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ABSTRACT

Does Domestic Violence Jeopardize the Learning Environment of Peers within the School? Peer Effects of Exposure to Domestic Violence in Urban Peru*

This study builds on the findings of Carrell and Hoekstra (2010, 2018) by exploring the peer effects of domestic violence exposure over the academic attainment of secondary school students in Peru. However, we also study these peer effects over a novel set of outcomes: internalizing behaviors and forms of violence at school. Our results show that being in a classroom with peers exposed to domestic violence leads to increased dropout and school mobility rates; increased levels of depression, isolation, victimization from bullying and attitudes towards violence at school; and lower verbal and math test scores. We also find no evidence that internalizing behaviors and forms of violence at school constitute mediators through which peer exposure to domestic violence affects test scores.

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1. Introduction

A large body of evidence indicates that domestic violence can have a significant effect on the well-being and development of children (Edleson, 1999; Wekerle and Wolfe, 1999; McIntosh, 2003; Bauer et al, 2006; Holt et al, 2008).[1] Less is known about how the effects of domestic violence can be spread to children's peers, via their interactions at school or in other settings. Understanding this potential negative externality should be an important task in the academic and policy domains, particularly for regions with high levels of domestic violence like Latin America and the Caribbean. This paper contributes to this goal by analyzing how, for the case of urban public schools in Peru, exposure to violence at home affects school peers on a range of negative behaviors and academic outcomes.

Peru is a compelling case to study, as it is one of the countries with the highest rates of violence against women in the Latin American and Caribbean region, only below Bolivia and similar to Colombia (ECLAC, 2015). According to the 2017 Peruvian Demographic and Health Survey, 65.4% of women aged 15-49 years reported to have ever experienced psychological, physical or sexual violence for their partners, and 10.6% reported having experienced it in the last year.

The negative externality of exposure to violence at home on school peers has only been addressed by Carrell and Hoekstra, in two studies that look at short-term school achievement outcomes, such as math and verbal test scores and disciplinary incidents (Carrell and Hoekstra, 2010); and longer-term labor market outcomes, such as college enrollment, degree attainment and wages (Carrell and Hoekstra, 2018). This paper complements their critical contributions to this area of study in two main aspects. First, they identify exposure to domestic violence by linking administrative student data to public records information on cases filed in civil court, whereas in our study we rely on students' responding to a set of questions about exposure to family violence.

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[1] Edleson (1999) explore how children who witness domestic violence can exhibit externalizing behaviors (e.g. being aggressive or antisocial) or internalizing behaviors (e.g. acting fearfully or an inhibited way); Wekerle and Wolfe (1999) found exposure to violence at home is the best predictor of adolescent male abusive behavior; Bauer et al (2006) found that affected children may either pick up on and act to aggressive cues in their interactions with other children and be at risk of bullying; Holt et al (2008) point out a shift in the literature: whereas children exposed to domestic violence used to be considered tangential to the violence between their parents (i.e. silent witnesses) (McIntosh, 2003), more recently they are thought to be indirectly affected by it.

A similar approach of directly asking children to measure being exposed to domestic violence has been used in the National Survey of Children Exposure to Violence (Finkelhor and Turner, 2009).

Measuring exposure domestic violence is inherently a difficult task, and each approach has potential measurement error problems. In the case of courts' data, research shows that most incidents related to domestic violence do not get reported to the police, courts, or other institutions. For example, in Peru women seek help from public institutions in less than one-third of the cases (INEI, 2017). Similarly, in the United States, less than half of incidents of intimate partner violence gets reported (Morgan and Kena, 2018). Thus, data from courts may be selective in certain ways. For example, it may be related to more extreme cases of domestic violence, or it may be coupled with other issues such as marital dissolution or separation. These considerations should be kept in mind, as the effects found using these data may not be extrapolated to other cases of domestic violence or may not correspond to the average effect of domestic violence.

Directly asking children about exposure to domestic violence is also subject to reporting error. However, the use of self-administered questionnaires (as in this study, in contrast to in-person interviews), and a relative scale ("no," "a little," "sometimes," "often," very) can reduce the risk of non-reporting. Thus, our data allows for an understanding of the effects less extreme forms of domestic violence exposure on the children's school peers.

