

**Are homicide and drug trafficking linked to peer physical victimization in  
Costa Rican schools?**

Gregorio Gimenez,<sup>1</sup> Liuvob Tkacheva<sup>2</sup> and Beatriz Barrado<sup>1</sup>

<sup>1</sup> Faculty of Economics and Business Administration, University of Zaragoza

<sup>2</sup> Faculty of Psychology, Saint-Petersburg State University

**Acknowledgements**

This work was supported by the *Ministerio de Ciencia, Innovación y Universidades del Gobierno de España* [research project number EDU2016-76414-R] and the *Gobierno de Aragón* [research project number S44\_20R: SEIM]. They provided the funds to finance the article review process and proofreading. We wish to express our gratitude to the members of the *Estado de la Educación* program, in Costa Rica, for their valuable ideas and technical support. We also thank two anonymous reviewers and Dr. Miguel Villodas, senior consulting editor, whose suggestions helped to improve and clarify this manuscript.

**© 2020, American Psychological Association. This paper is not the copy of record and may not exactly replicate the final, authoritative version of the article. Please do not copy or cite without authors' permission. The final article will be available, upon publication, via its DOI: 10.1037/vio0000358**

**Are homicide and drug trafficking linked to peer physical victimization in Costa Rican schools?**

**Abstract**

**Objective:** This study investigates the connection between crime rates and victimization by peer physical aggression in Costa Rican schools. Although previous research has demonstrated that peer victimization is related to community crime, no study to date has examined its association with homicides and drug trafficking, two criminal offenses that are key in Latin America. **Method:** We combined information on crime rates and socioeconomic characteristics at the district level with the data on peer physical victimization, school climate and characteristics of student-teacher relationships, retrieved from the Programme for International Student Assessment (PISA) questionnaire. In total, 6,866 adolescents were surveyed, with an average age of 15 years, attending 205 schools, located in 154 districts. In the estimated probit model, the introduction of a variable representing districts' social development and of fixed effects, at school and district levels, helped us to deal with unobserved heterogeneity. **Results:** We found that attending schools situated in districts with higher homicide rates and cocaine confiscations increase the probability of suffering victimization by peer physical aggression at school, while attending schools with high economic, social and cultural status, that offer sports activities for students and which were situated in the districts with a high level of social development, decrease the possibility of peer physical victimization. **Conclusions:** These results suggest that interventions beyond school level are needed to ensure the safety of students inside of schools and thus effective preventive programs should address crime at the neighborhood level.

*Keywords:* crime rates; victimization; drug trafficking; homicide; adolescents

**Are homicide and drug trafficking linked to peer physical victimization in Costa Rican schools?**

Peer victimization is a huge social problem with wide prevalence all around the world (Lansford et al., 2012). Suffering peer physical victimization in adolescence can lead to dramatic prolonged consequences for the health and psychological wellbeing of the victims extending throughout their life span (Fang, Brown, Florence, & Mercy, 2012). Additionally, it puts them at increased risk for a number of adverse behavioral outcomes (Graham, Bellmore, & Mize, 2006) and immediate and long-term physical health problems (Hager & Leadbeater, 2016). Victims of peer victimization tend to experience depression, social exclusion, low self-esteem (Crick, Ostrov, & Werner, 2006) and perform at poorer academic levels (Rigby, 2000). Victimization increases the risk for later impairment, mental instability and criminal involvement (Turanovic, & Pratt, 2015). Knowing what factors play crucial roles in the manifestation and maintaining of peer victimization is necessary for timely intervention and providing effective prevention programs.

There are several risk factors for peer victimization in the context of community crime. Among them are: adverse neighborhoods and school insecurity (Hidalgo-Rasmussen & Hidalgo-San Martín, 2015); violent localities and belonging to a gang (Jarillo, Magaloni, Franco, & Robles, 2016); social environments with high rates of assaults and drug abuse (Cabezas Pizarro & Monge Rodriguez, 2014); exposure to community violence (Schwartz & Proctor, 2000); poverty and income inequality (Elgar et al., 2012). Peer victimization at school is a distinct form of peer behavior that is explicitly associated with concurrent social-psychological adjustment of adolescents (Crick & Dodge, 1994) and is generally believed to be based on social learning mechanisms (Bandura & Walters, 1977). Adolescents, through observation and modelling in the community, learn and internalize social norms, expectations and the roles which society represents them (Sampson, 1997).

The current study aims to investigate if there is a connection between crime rates at district level, measured as homicide rates and cocaine confiscations, and risk factors for peer physical victimization in schools. An important novelty is the combination of geolocalized data from PISA-Costa Rica 2015 and highly disaggregated information on crime at the district level. Following ecological framework (Bronfenbrenner, 1994), we took into consideration different levels of macro and micro system, such as individual, social, educational and economic contexts. According to this framework, we identified a set of additional factors that, together with crime rates, may play crucial role in occurrences of peer physical victimization. Specifically, socio-economic development of the schools and districts, gender, lack of respect from teachers to students, disciplinary climate in the classroom, and extracurricular sport activities provided by schools.

### **Victimization by Peer Physical Aggression**

Peer victimization is the experience of any act of aggression inflicted by similar-age peers (Graham et al., 2006). Physical victimization involves behavior that aims to cause physical pain like shoving, pushing, hitting, punching, or kicking; and also includes name-calling (Hong & Espelage, 2012). This form of victimization is widespread among urban youth (Swahn, Simon, Arias, & Bossarte, 2008) and often results in depression, loneliness, and externalizing problems (Crick et al., 2006). The victimization process can be triggered by both previous victimization experiences (Finkelhor, 2008) and a hostile high-risk environment (Cabezas Pizarro & Monge Rodríguez, 2014). For some adolescents, victimization is a short and transitory experience, while for others it is a recurring one (Cillessen & Lansu, 2015). Youths who suffered victimization are at high risk to be victimized again (Solberg & Olweus, 2003).

### **Community Crimes and Peer Victimization**

The general tendency is that adolescents who live in cities are more prone to crime exposure than ones who live in nonurban environments (Schwartz & Proctor, 2000). Violence-related problems such as exposure to organized crime and drug-trafficking are more prevalent in poor areas (Jarillo et al., 2016). People living in violent environments face multiple stressors that contribute to their behavior. This implies a great social risk, which is revealed in mechanisms of social learning (Bandura & Walters, 1977). Exposure to crime has a significant impact on students' behavior at school increasing conduct problems and symptoms of anxiety (Chaux, Arboleda, & Rincón, 2012). Parental control mitigates the effects of community violence on peer victimization (Low & Espelage, 2014). Thus, living in proximity to crime areas and low parental control contribute to high risks for victimization. We must highlight that this empirical research could not escape a central methodological difficulty: unobserved heterogeneity. "Communities more likely to be exposed to homicides and other types of violence differ from nonviolent neighborhoods on factors that may also affect educational outcomes" Caudillo & Torche, (2014, pp. 89-90)

### **Social Development of the Districts, Extracurricular Activities and Peer Victimization**

A growing body of theory and evidence has implicated the role of adverse neighborhoods and poor socio-economic conditions in peer victimization (Engström, 2018; Sampson, 2011), considering that districts with high levels of chaos and insecurity usually present higher rates of crime (Sampson, 1997). These conditions increase criminal behaviors and influence the development of self-control, affecting individual risks for victimization (Holt, Turner, & Exum, 2014). Low social support aggravates the problem of peer victimization at school (Rigby, 2000). The youth whose leisure time is unstructured and unsupervised are at higher risk for victimization (Lee, Lewis, Kataoka, Schenke, & Vandell, 2018). The connection between extracurricular sport activities and peer victimization has been investigated in many studies. The results seemed somewhat contradictory and depended

mostly on specific conditions such as the number of sports activities, whether they were provided on a school basis or on a multi-school basis, and security measures (Peguero, 2008). Thus, the positive effect of extracurricular activities on reducing peer victimization depends mostly on micro-level contextual factors such as social contexts of districts, type of school, and rigidity of social control (Guest & McRee, 2008).

