Effects of Domestic Violence on Children's Human Capital in Colombia

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Human capital is well-known to be an important factor in economic development. Less well-known is the impact of exposure to family violence on children's educational outcomes. This paper fills a void in the literature by examining the effects of intimate partner violence (IPV) against the mother on the educational outcomes of her children ages 6-14. We take seriously the potential endogeneity of IPV and use both parametric and non-parametric instrumental variables methods to address it. Our data comes from Colombia's 2005 DHS, which includes an in-depth module on domestic violence. Our results indicate that mother's experience of IPV reduces children's school attendance by 1.3 to 2.7 percentage points, depending on the method used. It reduces unconditional grade advancement (i.e advancing vs. repeating the grade or dropping out) by 2.1 to 2.8 percentage points, while grade advancement conditional on staying in school falls by 1.5 to 1.9 percentage points. We are unable to detect any statistically significant effect of mother's IPV on the probability of drop-out in the past year, but we find that it lowers grade attainment conditional on current attendance by 0.06 to 0.09 years.

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Due to its endemic nature, intimate partner violence (IPV) – violence perpetrated by a male against his female partner – is increasingly being recognized as a human development problem worldwide (Kishor and Johnson 2004). IPV is also known as domestic violence, spousal abuse, and wife battery.[1] IPV is a multidimensional phenomenon that includes physical, emotional, and sexual violence, as well as stalking. The prevalence of physical IPV in different parts of the world has been estimated to range between 13 and 61 percent (Garcia-Moreno 2006).

IPV has cascading negative effects on the economic (Renzetti 2009), physical (Matthew *et al.* 1996), mental health (DeJonghe *et al.* 2008), and unintended pregnancy (Pallitto and O'Campo 2004) status of individual victims. Furthermore, IPV has negative consequences not only for the woman subjected to violence but also for the human development of her children (Evans, Davies, and DiLillo 2008). For instance, IPV is highly predictive of poor child nutrition (Heaton and Forste 2008) and poor cognitive, emotional and behavioral outcomes (Kirtzmann, Gaylord, Holt, and Kenny 2003). The objective of this paper is to explore the effects of mother's IPV on her children's current school attendance, drop-out in the past year, grade advancement in the last year, and grade attainment conditional on still being in school, in the context of Colombia.

Colombia is a multi-ethnic democratic republic with a population of about 42 million individuals as of 2005. Roughly 70 percent of the population lives in urban areas, and the literacy rate among individuals 15 years old and older is 91 percent. Armed conflict between the government, paramilitary groups and guerrilla groups has been going on in Colombia for forty years. The use of violence in multiple social contexts is so wide-reaching that some scholars argue it is contagious (Sánchez 2007). Recent evidence shows that 44.3 percent of women who are conflict-displaced have been physically abused by their intimate partners (Sanchez Lara *et al*. 2008).

Colombia has one of the highest physical IPV prevalence rates in the world and, after Peru, the highest in Latin America (Kishor and Johnson 2004). In a study using Colombia's 2005

[1] The term "domestic violence" typically includes violence between household members. It can be female to-male violence, childhood maltreatment, or between siblings. IPV is restricted to male-to-female violence.

Demographic Health Survey, 40 percent of women reported having ever experienced any type of physical violence, while 22 percent reported it for the last 12 months (Friedemann-Sánchez and Lovatón 2011; see Table 1, reproduced here). The prevalence of a woman having *ever* experienced severe forms of physical violence (threatened or attacked with a knife or a fire arm, strangled or burned, raped) is 16.6 percent. Sexual assault (11.7%) constitutes the most common severe form of violence. Being pushed or shaken is the most frequently reported among the less severe forms of violence (34%). The life-time and past-year rates of emotional abuse are even higher than the rates of physical violence at 66.4 percent and 52.3 percent respectively. This same study reveals that among the women who experienced IPV, 13.05 percent had bones broken, 23.7 percent reported having suicidal thoughts, and over one-third reported loss of productivity at work or in their studies.

What factors predict IPV in Colombia? Living in an urban environment, cohabitating with a partner, being younger, and having a larger number of children are all predictors of an increased probability of experiencing IPV (ibid). However, the highest probability of experiencing IPV is associated with the maltreatment of the woman's partner when he was a child (ibid). There is robust evidence for developed countries (Whitfield *et al.* 2003), also reported for a few developing regions like India (Martin *et al.* 2002), that childhood exposure to violence between parents is a risk factor for becoming a victim and/or perpetrator of violence later in life. The intergenerational perpetuation of intimate partner violence, along with its consequences related to multidimensional deprivation, suggests that domestic violence can contribute to intergenerational poverty traps (Evans, Davies and DiLillo, 2008).