The second contribution of this study is in the set of outcomes studied. Carrell and Hoekstra (2010, 2018) find that peers' exposure to domestic violence worsens children's contemporaneous achievement and increases the number of disciplinary incidents, as well as long-term academic achievement and earnings. In this study, we look at how peers' exposure to violence at home affects the probability that children have negative behaviors, both focused inward or internalizing behavior (e.g., isolation and depression) and focused toward others as forms of violence at school (e.g., bullying their peers or being permissive and encouraging bullying toward peers). Moreover, we are also able to investigate the role of some factors that may drive the negative behaviors, such as being a victim of bullying by their peers and having a proactive attitude towards violence at school. Finally, using administrative records, we are also able to analyze the role of peers' exposure to violence at home on academic outcomes, such as enrollment and standardized test scores.

Our findings indicate that peer exposure to domestic violence can have a significant impact over students' academic attainment, internalizing behaviors and forms of violence at school.

Specifically, a higher proportion of peers exposed to domestic violence leads to: i) higher dropout rates and school mobility rates, ii) diminished verbal and math test scores in a magnitude similar to the one found by Carrell and Hoekstra (2010), iii) increased levels of depression and isolation among students, and iv) higher levels of victimization from bullying and of attitudes towards violence.

We also found that internalizing behaviors and forms of violence at school act as mediators through which own exposure to domestic violence affects test scores. However, the same does not occur for the case of peer exposure to domestic violence. In other words, the magnitude of the effect of one's own exposure to domestic violence over test scores is affected after controlling for depression, isolation, aggression, victimization from bullying, attitudes towards violence at school and bystander behavior. However, doing the same exercise for peer exposure to domestic violence shows that the magnitude of its effect over test scores remains the same.

All of peer effects' estimations were calculated controlling for own exposure to domestic violence. The reason for this is further proved by the positive association between peer exposure to domestic violence and dropout and school mobility rates. In this regard, even though there is no tracking system in Peruvian schools, dropouts and mobility in between them are common because of misbehavior problems, thereby biasing the composition of student cohorts towards more or less than the average exposure to domestic violence. To prevent this potential bias, as it was done by Carrell and Hoekstra (2010; 2018), we use own exposure to domestic violence as a control for peer exposure to domestic violence.

As discussed above, these findings contribute to the knowledge base on how exposure to violence at home affects children. Research has focused on the effects on outcomes such as depression (McCloskey et al., 1995; Edleson, 1999, Walker et al., 2007; Holt et al., 2008) for the children directly exposed to violence in their homes. This paper extends the analysis to the effects on their peers which, to the best of our knowledge, has not been addressed yet.

Our study also contributes to the broader literature on peer effects and, in particular, on how disruptive peers generate negative externalities within the classrooms (Hoxby, 2000; Hoxby and Weingarth, 2006; Figlio, 2007; Lavy and Schlosser, 2011; Kristoffersen et al., 2015). The focus of study in this literature has tended to be on educational outcomes, and thus we contribute by also evaluating internalizing behaviors and other forms of violence at school.

The rest of the paper is structured as follows. Section 2 discusses our methods: our data, variables and summary statistics, and our identification strategy. Section 3 discusses our results on peer effects for academic attainment, internalizing behaviors and forms of violence at school; as well whether the latter outcomes constitute mediators through which peer and own exposure to domestic violence affect test scores. Lastly, section 4 concludes.

2. Methods

2.1. Data, variables and summary statistics

Data was collected as part of an impact assessment study on school violence developed by the Ministry of Education (MoE) of Peru, which sought to reduce the cases of violence in schools (Oriol et. al, 2017). The MoE sampled 70 urban secondary public schools from 19 different regions at the national level. In the sampled schools, students from first and second grades (in secondary education) took part of the study.[2]

All questionnaires were self-administered in the classroom in the presence of at least one member of the research team. The questionnaire collected data of diverse student characteristics such as gender, age, and other socioeconomic household characteristics. It also collected detailed information that allowed measuring exposure to domestic violence; negative internalizing behaviors; and forms of violence at school such as aggression towards peers, bystander behavior, attitudes towards violence committed against peers, and victimization from bullying. These variables were based on measures developed in prior studies.[3] Furthermore, individual measures of academic attainment were obtained from administrative data of the MoE. Table 1 shows the summary statistics of our data.

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[2] Our dataset contained a set of missing values for the classroom variable. In order to address a possible bias, we regressed the peer exposure to domestic violence index against the missing values and found that there was not a significant relation. Further details can be found at the Appendix 1.

[3] Specific details on the items used to construct each variable is provided in Appendix 1.