### **School Climate and Peer Victimization**

Adolescents spend a lot of time at school, and school climate affects their emotional and social development and is an important factor in maintaining social trust between young people and adults (Morrill & Musheno, 2018). School climate is closely related to peer victimization (Hong & Espelage, 2012; Wang, Berry & Swearer, 2013), which generally occurs in schools where the level of supervision is low (Rigby, 2000) and where students have negative relationships with teachers (Longobardi, Iotti, Jungert, & Settanni, 2018; Wang, Swearer, Lembeck, Collins, & Berry, 2015). The higher the rates of student-student and teacher-student conflict at school, the greater the probability of oppositional, attentional, and conduct problems (Bauman & Del Rio, 2006). Students who experience positive attitudes towards classmates and teachers have less risks to be victimized (Kasen, Berenson, Cohen, & Johnson, 2004). Thus, respectfulness and social trust are protective factors against peer victimization, as well as strict requirements to school discipline (Cornell, Shukl, & Konold, 2015).

### **The Case of Costa Rica**

The present analysis was carried out in Costa Rica, a country located in Central America, a region where violence is a serious issue. Although its levels of violence are far from those of other Central American countries, such as Honduras, Guatemala or El Salvador, in recent years, Costa Rica has experienced an alarming increase in its crime rates.

According to *Unidad de Información y Estadística Nacional sobre Drogas* (2018), the amount of cocaine confiscated went from 9,959 kilos in 2010 to 27,838 kilos in 2017.

Simultaneously, the country has experienced a huge increase in violent crimes. The rate of intentional homicides in Costa Rica in 2017 (11.9 per 100 000 inhabitants) doubled both the world average and the rate presented by the country a decade earlier (United Nations Office on Drugs and Crime, 2018). The group of youths aged between 15 and 29 years has one of the highest rates of intentional homicides (20.3 victims per 100,000 inhabitants). Almost one third of these deaths was related to drug trafficking (*Comisión Técnica Interinstitucional sobre Estadísticas de Convivencia y Seguridad Ciudadana*, 2017). Costa Rica is one of the countries in Central America providing the most accurate statistics, both with regard to the variety of the collected information and to the methodological quality of its elaboration. This makes Costa Rica a highly suitable case for analysis.

### **The Current Study**

Although previous research has found that peer victimization is related to community crime, as far as we know, no study to date has specifically examined its association with homicides and drug trafficking. We suppose that higher crime rates are linked to victimization, especially to peer physical victimization, which is widely prevalent (Swahn et al., 2008). Following ecological framework (Bronfenbrenner, 1994) and focusing on individual, educational, social and economic levels, we formulated the following hypotheses.

*H.1:* Our main hypothesis is that students attending schools situated in districts with higher crime rates (measured as homicide rates and cocaine confiscations) will have higher possibilities of being victims of peer physical aggression inside school.

*H.2:* Additional hypotheses are that peer physical victimization inside school will be a) positively related to being male, lack of respect from teachers to students, and poor disciplinary climate in the classrooms; and b) negatively related to teacher support in the

classroom, extracurricular sport activities provided by school, and high social development in the districts where the school is situated

## Method

### Participants and Procedure

Our research relied on the 2015 questionnaire from PISA. This international program, created by the Organisation for Economic Co-operation and Development (OECD), tests the skills and knowledge of 15-year-old students in reading, mathematics and science. Seventy-two countries took part in the 2015 assessment. In Costa Rica, participants included 6,866 students (3,494 girls and 3,372 boys) from 205 schools distributed in 154 districts. As such, the data presented a nested structure with three levels. The sample was representative of the target population: 15-year-old students throughout all the country attending educational institutions in grades 7 and higher. OECD (2017a, ch. 4) explains the sampling principles applied in PISA to ensure representation of the full target population.

In addition to the cognitive test, students answered a background questionnaire. The questionnaire sought information about the students, their homes, their school and learning experiences. School principals completed another questionnaire, which covered the school system and the learning environment. These questionnaires contained key information concerning victimization by peer aggression, and its student-and-school-level predictors, that we used in our study. In a further step, we matched the PISA dataset with highly disaggregated information on crime rates and socioeconomic characteristics of the districts where the schools were situated, kindly provided by the *Ministerio de Educación* and *Programa Estado de la Educación*. To do so, we obtained the geolocation of the schools participating in PISA. As we had the information of the location of every school, of crime rates and socioeconomic characteristics in every district, no observations were lost in the matching process of the PISA and crime datasets.



This multidimensional dataset allows us to benefit from a methodological approach that helps to deal with unobserved heterogeneity, using fixed effects. To the best of our knowledge, no effort to combine criminal geolocalized data and the PISA survey has previously been made to understand the impact of crime rates on peer physical victimization. Additionally, we employed two measures of crime rates: homicide rate and confiscations of cocaine. The latter is unusual in the literature in the field.

It is our understanding that our research was conducted in accordance with ethics requirements of our universities and is exempt from research ethics committee oversight. The reason is that PISA dataset is a source of public access in which subjects cannot be identified or exposed to risks, liabilities or reputational damage. In addition, crime data came from official public sources and was handled in all our research in an aggregated manner, as districts' averages. Overall, in the dataset we have managed in the study, human subjects could not be identified in anyway.

## **Measures**

### ***Reliability***

Specific standards (such as national review, cognitive labs, centralized transfer of trend material, and monitoring and recording of procedures) underlie the PISA questionnaire and the implementation of the material into the final instruments (OECD, 2017a, p. 62). The questions were developed specifically for PISA by a Questionnaire Expert Group (QEG). Kuger, Klieme, Jude, & Kaplan (2016) have provided detailed information about analytical framework, design and psychometric properties of the questionnaires.

The dataset includes composite indicators and single-item measures (SIM) than can be used to measure specific issues. In our empirical work, schools' socio-economic status was measured through a composite score; and victimization by peer physical aggression, disciplinary climate, teacher support, and lack of respect from teachers to students were

measured using SIM. To ensure the psychometric properties of the variables, the PISA work team performed analyses separately for each country to evaluate the validity of these single items; irregular cases, such as outliers as well as cases with obvious scoring rule deviations, were identified and treated (OECD, 2017a, p.134).

