a. n.a.	-8.454*** (0.882)	-5.958*** (0.78)
TSR x Homicide Rate	0.00593 (0.00367)	-0.00984 (0.00701)	n.a. n.a.	2.229*** (0.696)	2.382*** (0.585)
Constant	0.703*** (0.0428)	-0.346*** (0.0518)	n.a. n.a.	736.1*** (4.691)	698.8*** (4.615)
Control variables <sup>a</sup>	Yes	Yes	Yes	Yes	Yes
Observations	153,157	150,535	n.a.	161,789	160,969

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Notes: (a) Controls for age and gender of the student, mother education; municipality total population, rurality index, municipality altitude, distance to the capital of the Department and to Bogotá, and Department fixed effects. (b) Homicide Rate defined as the number of violent deaths per 10.000 habitants (on standard deviation units) during 2012. (c) The “Empathy” measure is calculated using 5 questions that aim to show the students empathy. (d) The “Normative Beliefs about Aggression” measure is calculated with 6 questions that aim at identifying a child’s perspective toward the use of violence as a valid response to problems. (e) We define “Avoidance Behavior” as conducts where a student reacts in a manner as to avoid further problems when facing any provocation from peers.

**Table 7.** *School Human Capital Index: Moderation effects on the association between Homicide Rate and skill development measures, for 5<sup>th</sup> and 9<sup>th</sup> graders*

Variables	Empathy	Normative Beliefs about Aggression	Avoidance Behavior	Language	Mathematics
	(1)	(2)	(3)	(4)	(5)
<b>Fifth Grade Students</b>					
Homicide Rate <sup>b</sup>	-0.0153*** (0.0028)	0.0260*** (0.00486)	-0.00699** (0.0029)	-1.103*** (0.383)	-1.695*** (0.388)
School Human Capital Index (SHCI)	0.0002*** (0.000032)	-0.00027*** (0.00007)	0.00018*** (0.00003)	0.0857*** (0.0045)	0.0965*** (0.0046)
SHCI x Homicide Rate	-0.00008*** (0.00003)	-0.00001 (0.00005)	-0.00001 (0.00003)	-0.00177 (0.00348)	-0.00429 (0.00354)
Constant	1.961*** (0.0242)	-2.401*** (0.0465)	0.584*** (0.0254)	683.2*** (3.403)	697.8*** (3.461)
Control variables <sup>a</sup>	Yes	Yes	Yes	Yes	Yes
Observations	174,745	170,267	164,166	201,216	200,018
<b>Ninth Grade Students</b>					
Homicide Rate <sup>b</sup>	-0.0126*** (0.00413)	0.0235*** (0.00497)	n.a. n.a.	-1.909*** (0.46)	-2.814*** (0.453)
School Human Capital Index (SHCI)	0.00013*** (0.00005)	-0.0003*** (0.00005)	n.a. n.a.	0.0933*** (0.00485)	0.117*** (0.00479)
SHCI x Homicide Rate	-0.00011*** (0.00003)	-0.00001 (0.00004)	n.a. n.a.	0.0117*** (0.0035)	0.00743** (0.00344)
Constant	0.687*** (0.0429)	-0.342*** (0.0519)	n.a. n.a.	736.3*** (4.696)	698.4*** (4.621)
Control variables <sup>a</sup>	Yes	Yes	n.a.	Yes	Yes
Observations	153,157	150,535	n.a.	161,789	160,969

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Notes: (a) Controls for age and gender of the student, mother education; municipality total population, rurality index, municipality altitude, distance to the capital of the Department and to Bogotá, and Department fixed effects. (b) Homicide Rate defined as the number of violent deaths per 10.000 habitants (on standard deviation units) during 2012. (c) The “Empathy” measure is calculated using 5 questions that aim to show the students empathy. (d) The “Normative Beliefs about Aggression” measure is calculated with 6 questions that aim at identifying a child’s perspective toward the use of violence as a valid response to problems. (e) We define “Avoidance Behavior” as conducts where a student reacts in a manner as to avoid further problems when facing any provocation from peers.



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