Table 1: Descriptive Statistics

Variables	Mean	Standard Error	Min	Max	Observations
Student demographics					
Female	0.46	0.50	0.00	1.00	17086
Migrant status	0.27	0.44	0.00	1.00	16803
Overaged for grade	0.04	0.18	0.00	1.00	17086
Number of siblings	2.68	1.69	0.00	7.00	16763
Divorced parents	0.40	0.49	0.00	1.00	17086
Access to internet	0.73	0.45	0.00	1.00	16487
Access to drinking water	0.91	0.29	0.00	1.00	16904
Access to electricity	0.98	0.13	0.00	1.00	16985
Access to sanitary sewers	0.95	0.23	0.00	1.00	16955
Poverty	0.13	0.34	0.00	1.00	16822
Average number of students per class	24.53	7.33	1.00	53.00	17086
District's per capita income	734.09	200.88	214.90	1049.20	17086
% exposed to domestic violence	0.55	0.50	0.00	1.00	17086
% exposed to violence between couples	0.10	0.31	0.00	1.00	17086
% exposed to physical or verbal domestic violence	0.42	0.49	0.00	1.00	17086
% peers exposed to domestic violence	0.55	0.14	0.00	1.00	17086
% peers exposed to violence between couples	0.10	0.08	0.00	1.00	17086
% peers exposed to physical or verbal violence	0.42	0.14	0.00	1.00	17086
Index of exposure to domestic violence	1.38	2.08	0.00	16.00	17086
Peers' index of exposure to domestic violence	1.38	0.61	0.00	9.00	17086
Index of exposure to violence between couples	0.14	0.54	0.00	4.00	17086
Peers' index of exposure to violence between couples	0.14	0.14	0.00	2.00	17086
Index of exposure to physical or verbal violence	0.81	1.37	0.00	8.00	17086
Peers' index of exposure to physical or verbal violence	0.81	0.40	0.00	8.00	17086
Internalizing behaviors					
Depression index	8.62	4.11	0.00	30.00	16654
Severe depression	0.34	0.48	0.00	1.00	17086
Isolation index	1.42	1.34	0.00	6.00	16540
Forms of violence at school					
Aggression index	0.71	1.24	0.00	8.00	16745
Bystander behavior index	2.17	1.48	0.00	8.00	16577
Victimization from bullying index	2.58	2.95	0.00	16.00	16823
Attitudes towards violence index	5.34	5.08	0.00	24.00	16746

Variables	Mean	Standard Error	Min	Max	Observations
Academic attainment					
Dropout rate	0.03	0.16	0.00	1.00	17086
School mobility rate	0.12	0.32	0.00	1.00	17086
Same class rate	0.73	0.44	0.00	1.00	13395
Any kind of mobility rate	0.33	0.47	0.00	1.00	17086
Grade retention	0.04	0.19	0.00	1.00	13507
Verbal test scores	571.10	64.12	343.63	909.36	7739
Math test scores	559.09	69.69	301.13	965.17	7739

Exposure to Domestic Violence

We measure exposure to domestic violence as an index based on four self-reported items: i) whether or not the students' parents are physically violent against one another; ii) whether or not there is physical or verbal violence in between any family members at the household (excluding the surveyed children), iii) whether or not there is physical violence against the surveyed children and iv) whether or not there is verbal violence against the surveyed children. Each item uses a relative scale to measure the frequency in which violence occurs (i.e. "it doesn't", "a little," "sometimes," "often," "very often"), which has a numerical correspondence (per item) from 0 to 4. Thus, the range of the index of exposure to domestic violence goes between 0 to 8. On average, students report an index of exposure to domestic violence of 1.38. Furthermore, 55 percent of the students in the sample are exposed to at least "a little" domestic violence.

A regression of student demographic variables such as being a female, being in poverty, having divorced parents, the number of siblings and being an overaged student for the school cohort (including school-grade fixed effects) shows that they are positively related to exposure to domestic violence (see Table 2).[4] Thus, we control for all of them, both as individual and peer controls, in our estimations of the subsequent sections.

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[4] Except stated otherwise, domestic violence always refers to the measurement constructed with all the four forms of violence from our data.

Table 2: Own Domestic Violence Exposure Index and Students' Demographics

Students' Demographics	Own Domestic Violence Index
Female	0.152***
	(0.020)
Poverty	0.181***
	(0.028)
Number of Siblings	0.030***
	(0.005)
Divorced Parents	0.187***
	(0.017)
Overaged for Cohort	0.110*
	(0.056)
Observations	16,540
Nr. Clusters	808
School-grade FE	Yes

Some of these results are consistent with the empirical evidence. In this regard, Holt et al (2008) mention boys and girls respond differently to exposure to violence, and girls tend to exhibit more frequently internalized difficulties such as depression and somatic complaints. Thus, given the self-reported nature of the index, it is reasonable to expect a higher exposure to domestic violence from girls. On the other hand, there is a higher incidence of domestic violence in lower quintiles in Peru and among divorced couples (INEI, 2017).