Despite these statistical checks, the use of SIM from PISA can constitute a limitation in our research. SIM variables may be more vulnerable to random measurement errors and their internal consistency reliability statistic cannot be computed. However, SIM also have psychometric advantages and, if the meaning of the construct is sufficiently narrow and clear to the respondent, they can be as effective as multiple-item scales in self-report questionnaires (Hoepfner, Kelly, Urbanoski, & Slaymaker, 2011; Postmes, Haslam, & Jans, 2012). SIM eliminate item redundancy and therefore reduce the fatigue and boredom associated with answering highly similar questions repeatedly. Asking more or less the same question many times may, in fact, compound systematic errors, and there are good reasons to believe that measurement errors could not be randomly distributed across items in multiple-item responses (Robins, Hendin, & Trzesniewski, 2001). Rather, SIM reduce the chance of common method variance where spurious correlations are observed due to the use of the same response format among highly related items (Williams, Cote, & Buckley, 1989). SIM can provide an acceptable balance between practical needs and psychometric concerns and the empirical literature contains many examples where they *have shown comparable or equal predictive validity compared with multiple-item measures* (Hoepfner et al., 2011). Issues focused on subjective well-being (Sandvik, Diener, & Seidlitz, 2009), life satisfaction (Nagy, 2002), self-esteem (Robins et al., 2001), bullying (Solberg & Olweus, 2003) or interparental violence (Reuter, Sharp, Temple, & Babcock, 2015) have been assessed successfully using SIM.

Next, we describe the variables and sources used in the empirical study. The PISA dataset was the source from which we took the dependent variable and the predictors at student and school-level. Except for the case of peer victimization, that we explain below, we processed every SIM maintaining the original response options that are in the PISA questionnaire. In the case of the socioeconomic and crime predictors at district-level we used continuous variables retrieved from official Costa Rican sources.

### ***Dependent Variable***

PISA 2015 includes include a set of questions about bullying. Students answered how often (“never or almost never”, “a few times a year”, “a few times a month”, “once a week or more”) during the 12 months prior to the PISA test they had had the following experiences in school: “Other students left me out of things on purpose” (relational bullying); “Other students made fun of me” (verbal bullying); “I was threatened by other students” (verbal/physical bullying); “Other students took away or destroyed things that belonged to me” (physical bullying); “I got hit or pushed around by other students” (physical bullying); and “Other students spread nasty rumors about me” (relational bullying). Exploratory analysis of the data, carried out by the PISA work team, showed that the first two of the eight items on bullying presented measurement issues, were not strongly correlated with the other six items and did not load well onto a unidimensional construct. Thus, the PISA 2015 international database just offers information about the SIM of the questionnaire on bullying and not a composite scale (OECD, 2017b, pp. 252, 299).

Our endogenous variable relied on the question “During the past 12 months, how often have you had the following experience in school? I got hit or pushed around by other students” (PISA code ST038Q07NA). Students might find it relatively difficult to distinguish between “a few times a month” and “once a week or more” and the variation between the two categories might reflect different interpretations of the question. So, we built a dummy

variable =0 if the student responded “Never or almost never”, and =1 in the rest of the cases (8.10 percent of the students, 6 percent of the girls and 11.9 percent of the boys). It should be highlighted, that this single item cannot capture, by itself, bullying but rather represents victimization by peer physical aggression.

### *Predictors*

**Student-Level Factors.** At this level, we considered the gender, lack of respect from teachers to students, the disciplinary climate, and the teacher support. The gender was given by the variable with the PISA code ST004D01T (50.89 percent of the sample were girls and 49.11, boys). Lack of respect from teachers to students was measured with the variable “During the past 12 months, how often did you have the following experience at school? Teachers said something insulting to me in front of others” (PISA code ST039Q06NA). The four questionnaire responses were “Never or almost never” (91.32 percent of the students), “A few times a year” (5.46 percent), “A few times a month” (1.74 percent), and “Once a week or more” (1.48 percent). Disciplinary climate was measured through the question “How often do these things happen in your school science lessons? Students do not listen to what the teacher says” (PISA code ST097Q01TA). The four response options were “Never or hardly ever” (7.86 percent of the students studied in schools whose principal chose this option), “Every lesson” (17.91 percent), “Most lessons” (52.38 percent), and “Some lessons” (21.85 percent). Teacher support in the classroom was measured with the question “How often do these things happen in your school science lessons? The teacher gives extra help when students need it” (PISA code ST100Q02TA). The four response options were “Never or hardly ever” (52.16 percent of the students studied in schools whose principal chose this option), “Every lesson” (28.49 percent), “Most lessons” (14.8 percent), and “Some lessons” (4.55 percent).

**School-Level Factors.** Sport activities at school were measured with the question “School offers sporting team or sporting activities” (located within the group of variables that measured extra-curricular activities and with the PISA code SC053Q10TA). The responses were “No” (6.11 of the students studied in these schools) and “Yes” (93.89 percent).

Finally, the economic, social and cultural status (ESCS) of every school was calculated as the school average of the PISA composite score (code ESCS). This index is built by the PISA project work group, via principal component analysis, using the indicators parental education (PARED), highest parental occupation (HISEI), and home possessions (HOMEPOS).<sup>1</sup> ESCS was defined as the component score for the first principal component. The higher the score, the higher economic, social and cultural status. For Costa Rica, the scale reliabilities (Cronbach’s alpha) for the z-standardized variables was 0.73. The average value of the ESCS for all schools was -0.79.

**District-Level Factors.** The social development in the districts where the schools were situated was measured through a composite indicator. This is the Social Development Index (SDI) designed by the Statistical Division of the *Ministerio de Planificación Nacional y Política Económica* (MIDEPLAN) of Costa Rica. It was constructed by applying PCA to a

---

<sup>1</sup> Occupational data for both the student’s father and student’s mother were obtained from responses to open-ended questions. The responses were coded to four-digit ISCO codes and then mapped to the international socioeconomic index of occupational status (ISEI). The highest occupational status of parents (HISEI) corresponds to the higher ISEI score of either parent or to the only available parent’s ISEI score. For all three indices, higher ISEI scores indicate higher levels of occupational status. Indices on parental education were constructed by recoding educational qualifications into the following categories: (0) None, (1) ISCED 1 (primary education), (2) ISCED 2 (lower secondary), (3) ISCED Level 3B or 3C (vocational/pre-vocational upper secondary), (4) ISCED 3A (general upper secondary) and/or ISCED 4 (non-tertiary post-secondary), (5) ISCED 5B (vocational tertiary) and (6) ISCED 5A and/or ISCED 6 (theoretically oriented tertiary and post-graduate). The index of highest educational level of parents (HISCED) corresponds to the higher ISCED level of either parent. The index of highest educational level of parents was recoded into estimated number of years of schooling (PARED). HOMEPOS was constructed as a summary index of all household and possession items (included in questions ST011, ST012 and ST013). For students with missing data on one out of the three components, the missing variable was imputed. Regression on the other two variables was used to predict the third (missing) variable, and a random component was added to the predicted value. If there were missing data on more than one component, ESCS was not computed and a missing value was assigned for ESCS. After imputation, all three components were standardized for OECD countries and partner countries/economies with an OECD mean of zero and a standard deviation of one (OCDE, 2017a, p. 339).

set of standardized socioeconomic indicators grouped in 4 dimensions.<sup>2</sup> These are a) economy: a decent standard of living through earning income from participating in an economic activity; b) education: adequate access to educational and training services that contribute to the development of human capital; c) health: possibility of enjoying a healthy life, which implies having access to formal healthcare, guaranteeing an adequate quality of life; and d) electoral participation: development of the sense of belonging and social cohesion among the population, reflected through the participation in national and local civic procedures (MIDEPLAN, 2013, pp. 15-16). The SDI is built every four years and was referred in our study to the year 2013, the closest year to 2015, when the rest of the variables were measured. It showed values between 0 and 100. The higher the value of the index, the higher the level of development. The average score was 65.45. The internal and external statistical validity of the SDI was verified by means of correlation and regression techniques between the index and the variables used in its elaboration. The results are available in Tables 3 to 6 of the SDI technical report (MIDEPLAN, 2013, pp. 26-28).