Internalizing Behaviors

We measure symptoms of depression and loneliness as indicators of internalizing behaviors. To measure depression, we constructed an index based on a 10-item Depression Symptoms Test developed by Bradley et al. (2010), that has shown adequate factorial validity and internal consistency in adolescents. In this regard, our analysis indicate that the 10-item scale has a Cronbach's Alpha of 0.84 (see Appendix 3). This test is also the shorter version of the originally 20-item CES-D (The Center for Epidemiological Studies-Depression Scale) test. Specifically, the items include questions on whether the person has experienced depressive symptoms, and use a relative scale to measure the frequency of occurrence of depressive symptoms during a week (i.e. 1-2 days, 3-4 days, 5-7 days, every day) with a numerical correspondence (per item) from 0 to 3 (Bojorquez & Salgado, 2010).

Thus, the range of the index of depression goes from 0 to 30. On average, students report an index of exposure to depression of 8.62. Moreover, 34 percent of them experience clinically significant depressive symptoms – i.e. a score of 10 or above in the index (Bradley et al., 2010).

To measure isolation, we included a 3-item Isolation Symptoms Test which has been used extensively in the literature (Hays & DiMatteo, 1987; Hughes et al., 2004). This test is the shorter version of the originally 20-item UCLA Loneliness Scale Test and has also been shown to provide reliable results (Hughes et al., 2004). In this regard, our analysis indicate that the 3-item scale has a Cronbach's Alpha of 0.72 (see Appendix 3). The items include questions about the frequency with whom the person has experienced feelings of lack of company, rejection and isolation from others. They also use a relative scale to measure the frequency of those symptoms (i.e. "never or almost never", "sometimes", "all the time or almost all the time") with a numerical correspondence (per item) from 0 to 2. Thus, the range of the index of isolation goes from 0 to 6. On average, students obtained 1.42 in the isolation index.

Forms of Violence at School

As forms of violence at school, we measured the frequency of aggression, of victimization from bullying and of bystander behavior; and different attitudes towards violence committed against peers reported by the students. To measure aggression, we constructed an index based on a 4-item questionnaire used by Espelage and Holt (2001). The items include questions about whether the student has had violent attitudes towards his or her peers. They also use a relative scale to measure the frequency of those violent attitudes (i.e. "never", "one time", "two or more times") with a numerical correspondence (per item) from 0 to 2. Thus, the range of aggression index goes from 0 to 8. On average, students obtained 0.71 on the aggression index.

To measure bystander behavior, we constructed an index based on a 4-item questionnaire used by Williams & Guerra (2007). The items include questions on whether the student avoided doing something to stop a violent act among his or her peers (e.g. intervene directly or summon a teacher) or even encouraged the act. The items also use a relative scale to measure the frequency of those behaviors (i.e. "never", "one time", "two or more times") with a numerical correspondence (per item) from 0 to 2. Thus, the range of the bystander behavior index goes from 0 to 8. On average, students obtained 2.17 on the bystander behavior index.

To measure victimization from bullying, we constructed an index based on an 8-item questionnaire used by Espelage & Holt (2001) and CUBE. The items include questions on whether the student has been physically or verbally abused by his or her peers at school. They also use a relative scale to measure the frequency of victimization (i.e. "never", "one time", "two or more times") with a numerical correspondence (per item) of 0 to 8. Thus, the range of the victimization from bullying index goes from 0 to 16. On average, students obtained 2.58 in the victimization index.

Finally, to measure the students' attitudes towards violence committed against their peers we constructed an index based on a 6-item questionnaire used by Williams & Guerra (2007). The items include questions on whether (and in what degree) students agreed with acts of violence committed against their peers such as physical or verbal abuses. They also use a relative scale to measure the degree of agreement with those violent acts (i.e. "none", "a little", "some", "a lot", "quite a lot") with a numerical correspondence (per item) from 0 to 4. Thus, the range of the attitudes towards violence index goes from 0 to 24. On average, students in the sample obtained 5.34 in this index.

Academic attainment

Among the variables regarding academic attainment, we obtained verbal and math test scores from the National Student Assessment for high school students taken in 2015. This assessment is an annual standardized test distributed to all students of second year of secondary education in Peru. Furthermore, the data from the MoE also allowed us to identify dropout rates, mobility rates – in between schools and classrooms -, and grade retention.

2.2. Identification Strategy and Methodology

In Peru there is no tracking system in schools. Thus, children exposed to domestic violence cannot self-select into classrooms. However, the same cannot be said regarding schools: dropouts and mobility in between them occur because of misbehavior problems, thereby biasing the composition of student cohorts towards more or less average exposure to domestic violence. In order to account for this, as it was done by Carrell and Hoekstra (2010; 2018), we use the individual's own index of exposure to domestic violence as a control for its peers' index of exposure to domestic violence. Formally, we estimate the following equation using ordinary least squares, based on the linear-in-means model used by Sacerdote (2011):

$$y_{isgc} = \alpha_0 + \alpha_1 \frac{\sum_{j \neq i} DVI_{jsgc}}{n_{sgc} - 1} + \alpha_2 DVI_{isgc} + X'_{isgc}\beta + \bar{X}'_{j \neq isgc}\beta + \phi_{sg} + \varepsilon_{isgc} \qquad (1)$$

where y_{isgc} is the outcome variable for individual i in school s in grade g in class c in the year 2015; the second term, $\frac{\sum_{j \neq i} DVI_{jsgc}}{n_{sgc} - 1}$, represents the peers' average exposure to domestic violence index in the school classroom c (i.e. all students within the classroom but i); DVI_{isgc} represents the average exposure to one's own domestic violence; X_{isgc} is a vector of covariates that includes gender; an indicator of poverty equal to 1 if the students reports lack of access to any basic service at home and 0 otherwise; number of siblings; an indicator of broken homes that is equal to 1 if parents are reportedly separated and 0 otherwise; an indicator of overaged student for the grade that takes the value of 1 if the student is more than two years older than the age corresponding to the grade in which he or she is enrolled and 0 otherwise. The vector $\bar{X}_{j \neq isgc}$ includes the average of the control variables from peers, excluding individual i. ϕ_{sg} is a set of school-grade fixed effects that allows us to control for any unobserved heterogeneity between schools and grades in the sample. Standard errors, ε_{isgc}, are clustered at the classroom level in the analysis given the potential correlation across individuals who attended the same classrooms. The coefficient of interest in equation (1) is α_1, which can be interpreted as the contribution of troubled peers to educational outcomes, to internalizing behaviors of students, and to variables related to violence at school. Lastly, all indexes used for the estimations – either outcomes or independent variables – were standardized with respect to the sample.

3. Results

3.1. Peer effects of domestic violence

Table 3 shows results of various specifications for academic attainment outcomes. As Carrell and Hoekstra (2010), all specifications (1-4) include the students' own exposure to domestic violence index, whereas specifications 2-4 gradually add more controls. Even in the more highly specified model, which includes school-grade fixed effects, individual controls and peer controls, domestic a higher peer domestic index positively affects dropout and school mobility rates. The coefficients are remarkably stable across all specifications which further proves the robustness of our estimations.

These results imply a possible self-selection of students exposed to domestic violence into a subset of specific schools. Thus, we treat this as evidence to control for own exposure to domestic violence in all our estimations, to avoid a possible bias stemmed from this self-selection.

We also find strong evidence that peer exposure to domestic violence reduces both verbal and test scores, although the former ones with a higher statistical significance. For these regressions, we use controls at the school level instead of school-grade fixed effects.[5] Specifically, an additional standard deviation in the peer domestic violence index translates into a reduction of 5 percentage points in standard deviations of verbal test scores, and of 3.5 percentage points in standard deviations of math test scores. The magnitude of our results is similar to those of Carrell and Hoekstra (2010) who obtain a reduction of 2.4 percentage points in standard deviations of a composite of math and verbal test percentile scores.[6]

Table 3: Academic attainment

Specification	Dropout Rate				Mobility Rate			
	[1]	[2]	[3]	[4]	[1]	[2]	[3]	[4]
Peer Domestic Violence Index	0.003	0.003*	0.003**	0.004**	0.010***	0.007**	0.007**	0.008**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
Own Domestic Violence Index	0.006***	0.006***	0.005***	0.006***	0.018***	0.017***	0.016***	0.016***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
Observations	17,086	17,086	16,540	16,525	17,086	17,086	16,540	16,525
Nr. Clusters	808	808	808	793	808	808	808	793
Own DV	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
School-grade FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Individual controls	No	No	Yes	Yes	No	No	Yes	Yes
Peer controls	No	No	No	Yes	No	No	No	Yes

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[5] These variables include a dummy of whether the school has a public or private administration, a categoric variable that indicates if the school is only for boys, only for girls or for both; and a categoric variable that indicates the region in which the school is located within the country.