To measure crime rates in 2015, we relied on two key aspects: homicide rates and cocaine confiscations. The data on homicide rates in 2015 were provided by the *Oficina de Planificación y Estadística del Poder Judicial* of the *Ministerio de Justicia y Paz* of Costa Rica and corresponded to formal complaints to the *Organismo de Investigación Judicial*.<sup>3</sup> The average homicide rate in our sample was 11.35 homicides per 100,000 inhabitants. The data on cocaine confiscations in 2015 came from the *Unidad de Información y Estadística*

---

<sup>2</sup> The index is the only tool that measures social development from the district level and it is used by the Costa Rican government for the definition, monitoring and evaluation of public policies and projects, as well as for the diagnosis of the social situation of the districts, and regions of Costa Rica (MIDEPLAN, 2013, p. 5).

<sup>3</sup> The number of homicides per 100,000 inhabitants that represents the homicide rate is widely used in empirical studies. Different bodies of law have a more homogeneous definition of homicide than of other criminal offenses; thus, the data were more easily comparable. In addition, its measurement was more accurate, because other offenses, especially misdemeanors, are often not reported to the police for various reasons, such as the costs and hassles inherent in the presentation of complaints and a lack of trust in the local police force and/or the judicial system (Gimenez, Svitková, Tkacheva & Barrado, 2020).

*Nacional sobre Drogas* of the *Instituto Costarricense Sobre Drogas*, ascribed to the *Ministerio de la Presidencia*. Drug trafficking was estimated through confiscations of cocaine in kilos per 100,000 inhabitants. This estimation allowed us to correct the effect of the districts for the scale. The cumulative distribution of the confiscations followed an exponential function that was a consequence of the huge differences in the amount of confiscations, from just a few grams to several tons.<sup>4</sup> The extreme variability in the amounts confiscated made it convenient for our analysis to take logarithms in the variable. The average confiscation in our sample was 351 kilos per 100,000 inhabitants (5.86 in logarithm). Extreme values, of both homicide rates and cocaine confiscations, could affect the estimation and lead to obtaining biased results. For this reason, we performed an analysis through box plots that let us detect their presence. The three districts with crime rates above the upper whisker and the three districts below the lower whisker were not included in analysis. There were no outlier problems concerning the rest of the variables in the study.

After the elimination of outliers, and considering the presence of missing data (which represented 34 % of the sample), the final sample consisted of 4,243 observations (62% of the observations of the original database). We performed a statistical sensitivity power analysis to determine the smallest effects related to our objectives that we would have adequate power to detect. With an  $\alpha = .05$  and power = 0.95, the minimum effect size (ES) that is likely to be detected with this sample is  $ES = .003$ . Thus, this sample size was more than adequate for the statistical analysis carried out in the research.

### **Analytic Plan**

---

<sup>4</sup> According to the *Unidad de Información y Estadística Nacional sobre Drogas* of the *Instituto Costarricense sobre Drogas* (2018), 94.87 percent of drug confiscation events were in quantities of 0 to 5 grams. Only 1.53 percent of the confiscations corresponded to stashes of more than 100 grams. The confiscations were concentrated in the most economically and socially vulnerable areas. Zones with serious deficiencies in personal rights, security, housing, labor opportunities, nutrition, infrastructures and basic medical assistance.

We used a discrete probit model for binary response to determine the link between crime rates and peer physical victimization in schools.<sup>5</sup> In equation (1), the probability of being a victim of peer aggression depends on a set of psychological and socioeconomic factors, including crime rates in the districts where the schools are situated, as regressors:

$$P(\text{Victimization}_{ijk} = 1|\mathbf{x}) = \beta_0 + \beta_1\mathbf{X}_{ijk} + \beta_2\mathbf{Z}_{jk} + \beta_3\mathbf{D}_k + \text{school}_{FE} + \text{district}_{FE} + \varepsilon_i \quad (1)$$

In this model,  $P(\text{Victimization}_{ijk} = 1|\mathbf{x})$  represents student  $i$ -th, attending school  $j$ -th, situated in district  $k$ -th, probability of having been hit or pushed by other students. This probability was determined by a set of factors at student-level ( $\mathbf{X}_{ijk}$ ), school-level ( $\mathbf{Z}_{jk}$ ), and district-level ( $\mathbf{D}_k$ ). Student-level included gender, lack of respect from teachers to students (variable *Teachers said something insulting to me in front of others*), disciplinary climate (variable *Students do not listen to what the teacher says*), and teacher support (variable *The teacher gives extra help when students need it*). School-level included whether the school offers *sporting team or sporting activities* and *socioeconomic characteristics of the schools*. District-level included a variable to measure the *social development* of the districts and our key variables *homicide rate* and *cocaine confiscations*. Crime rates may be correlated with latent factors and, if we do not correct for them, the coefficients of the variables *homicide rate* and *cocaine confiscations* could be reflecting the effects of these factors and, thereby, be biased. For example, poverty, inequality and lack of education are elements strongly associated with crime (Gimenez et al., 2020). To avoid biased estimations, the model included the SDI, a variable explained in the previous section, that accounted for a wide set

---

<sup>5</sup> These models relate the probability of an event to various independent variables and are based on the cumulative normal probability distribution. The relationship between a specific regressor and the outcome of the probability is interpreted by means of a marginal effect, which accounts for the partial change in the probability. Once the model is estimated, marginal effects are calculated for each variable while holding other variables constant at their sample mean values. In the case of factor levels, the marginal effect is the discrete change from the base level.



of socioeconomic factors in the districts, generally believed to be correlated with severe crimes. Additionally, the model incorporated fixed effects that allowed to control for characteristics of each school and district that, without being explicitly recognized in the model, were related to peer physical victimization.  $\varepsilon_i$  is the error term.

Estimations were executed with Stata 16 statistical software.

## Results

Table 1 presents results estimated from the binary probit model. For the outcome variable, the value 0 denoted that the student was not being hit or pushed around by other students, and 1 that he/she was. McKelvey and Zavoina's pseudo- $R^2$  was calculated (0.643). This value indicated that the independent variables included in the probit model explained a high level of the probabilities of peer physical victimization.

The estimated coefficients and standard errors strongly supported our main hypothesis: studying in schools situated in districts with higher homicide rates and cocaine confiscations increased the probability of peer physical victimization in school. Further, in line to our secondary hypotheses, we found that a) being male, lack of respect from teachers to students (variable *Teachers said something insulting to me in front of others*) and poor disciplinary climate (variable *Students do not listen to what the teacher says*) increased the possibility of suffering peer physical victimization; b) studying in schools that offered sporting activities, that had a higher average economic, social and cultural status and that were located in districts with a higher level of social development decreased the possibility of victimization; and c) the three categories for teacher support (*The teacher gives extra help when students need it*) were not statistically significant.<sup>6</sup>

---

<sup>6</sup> To test an overall effect of the variables with more than one category, we performed a chi-square test of whether all predictors' regression coefficients of the categories in the variable were simultaneously zero. The overall effects of the three categories in the variable *Teachers said something insulting to me in front of others* and *Students do not listen to what the teacher says* were statistically significant at any standard level ( $\chi^2=87.23$

The last column of Table 1 shows the marginal effects on the probability of being a victim of physical aggression. Focusing on our central variables, on average, an increase in a marginal unit in the homicide rate and cocaine confiscations increased the probability of victimization by peer aggression by 1.7% and by 10.4%, respectively.