[6] We standardized their results to compare them to our estimations. Specifically, they show that adding one more student to a class of 20 students (i.e. an increase of 0.05) causes a reduction of 0.69 percentage points in test scores (0.05x13.79). Considering that the average score in the math and verbal composite is of 52.91 with a standard deviation of 29.02, this reduction is of 0.024 in standard deviations.

	Verbal Test Score				Math Test Score			
Specification	[1]	[2]	[3]	[4]	[1]	[2]	[3]	[4]
Peer Domestic Violence Index	-0.091***	-0.066***	-0.063***	-0.050***	-0.097***	-0.062***	-0.052**	-0.035*
	(0.023)	(0.018)	(0.017)	(0.017)	(0.024)	(0.021)	(0.020)	(0.020)
Own Domestic Violence Index	-0.037***	-0.033***	-0.014	-0.015	-0.045***	-0.040***	-0.013	-0.014
	(0.011)	(0.011)	(0.011)	(0.011)	(0.010)	(0.010)	(0.010)	(0.010)
Observations	7,739	7,739	7,537	7,535	7,739	7,739	7,537	7,535
Nr. Clusters	381	381	381	379	381	381	381	379
Own DV	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
School controls	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Individual controls	No	No	Yes	Yes	No	No	Yes	Yes
Peer controls	No	No	No	Yes	No	No	No	Yes

Table 4 shows results for internalizing behaviors across various specifications. The effect of peer exposure to domestic violence over depression and isolation is positive and significant even in the more highly specified model. In this regard, when controlling for own exposure to domestic violence, school-grade fixed effects, and individual and peer demographics, we find that an increase in one standard deviation of peer exposure to domestic violence increases the depression index of students in 2.9 percentage points in standard deviations, and the isolation index in 1.9 percentage points in standard deviations (see specification 4).

Table 4: Internalizing Behaviors

	Depression				Isolation			
Specification	[1]	[2]	[3]	[4]	[1]	[2]	[3]	[4]
Peer Domestic Violence Index	0.040***	0.030***	0.030***	0.029***	0.026***	0.023**	0.020**	0.019**
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Own Domestic Violence Index	0.286***	0.285***	0.270***	0.270***	0.340***	0.339***	0.324***	0.324***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.009)	(0.009)	(0.009)	(0.009)
Observations	16,654	16,654	16,154	16,139	16,540	16,540	16,052	16,037
Nr. Clusters	807	807	807	792	808	808	808	793
Own DV	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
School-grade FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Individual controls	No	No	Yes	Yes	No	No	Yes	Yes
Peer controls	No	No	No	Yes	No	No	No	Yes

Table 5 shows results for different forms of violence at school. Even though peer exposure to domestic violence does not seem to affect the aggression index, own exposure to domestic violence does. If interpreted together with the positive effect of peer exposure to domestic violence over victimization from bullying, these results may imply that domestic violence constitutes an externality for school peers intermediated by the aggressor exposed to violence. Remarkably, the results for the Victimization from Bullying Index are quite stable and robust across all specifications.

On the other hand, an increase in one standard deviation in the peer exposure to domestic violence index implies a rise in 2.5 percentage points in standard deviations of the Attitudes Towards Violence index. Carrell and Hoekstra (2010) find a similar result: an increase in the proportion of peers exposed to domestic violence causes more disciplinary incidents at school. These results are also quite stable across all specifications.

Table 5: Forms of violence at school

	Aggression				Victimization from bullying			
Specification	[1]	[2]	[3]	[4]	[1]	[2]	[3]	[4]
Peer Domestic Violence Index	-0.004	0.004	0.011	0.009	0.023*	0.024**	0.028***	0.029***
	(0.012)	(0.010)	(0.010)	(0.010)	(0.013)	(0.010)	(0.010)	(0.010)
Own Domestic Violence Index	0.233***	0.234***	0.242***	0.242***	0.334***	0.334***	0.338***	0.338***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.010)	(0.010)	(0.010)	(0.010)
Observations	16,745	16,745	16,240	16,226	16,823	16,823	16,309	16,295
Nr. Clusters	807	807	807	793	807	807	807	793
	Attitudes Towards Violence				Bystander Behavior			
Specification	[1]	[2]	[3]	[4]	[1]	[2]	[3]	[4]
Peer Domestic Violence Index	-0.003	0.025**	0.026**	0.025**	0.016	0.006	0.005	0.002
	(0.013)	(0.012)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.012)
Own Domestic Violence Index	0.168***	0.172***	0.175***	0.175***	0.021**	0.019**	0.015*	0.016*
	(0.009)	(0.009)	(0.010)	(0.009)	(0.008)	(0.008)	(0.008)	(0.009)
Observations	16,746	16,746	16,236	16,221	16,577	16,577	16,078	16,063
Nr. Clusters	808	808	808	793	808	808	808	793
Own DV	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
School-grade FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Individual controls	No	No	Yes	Yes	No	No	Yes	Yes
Peer controls	No	No	No	Yes	No	No	No	Yes

3.2. Mediators between domestic violence and test scores

Table 6 shows the results of evaluating whether internalizing behaviors and forms of violence at school constitute mediators between peer domestic violence exposure and academic attainment outcomes. Broadly, this analysis strives to identify through which channels peer domestic violence is canalized towards test scores.

Our findings show that the magnitude of the coefficient of peer exposure to domestic violence over academic attainment outcomes is not affected after controlling for internalizing behaviors and forms of violence at school. However, its statistical significance remains unchanged. Together, these results imply two remarks: i) there is strong evidence to assure that peer exposure to domestic violence affects academic attainment of students, ii) the channels through which this occurs constitute a topic that requires further research.

Interestingly, though, the coefficient of own violence is affected. In this regard, internalizing behaviors, victimization from bullying and having a positive attitude towards violence constitute mediators through which own exposure to domestic violence affects test scores. In relation to these results, Owens et al (2012) find that depression and anxiety negatively impact academic performance; whereas, Peterson and Ray (2006) point out that gifted students are at a higher risk of experiencing bullying. Thus, when the own exposure to domestic violence effect over test scores is dissociated from these variables, the remaining association changes from not having an impact to having a positive one over test scores.

Table 6: Intermediate effects

	Verbal Test Scores						
Peer Domestic Violence Index	-0.050***	-0.051***	-0.052***	-0.054***	-0.054***	-0.048***	-0.050***
	(0.017)	(0.017)	(0.018)	(0.018)	(0.018)	(0.017)	(0.017)
Own DV	-0.015	0.026**	0.038***	0.043***	0.043***	0.059***	0.049***
	(0.011)	(0.012)	(0.013)	(0.013)	(0.014)	(0.013)	(0.013)
Depression index		-0.153***	-0.130***	-0.128***	-0.125***	-0.101***	-0.107***
		(0.012)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Isolation Index			-0.052***	-0.049***	-0.051***	-0.041***	-0.054***
			(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Aggression Index				-0.026**	-0.022*	0.021*	-0.004
				(0.012)	(0.012)	(0.012)	(0.013)
Bystander Behavior Index					-0.014	-0.002	0.008
					(0.012)	(0.011)	(0.011)
Attitudes Towards Violence Index						-0.239***	-0.247***
						(0.013)	(0.013)
Victimization Index							0.073***
							(0.014)
Observations	7,535	7,419	7,288	7,201	7,114	7,051	7,051
Nr. Clusters	379	378	378	378	378	378	378
School controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Peer controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

	Math Test Scores						
Peer Domestic Violence Index	-0.035*	-0.034*	-0.037*	-0.038*	-0.038*	-0.034*	-0.035*
	(0.020)	(0.020)	(0.020)	(0.020)	(0.021)	(0.020)	(0.020)
Own DV	-0.014	0.025**	0.035***	0.038***	0.039***	0.053***	0.044***
	(0.010)	(0.011)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Depression index		-0.144***	-0.122***	-0.120***	-0.115***	-0.093***	-0.098***
		(0.012)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Isolation Index			-0.047***	-0.044***	-0.048***	-0.042***	-0.052***
			(0.014)	(0.014)	(0.014)	(0.013)	(0.013)
Aggression Index				-0.023**	-0.020*	0.018	-0.003
				(0.011)	(0.011)	(0.011)	(0.012)
Bystander Behavior Index					-0.017	-0.006	0.002
					(0.012)	(0.011)	(0.011)
Attitudes Towards Violence Index						-0.200***	-0.206***
						(0.014)	(0.014)
Victimization Index							0.058***
							(0.014)
Observations	7,535	7,419	7,288	7,201	7,114	7,051	7,051
Nr. Clusters	379	378	378	378	378	378	378
School controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Peer controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

4. Conclusion

Understanding the effects of exposure to domestic violence over the wellbeing of children constitutes an important task, especially for Latin American countries in which the spread of this problem is of a considerable magnitude. Our study follows closely the approach on this issue used by Carrell and Hoekstra (2010; 2018), but distinguishes itself by two contributions: i) we use a self-reported measure of exposure to domestic violence, opposed to their objective court-based identification strategy; and ii) we broaden the spectrum of studied outcomes by including not only academic attainment variables (i.e. dropout rates, school mobility rates and test scores), but also internalizing behaviors (i.e. depression and isolation) and forms of violence at school (i.e. aggression, victimization from bullying, attitudes towards violence and bystander behavior).