Graphing these predicted probabilities helped us to understand the nexus between crime rates and victimization. In Figure 1, we represent the predicted probabilities of being a victim of physical aggression in school for all the homicide rates of the districts in the sample. These average predicted probabilities were calculated using the average sample values of the other predictor variables. The figure shows that the higher the homicide rate, the higher the probability of being victimized. For example, the mean predicted probability of being a victim of physical aggression was only 0.55% in districts with no homicides (where 34% of the students studied). This probability increased to greater than 50% for students who attended schools situated in districts with homicide rates higher than 22 homicides per every 100,000 inhabitants (where 8.62% of the students studied).

With respect to cocaine confiscations, Figure 2 shows a direct relationship between cocaine confiscations and the probability of being a victim of physical aggression. If the students attended schools situated in districts where confiscations were less than 400 kilos of cocaine for every 100,000 inhabitants (6 in logarithm), the mean predicted probability of victimization was low (less than 20%). In the sample, 60% of the students went to schools situated in these districts. In districts with confiscations higher than 3,000 kilos (8 in logarithm), where 12.3% of the students studied, the probability of aggression increased by more than 50%.

---

and  $\chi^2_3 = 13.78$ , respectively). The overall effect of the variable *The teacher gives extra help when students need it* was not ( $\chi^2_3 = 4.37$ ).

Missing data were list-wise deleted when running the analyses. To examine whether they were missing as a function of any variables in the study and could bias significantly our results, we tested differences between participants with complete and incomplete data. Chi-square analyses showed, at 5% level of significance, that participants with incomplete data did not differ significantly from those with complete data on the variables that presented missing values: “Teachers said something insulting to me in front of others” (918 missing values,  $\chi^2 = 3.752$ ,  $p = .053$ ); “Students do not listen to what the teacher says” (555 missing values,  $\chi^2 = 2.750$ ,  $p = .097$ ); “The teacher gives extra help when students need it” (669 missing values,  $\chi^2 = 2.306$ ,  $p = .129$ ); “School offers sporting team or sporting activities” (102 missing values,  $\chi^2 = 3.349$ ,  $p = .067$ ). The rest of the variables, “Gender”, “Economic, social and cultural status”, “Social Development Index”, “Homicide rate” and “Cocaine confiscations rate” did not present missing data. The missing values were homogeneously distributed among schools and districts, following a normal distribution. The percentage of missing cases among schools followed a normal distribution of mean = 5.071 and standard deviation = 3.717, with a Jarque-Bera normality test value = 1800.03,  $p < .001$ . In the case of the distribution among districts, they followed a normal distribution of mean = 5.227 and standard deviation = 3.221, with a Jarque-Bera normality test value = 107.081,  $p < .001$ . Based on this analysis, we treated the missing cases as though they were missing at random, because there was no reason to believe that they were missing as a function of any variables in the study.

To summarize, the results provide strong evidence in support of the connection between crime rates in the districts where schools are situated and the probability of being a victim of physical aggression inside schools.

## **Discussion**

Using a large sample of 15-year-old Costa Rican students, the novel findings of this study revealed that attending schools which were situated in districts with higher homicide rates and cocaine confiscations increased the probability of being a victim of peer physical aggression at school. These results are consistent with previous literature that has noted the relationship between homicide rate and academic achievement (Gimenez & Barrado, 2020; Jarillo et al., 2016); and between exposure to community violence, through witnessing and through direct victimization, and peer group social maladjustment, in the form of aggression, peer rejection, and bullying by peers (Schwartz & Proctor, 2000). Though we could not conclude that peer physical victimization was caused by crime exposure or previous psycho-traumatic experiences due to known limitations of our study, these findings still confirmed the fact that there is a connection between crime rates at district level and peer physical victimization at school. Possible explanations for our findings laid in the fields of ecological framework, asserting influence of different level factors on adopting behavioral models (Bronfenbrenner, 1994; Hong & Espelage, 2012) and social learning theory, which declares that observation through modelling is the way young people learn new behavior (Bandura & Walters, 1977). Thus, our findings supported the idea that adverse neighborhoods and poor socio-economic conditions play crucial roles in peer victimization, which corresponds with previous research (Engström, 2018; Sampson, 2011), confirming that studying in schools that have higher average economic, social and cultural status and that are in districts with a higher level of social development decrease the possibility of being a victim of peer physical aggression.

Our findings also showed that being a male and studying in an unfriendly educational environment, where there is a lack of respect from teachers to students (variable *Teachers said something insulting to me in front of others*), increased the possibility of peer physical victimization. The finding that being a male was associated with higher risks of peer physical

victimization is consistent with results of previous research, showing that boys are more likely to be physically victimized by peers than girls (Lansford et al., 2012). It is well known that support from teachers at school is strongly associated with students' psychological well-being (Chu, Saucier, & Hafner, 2010). Thus, the finding that lack of respect from teachers to students affected peer victimization was not surprising. The body of research in the field suggests that students who have negative relationships with teachers are more likely to be rejected by peers (Longobardi et al., 2018) and victimized (Wang et al., 2015). However, we found that the three categories for teacher support were not statistically significant. A possible reason is the narrowness of this variable, since it only measured teacher support during science classes (main subject in 2015 PISA round) but did not capture general support. Also, while some studies have shown that teacher support helps to decrease peer victimization, others report little or non-significant effects, and the results often depend on methodological choices (Troop-Gordon, 2015). Furthermore, our findings suggested that studying in an educational environment with discipline problems (variable *Students do not listen to what the teacher says*) increased the probability of being a victim of peer physical aggression. As previous literature has noted, school climate and discipline problems are associated with peer victimization (Cornell et al., 2015; Hong & Espelage, 2012; Wang et al., 2013). It seems that both variables in connection to student-teacher relationships, lack of respect from teachers to students and disciplinary climate, illustrate the lack of respectfulness and social trust, which is supposed to be shared feelings and normally demand mutual desire of the involved parties to be properly established. Though, the question whether teachers or students first showed disrespect goes beyond our study.

Finally, our results showed that studying in schools that offered sporting activities, had higher average economic, social and cultural status and were in districts with a higher level of social development decreased the possibility of suffering peer physical victimization.

Generally, it is believed that providing students with extra activities at school helps to create peer connectedness and facilitates prosocial behaviors (Lee et al., 2018). On the other hand, results of many studies have shown that positive influence of extracurricular sport activities on reducing peer victimization depends mostly on specific social contexts (Guest & McRee, 2008; Peguero, 2008). Thus, we had to associate this finding to the high social, cultural and economic status of schools and districts rather than the sports activities themselves, because the higher the social development of the districts, the more facilities and resources are available to provide students in their leisure time.

The current study has several methodological advantages worth noting. Previous studies examining associations among community crimes and peer victimization have largely focused on exposure to community crimes, but did not use models that controlled for districts' socioeconomic characteristics. Furthermore, this study appears to be the first to use a methodological approach that helped us to deal with unobserved heterogeneity.

### **Limitations**

Our study is limited by the fact that the PISA sample is representative of just 15-year-old students, which restricts the conclusions. Further research is needed to test the effects in the case of students of different ages. We also recognize that the use of PISA background questionnaires exhibits several problems, as Rutkowski and Rutkowski (2010) have pointed out. One is the presence of missing data that is especially important in some economically-developing economies. The other, the possible respondent misinterpretation of the questions and/or answers, due to its poor design. This problem can be aggravated by the lack of motivation for the students to answer questionnaires without consequences in their school records.