In summary, our findings provide strong evidence for the following conclusions. First, there is a clear direct impact of peer exposure to domestic violence over test scores, both by the stability and robustness of our estimations and because of previous studies on the subject (Carrell and Hoekstra; 2010, 2018). In this regard, the statistical significance of the coefficient of peer exposure to domestic violence persists, even after controlling for own exposure to domestic violence, individual, peer and school controls and all internalizing behaviors and forms of violence at school. Second, peer exposure to domestic violence also leads to higher levels of depression, isolation, victimization from bullying and attitudes towards violence among students; and this is a novel result within the peer effects literature. Lastly, internalizing behaviors and forms of violence at school constitute mediators of the effect of own exposure to domestic violence over academic attainment. However, the same cannot be said for peer exposure to domestic violence.

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Appendix

Appendix 1: Missing values at the classroom identifier

	Missing values at the classroom identifier
Peer Domestic Violence Index	0.001 (0.002)
Observations	18,882
Nr. Clusters	131
School-grade FE	Yes
Individual controls	Yes

Appendix 2: Construction of scales

All indexes were constructed by adding scores of a specific set of questions or statements. Each response to every statement has a specific punctuation. It is important to notice that every index is defined as negative or positive, therefore, all statements that conform each index must have the same direction (negative or positive). If any statement has a different direction, the punctuation is changed so it can be interpreted correctly. The questionnaire (baseline and follow-up surveys) is based on tests developed by Bradley et al. (2010), Hughes et al. (2004), CUBE ("Cuestionario de Bienestar Escolar" instrument for *Escuela Amiga*), Espelage and Holt (2001), and Williams and Guerra (2007) and Cornell (2013).

Questionnaire Items

Domain	Indicators	Statements
Violence	Exposure to domestic violence	1. Sometimes your mom (or dad) had been hit by you dad (or mom) or her/his partner
		2. There is always someone at home that is fighting with another member of your family
Internalizing Behaviors	Depression	1. I have been bothered by things that didn't use to
		2. I have trouble concentrating on a specific subject
		3. I felt depressed
		4. Everything takes a lot of effort
		5. I felt optimist about the future
		6. I felt scared
		7. I couldn't sleep well
		8. I was happy
		9. I felt lonely
		10. I didn't feel like doing anything
	Isolation	1. How frequently did you feel left out
		2. How frequently did you feel isolated from others
		3. How frequently did you feel that you lack companionship?

Domain	Indicators	Statements
Forms of violence at school	Attitudes towards violence	1. Do you agree with … Students bother other students in front of everybody
		2. Do you agree with … Students bother other students through social media
		3. Do you agree with … Students hit, push or kick other students
		4. Do you agree with … Students enjoy watching how other students hit their peers
		5. Do you agree with … Students do nothing when they witness in-school violence
		6. Do you agree with … Students report violence acts to teachers
	Aggression	1. I threatened another student with beating him or her
		2. I mocked another student through social media
		3. I insulted another student
		4. I started a fight with other student that ended up in a beating
	Bystander behavior	1. I celebrated when someone was being beaten by other students
		2. I celebrated when someone was being pushed by other students
		3. I tried to help a student that was being bullied
		4. I told an adult that a student was being bullied at school
	Victimization from bullying	1. Do you agree with … Students bother other students in front of everybody
		2. Do you agree with … Students bother other students through social media
		3. Do you agree with … Students hit, push or kick other students
		4. Do you agree with … Students enjoy watching how other students hit their peers
		5. Do you agree with … Students do nothing when they witness in-school violence
		6. Do you agree with … Students report violence acts to teachers

Appendix 3: Cronbach's Alpha reliability

Scale	# questions	Cronbach's Alpha	Reliability
Depression	10	0.84	High
Isolation	3	0.72	Acceptable
Bystander behavior	4	0.84	High

<u>Note</u>: Poor reliability ($\alpha < 0.6$), acceptable reliability ($0.6 \leq \alpha < 0.8$), good or high reliability ($\alpha \geq 0.8$)