Furthermore, the use of SIM is a significant limitation of the study. Even though its use has certain psychometric advantages, which we have pointed out in the methodological

section, there are a number of psychometric reasons to be skeptical about the use of SIM when compared with multiple-item scales: a) they are more vulnerable to unknown biases in meaning and interpretation; b) their internal consistency reliability statistic cannot be computed; and c) they can be more affected by random measurement errors, which are more likely to be cancelled out with multiple-items (Hoepfner et al., 2011; Robins et al., 2001).

Literature has pointed out that violence close to the school has a decisive influence on students, as students spend a significant part of their time in their schools and carry out numerous extracurricular and leisure activities in the area around the school (Gimenez, Martín-Oro, & Sanaú, 2018). Still, another limitation is that data on crime rates refer to the districts where the schools are located. In Costa Rica, they correspond to the districts where the students live in the vast majority of cases, but not in all.

Finally, the use of a cross-sectional survey presents limitations in terms of the study of causality. Hence, a promising extension for future research would be to use a longitudinal perspective. As, in Costa Rica, some of the schools participating in PISA do so in different rounds of the survey, this information would allow us to jointly control for time and cross-sectional perspectives that would mitigate the endogeneity issue.

### **Research Implications**

In sum, our findings support previous research that highlights the link between community crimes, social development of districts and schools, and peer victimization (Chaux et al., 2012; Engström, 2018). In line with the social learning theory, peer physical victimization is more likely to happen in criminogenic environments as the result of learning through modelling. Appealing to ecological framework, we can explain how economic, social and educational contextual factors influence peer physical victimization. We conclude that crime rates near the schools, measured by the homicide rate and cocaine confiscations, are significantly related to the probability of peer physical victimization inside the schools, which

is also associated with being a male and having a poor disciplinary climate at school. Future research should address broader sets of factors to capture the complex interactions between crime rates and social, economic, educational and family contexts on peer physical victimization.

### **Prevention and Policy Implications**

Aiming to prevent peer physical victimization in school, social, economic and educational factors should be targeted to reduce the effect of community crimes on peer victimization. During recent years, policy efforts to reduce peer victimization at schools have been based on individual, family and school factors, including broader social contexts such as community and societal levels (Espelage & Swearer, 2010). This study suggests that policy makers should also take into consideration the impact of crime rates on peer victimization. Our results make clear that not only school context plays an important role in the development of peer physical victimization, but also district and neighborhood levels. Thus, beyond school-level interventions are needed to ensure the safety of students inside schools. Effective prevention programs need to address violence at the neighborhood level. Authorities in Costa Rica clearly advocate for this approach, strengthening local governance structures, preventing gang violence, increasing the number of security forces in key places where illicit activities and gang presence concentrate and controlling light arms and firearms (Ministerio de Justicia y Paz, 2011). Future research may consider evaluating programs focused on reducing crime rates surrounding schools and social support to improve student-teacher relations.

### **References**

Bandura, A., & Walters, R. H. (1977). *Social learning theory*. NJ: Prentice-Hall.



- Bauman, S., & Del Rio, A. (2006). Preservice teachers' responses to bullying scenarios: Comparing physical, verbal, and relational bullying. *Journal of Educational Psychology*, 98, 219–231. <https://doi.org/10.1037/0022-0663.98.1.219>
- Bronfenbrenner, U. (1994). Ecological models of human development. In T. Husen, & T. N. Postlethwaite (Eds.), *The International Encyclopedia of Education* (2nd ed., pp. 1643–1647). Elsevier Sciences.
- Cabezas Pizarro, H., & Monge Rodríguez, M. (2014). Influence of the environment where the school is located in the presence of bullying in the classroom. *Actualidades Investigativas En Educación*, 14(3). <https://doi.org/10.15517/aie.v14i3.16154>
- Caudillo, M. L., & Torche, F. (2014). Exposure to Local Homicides and Early Educational Achievement in Mexico. *Sociology of Education*, 87(2), 89–105. <https://doi.org/10.1177/0038040714523795>
- Chaux, E., Arboleda, J., & Rincón, C. (2012). Community Violence And Reactive And Proactive Aggression: The Mediating Role Of Cognitive And Emotional Variables. *Revista Colombiana de Psicología*, 21(2), 233-251.
- Chu, P. S., Saucier, D. A., & Hafner, E. (2010). Meta-Analysis of the Relationships Between Social Support and Well-Being in Children and Adolescents. *Journal of Social and Clinical Psychology*, 29(6), 624–645. <https://doi.org/10.1521/jscp.2010.29.6.624>
- Cillessen, A. H., & Lansu, T. A. (2015). Stability, correlates, and time-covarying associations of peer victimization from grade 4 to 12. *Journal of Clinical Child & Adolescent Psychology*, 44, 456–470. <https://doi.org/10.1080/15374416.2014.958841>
- Comisión Técnica Interinstitucional sobre Estadísticas de Convivencia y Seguridad Ciudadana (2017). *Análisis de los homicidios dolosos vinculados a la delincuencia organizada durante el periodo de 2010-2016*. Costa Rica.

[https://www.cr.undp.org/content/costarica/es/home/library/Analisis\\_Homicidios\\_Dolosos.html](https://www.cr.undp.org/content/costarica/es/home/library/Analisis_Homicidios_Dolosos.html)

- Cornell, D., Shukla, K., & Konold, T. (2015). Peer victimization and authoritative school climate: A multilevel approach. *Journal of Educational Psychology*, 107(4), 1186–1201. <https://doi.org/10.1037/edu0000038>
- Crick, N. R., & Dodge, K. A. (1994). A review and reformulation of social information-processing mechanisms in children's social adjustment. *Psychological Bulletin*, 115(1), 74-101. <https://doi.org/10.1037/0033-2909.115.1.74>
- Crick, N.R., Ostrov, J.M., & Werner, N.E. (2006). A longitudinal study of relational aggression, physical aggression, and children's social-psychological adjustment. *Journal of Abnormal Child Psychology*, 34(2), 127-138. <https://doi.org/10.1007/s10802-005-9009-4>
- Elgar, F. J., Pickett, K. E., Pickett, W., Craig, W., Molcho, M., Hurrelmann, K., & Lenzi, M. (2012). School bullying, homicide and income inequality: A cross-national pooled time series analysis. *International Journal of Public Health*, 58(2), 237–245. <https://doi.org/10.1007/s00038-012-0380-y>
- Engström, A. (2018). Associations between Risky Lifestyles and Involvement in Violent Crime during Adolescence. *Victims & Offenders*, 13(7), 898–920. <https://doi.org/10.1080/15564886.2018.1503984>
- Espelage, D. L., & Swearer, S. M. (2010). A social-ecological model for bullying prevention and intervention: Understanding the impact of adults in the social ecology of youngsters. In S. R. Jimerson, S. M. Swearer, & D. L. Espelage (Eds.), *Handbook of bullying in schools: An international perspective* (pp. 61-72). Routledge.

- Fang, X., Brown, D. S., Florence, C. S., & Mercy, J. A. (2012). The economic burden of child maltreatment in the United States and implications for prevention. *Child Abuse & Neglect*, 36(2), 156–165. <https://doi.org/10.1016/j.chiabu.2011.10.006>
- Finkelhor, D. (2008). *Childhood victimization. Violence, Crime, and abuse in the lives of young people*. Oxford University Press.
- Gimenez, G., & Barrado, B. (2020). Exposure to crime and academic achievement: A case study for Costa Rica using PISA data. *Studies in Educational Evaluation*, 65, 100867. <http://doi.org/10.1016/j.stueduc.2020.100867>
- Gimenez, G., Martín-Oro, Á., & Sanaú, J. (2018). The effect of districts' social development on student performance. *Studies in Educational Evaluation*, 58, 80–96. <https://doi.org/10.1016/j.stueduc.2018.05.009>
- Gimenez, G., Svitková, K., Tkacheva, L., Barrado, B. (2020). The urban component of violence: An empirical analysis for the case of Costa Rica. *DADOS- Revista de Ciências Sociais*. Forthcoming.
- Graham, S., Bellmore, A. D., & Mize, J. (2006). Peer Victimization, Aggression, and Their Co-Occurrence in Middle School: Pathways to Adjustment Problems. *Journal of Abnormal Child Psychology*, 34(3), 349–364. <https://doi.org/10.1007/s10802-006-9030-2>
- Guest, A. M., & McRee, N. (2008). A School-Level Analysis of Adolescent Extracurricular Activity, Delinquency, and Depression: The Importance of Situational Context. *Journal of Youth and Adolescence*, 38(1), 51–62. <https://doi.org/10.1007/s10964-008-9279-6>
- Hager, A. D., & Leadbeater, B. J. (2016). The Longitudinal Effects of Peer Victimization on Physical Health From Adolescence to Young Adulthood. *Journal of Adolescent Health*, 58(3), 330–336. <https://doi.org/10.1016/j.jadohealth.2015.10.014>

- Hidalgo-Rasmussen, C., & Hidalgo-San Martín, A. (2015). Violencia e inseguridad contextual percibida y roles en bullying en escolares mexicanos. *Revista Latinoamericana de Ciencias Sociales, Niñez y Juventud*, 13(2), 767–779. <https://doi.org/10.11600/1692715x.13215021214>
- Hoepfner, B. B., Kelly, J. F., Urbanoski, K. A., & Slaymaker, V. (2011). Comparative utility of a single-item versus multiple-item measure of self-efficacy in predicting relapse among young adults. *Journal of Substance Abuse Treatment*, 41(3), 305–312. <https://doi.org/10.1016/j.jsat.2011.04.005>
- Holt, T. J., Turner, M. G., & Lyn Exum, M. (2014). The Impact of Self Control and Neighborhood Disorder on Bullying Victimization. *Journal of Criminal Justice*, 42(4), 347–355. <https://doi.org/10.1016/j.jcrimjus.2014.04.004>
- Hong, J. S., & Espelage, D. L. (2012). A review of research on bullying and peer victimization in school: An ecological system analysis. *Aggression and Violent Behavior*, 17(4), 311–322. <https://doi.org/10.1016/j.avb.2012.03.003>
- Jarillo, B., Magaloni, B., Franco, E., & Robles, G. (2016). How the Mexican drug war affects kids and schools? Evidence on effects and mechanisms. *International Journal of Educational Development*, 51, 135–146. <https://doi.org/10.1016/j.ijedudev.2016.05.008>
- Kasen, S., Berenson, K., Cohen, P., & Johnson, J. G. (2004). The effects of school climate on changes in aggressive and other behaviors related to bullying. In D. L. Espelage & S. Swearer (Eds.), *Bullying in American schools: A social-ecological perspective on prevention and intervention* (pp. 187–210). NJ: Lawrence Erlbaum.
- Kuger, S., Klieme, E., Jude, N., & Kaplan, D. (Eds.). (2016). Assessing Contexts of Learning. *Methodology of Educational Measurement and Assessment*. <https://doi.org/10.1007/978-3-319-45357-6>

- Lansford, J. E., Skinner, A.T., Sorbring, E., Di Giunta, L., Deater-Deckard, K., Dodge, K.A., ... Chang, L. (2012). Boys' and Girls' Relational and Physical Aggression in Nine Countries. *Aggressive behavior*, 38(4), 298–308. doi:10.1002/ab.21433
- Lee, K. T. H., Lewis, R. W., Kataoka, S., Schenke, K., & Vandell, D. L. (2018). Out-of-School Time and Behaviors During Adolescence. *Journal of Research on Adolescence*, 28(2), 284–293. <https://doi.org/10.1111/jora.12389>
- Longobardi, C., Iotti, N. O., Jungert, T., & Settanni, M. (2018). Student-teacher relationships and bullying: The role of student social status. *Journal of Adolescence*, 63, 1-10. <https://doi.org/10.1016/j.adolescence.2017.12.001>
- Low, S., & Espelage, D. (2014). Conduits from community violence exposure to peer aggression and victimization: Contributions of parental monitoring, impulsivity, and deviancy. *Journal of Counseling Psychology*, 61(2), 221–231. <https://doi.org/10.1037/a0035207>
- Ministerio de Planificación Nacional y Política Económica (2013). *Índice de Desarrollo Social 2013*. Costa Rica. <http://www.mideplan.go.cr/component/content/category/249:indice-de-desarrollo-social-2013.html>. (Retrieved January 30, 2019).
- Ministerio de Justicia y Paz. (2011). *Plan Nacional de Prevención de la Violencia y Promoción de la Paz Social 2011-2014*. Costa Rica. Ministerio de Justicia y Paz.
- Morrill, C., & Musheno, M. (2018). *Youth conflict: Trust and control in a high-poverty school*. University of Chicago Press.
- Nagy, M. S. (2002). Using a single-item approach to measure facet job satisfaction. *Journal of Occupational and Organizational Psychology*, 75(1), 77–86. <https://doi.org/10.1348/096317902167658>
- Organisation for Economic Co-operation and Development (2016). *PISA database 2015*. [Data set]. <http://www.oecd.org/pisa/>

- Organisation for Economic Co-operation and Development (2017a). *PISA 2015 Technical Report*. Paris: OECD Publishing. <https://www.oecd.org/pisa/data/2015-technical-report/>
- Organisation for Economic Co-operation and Development (2017b). *PISA 2015 Assessment and Analytical Framework*. Paris: OECD Publishing. <https://www.oecd.org/publications/pisa-2015-assessment-and-analytical-framework-9789264281820-en.htm>
- Peguro, A. A. (2008). Bullying Victimization and Extracurricular Activity. *Journal of School Violence*, 7(3), 71–85. <https://doi.org/10.1080/15388220801955570>
- Postmes, T., Haslam, S. A., & Jans, L. (2012). A single-item measure of social identification: Reliability, validity, and utility. *British Journal of Social Psychology*, 52(4), 597–617. <https://doi.org/10.1111/bjso.12006>
- Programa de las Naciones Unidas para el Desarrollo (2011). *Cuaderno de desarrollo humano. Convivir es mejor: Estudiantes hablan sobre el barrio, la casa y el cole*. Costa Rica.
- Reuter, T. R., Sharp, C., Temple, J. R., & Babcock, J. C. (2015). The relation between borderline personality disorder features and teen dating violence. *Psychology of Violence*, 5(2), 163–173. <https://doi.org/10.1037/a0037891>
- Rigby, K. (2000). Effects of peer victimization in schools and perceived social support on adolescent well-being. *Journal of Adolescence*, 23(1), 57–68. <https://doi.org/10.1006/jado.1999.0289>
- Robins, R. W., Hendin, H. M., & Trzesniewski, K. H. (2001). Measuring Global Self-Esteem: Construct Validation of a Single-Item Measure and the Rosenberg Self-Esteem Scale. *Personality and Social Psychology Bulletin*, 27(2), 151–161. <https://doi.org/10.1177/0146167201272002>

- Rutkowski, L., & Rutkowski, D. (2010). Getting it “better”: the importance of improving background questionnaires in international large scale assessment. *Journal of Curriculum Studies*, 42(3), 411–430. <https://doi.org/10.1080/00220272.2010.487546>
- Sampson, R. J. (1997). Neighborhoods and Violent Crime: A Multilevel Study of Collective Efficacy. *Science*, 277(5328), 918–924. <https://doi.org/10.1126/science.277.5328.918>
- Sampson, R. J. (2011). *Great American city: Chicago and the enduring neighborhood effect*. University of Chicago Press. <https://doi.org/10.7208/chicago/9780226733883.001.0001>
- Sandvik, E., Diener, E., & Seidlitz, L. (2009). Subjective Well-Being: The Convergence and Stability of Self-Report and Non-Self-Report Measures. *Social Indicators Research Series*, 119–138. [https://doi.org/10.1007/978-90-481-2354-4\\_6](https://doi.org/10.1007/978-90-481-2354-4_6)
- Schwartz, D., & Proctor, L. J. (2000). Community violence exposure and children’s social adjustment in the school peer group: The mediating roles of emotion regulation and social cognition. *Journal of Consulting and Clinical Psychology*, 68, 670–683. <https://doi.org/10.1037/0022-006X.68.4.670>
- Solberg, M. E., & Olweus, D. (2003). Prevalence estimation of school bullying with the Olweus Bully/Victim Questionnaire. *Aggressive Behavior*, 29(3), 239–268. <https://doi.org/doi:10.1002/ab.10047>
- Swahn, M. H., Simon, T. R., Arias, I., & Bossarte, R. M. (2008). Measuring sex differences in violence victimization and perpetration within date and same-sex peer relationships. *Journal of Interpersonal Violence*, 23, 1120–1138. <https://doi.org/10.1177/0886260508314086>
- Troop-Gordon, W. (2015). The role of the classroom teacher in the lives of children victimized by peers. *Child Development Perspectives*, 9(1), 55–60. <https://doi.org/10.1111/cdep.12106>

- Turanovic, J. J., & Pratt, T. C. (2015). Longitudinal effects of violent victimization during adolescence on adverse outcomes in adulthood: a focus on prosocial attachments. *The Journal of Pediatrics*, 166(4), 1062–1069. <https://doi.org/10.1016/j.jpeds.2014.12.059>
- Unidad de Información y Estadística Nacional sobre Drogas (2018). *Informe de Situación Nacional sobre Drogas y Actividades Conexas. Costa Rica 2017*. Instituto Costarricense de Drogas. Costa Rica. Instituto Costarricense sobre Drogas.
- United Nations Office on Drugs and Crime (2018). *Statistics Online; 2018*. [Data set].
- Wang, C., Berry, B., & Swearer, S. M. (2013). The critical role of school climate in effective bullying prevention. *Theory Into Practice*, 52, 296–302. <https://doi.org/10.1080/00405841.2013.829735>
- Wang, C., Swearer, S.M., Lembeck, P., Collins, A., & Berry, B. (2015). Teachers matter: An examination of student-teacher relationships, attitudes toward bullying, and bullying behavior. *Journal of Applied School Psychology*, 31, 219–238. <https://doi.org/10.1080/15377903.2015.1056923>
- Williams, L. J., Cote, J. A., & Buckley, M. R. (1989). Lack of method variance in self-reported affect and perceptions at work: Reality or artifact? *Journal of Applied Psychology*, 74(3), 462–468. <https://doi.org/10.1037/0021-9010.74.3.462>



**Table 1**

*Estimates of the Binary Probit Model. Dependent Variable: “During the Past 12 Months, How Often Have You Had the Following Experience in School? I Got Hit or Pushed Around by Other Students”*

	Variable	Coef.	Robust Std. Err.	z-statistic	P>z	Marginal effects	
Baseline variables	Intercept	-10.827***	0.531	-20.410	< .01	0.096	
	Student	Gender					
		Female	Base				
		Male	0.375***	0.075	5.030	< .01	0.056
		During the past 12 months, how often did you have the following experience at school? Teachers said something insulting to me in front of others					
		Never or almost never	Base				
		A few times a year	0.943***	0.132	7.150	< .01	0.214
		A few times a month	0.008	0.274	0.030	0.98	0.001
		Once a week or more	1.119***	0.177	6.320	< .01	0.272
		How often do these things happen in your school science lessons? Students do not listen to what the teacher says					
		Never or hardly ever	Base				
		Every lesson	0.241**	0.142	1.690	0.09	0.035
		Most lessons	0.364***	0.106	3.440	< .01	0.057
		Some lessons	0.102	0.088	1.160	0.25	0.014
		How often do these things happen in your school science lessons? The teacher gives extra help when students need it					
		Never or hardly ever	Base				
Every lesson	-0.189	0.154	-1.230	0.22	-0.029		
Most lessons	-0.101	0.157	-0.640	0.52	-0.016		
Some lessons	-0.019	0.155	-0.120	0.90	-0.003		
School	School offers sporting team or sporting activities						
	No	Base					
	Yes	3.487***	0.210	16.600	< .01	0.154	
	Economic, social and cultural status	-0.215**	0.089	-2.400	0.02	-0.032	
	Social Development Index	0.025***	0.003	9.200	< .01	0.004	
Exposure to crime	District	Homicide rate	0.116***	0.009	12.520	< .01	0.017
		Cocaine confiscations rate (in logs)	0.698***	0.052	13.500	< .01	0.104

---

Fixed effects in school and districts	
Number of observations	4,243
McKelvey and Zavoina's pseudo R2	0.643
Log pseudolikelihood	-8,823.003

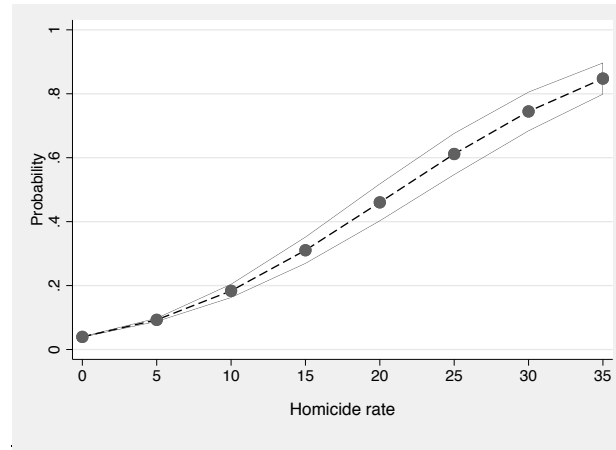
---

*Note.* (\*\*\*) , (\*\*), (\*) denote significance at the 1%, 5%, and 10% levels, respectively.

Regressions weighted by students' sampling probability. Robust standard errors adjusted for clustering at the district level are in parentheses.

**Figure 1**

*Homicide Rate and Predictive Margins for the Probability of Being Hit or Pushed Around by Other Students (95% Confidence Intervals)*



**Figure 2**

*Cocaine Confiscation Rate and Predictive Margins for the Probability of Being Hit or Pushed Around by Other Students (95% Confidence Intervals)*