Literature on Violence

There is a large literature on risk factors for IPV, but less has been written on effects of intimate partner violence on other outcomes, including those for children living in households with intimate partner violence. Although the study of IPV is more extensive for developed nations and specifically for the United States, an area that is understudied in both developed and developing nations is the effect that IPV has on children's education outcomes; the evidence about this is extremely limited. Among the few studies conducted in poor countries is one from Sri Lanka which found that children who were directly (watching, hearing, intervening) or

indirectly (observing maternal injuries, depression) exposed to IPV at home had poor school attendance and lower academic achievement on average as measured by exam scores (Jayasinghe, S., P. Jayawardena, and H. Perera, 2009). A study conducted in Brazil found that children 5 to 12 years old who lived with mothers exposed to psychological, physical and sexual IPV were more likely to be among those dropping out of school or failing a school year (Durand *et al*. 2011). Studies conducted in the United States have found lower reading levels among adolescents who have been exposed to IPV (Thompson and Whimper 2010), lower academic achievement in math and reading for children in elementary and middle school (Kiesel, L., Piescher, K, Edleson, J 2011), lower scores on standardized tests for children ages 6 to 17 – especially for girls and children younger than 12 years old (Peek-Asa, C. et al. 2007) – and more grade repetition and truancy among children 6 to 15 years old (Emery 2011).

This paper addresses two gaps in the literature. First, it provides evidence about the effects of IPV on child education. Second, we take seriously the issue of endogeneity, which is overlooked in much of the literature on consequences of IPV.[2] Endogeneity may arise due to at least two types of circumstances. The incidence of IPV could be related to confounding variables that affect both IPV and other household outcomes. For instance, an alcoholic father may not only beat his wife but also make the home environment difficult for study. It may also arise because of reverse causality: the outcome variable may provide the rationale for violence, as when the poor performance of children in school leads to a man abusing his partner. Addressing endogeneity is challenging in practice. In this paper we employ instrumental variables and matching methods, both of which rely on identifying assumptions.

Education in Colombia

According to Colombia's 2005 census, the literacy rate among individuals 15 years old and older was 91.6 percent (91.3% for men and 91.8% for women). A comparison of literacy rates since 1964 (when 75% of men and 71.1% of women reported they were literate) shows that they have

[2] Emery (2011) is the only study of child educational outcomes we have found that addresses the potential endogeneity of IPV. His concern is that children exposed to IPV are more likely to come from multi-problem families. Using panel data from Chicago, he estimates fixed-effect models in an attempt to separate the effects of IPV from effects of child abuse and selection bias. Because we do not have panel data, this approach is not available to us.

been steadily improving for both men and women. 2005 literacy rates were slightly higher in Colombia than in those of other Andean countries like Peru (88.6% in 2005) and Bolivia (87.2% in 2003) but were comparable to the rates of Venezuela (93.4% in 2003) and Ecuador (92.5% in 2003). According to 2005 census data, 78 percent of 5-6 year olds, 92 percent of 7-11 year olds, and 77 percent of 12-17 year-old children were enrolled in school; individuals between 15 and 24 years old had on average 9 years of formal schooling (DANE, 2005). A 2010 national study reports that of all children in elementary and secondary, 77.6 percent were enrolled in public schools, 5.5% received tuition subsidies, and 75.6 percent of urban children were enrolled (DANE, 2011). There is almost equal distribution by gender of current enrollment rates in primary (51% boys, 48% girls) and secondary (49% boys, 51% girls) education (ibid).

Our results using the 2005 Demographic and Health Survey (DHS) for Colombia show similar levels of educational outcomes. (See Tables 2 and 5.) We find that 93 percent of the 6-14 year-olds in our sample were attending school at the time of the survey. Over 91 percent of those who were in school the previous year advanced to the next grade; among those in school in both the previous year and the survey year, over 95 percent advanced. Only 2 percent dropped out in the year prior to the survey.

Estimation Strategy

We use both parametric and non-parametric instrumental variable (IV) and non-IV methods to address the potential endogeneity of intimate partner violence (IPV) to child human capital outcomes. We also test for the endogeneity of mother's experience with IPV to the child's educational outcomes. If such a test fails to reject exogeneity then the use of non-IV methods is justified.

Instruments. An IV strategy crucially depends on the validity of the instruments. Our instruments relate to the mother's partner's experience of violence when he was a child (that is, whether or not he was beaten) and her own childhood experience of witnessing her father battering her mother. We argue that these instruments are excludable from the child's school attendance equation if an appropriate set of controls for household socioeconomic status and contextual variables is included.

Dependent variables. We use a number of variables related to child schooling outcomes. These include whether the child is currently attending school, whether s/he dropped out in the past year, whether s/he has progressed a grade since the previous year – both conditional on not dropping out (i.e. repeating the grade only) and unconditionally (either repeating or dropping out) – and total number of years of education successfully completed to date.

Explanatory Variables. Our main explanatory variable is the potentially endogenous regressor indicating whether the mother has experienced physical intimate partner violence in the past 12 months. Women were asked about the following experiences: (i) being pushed or shaken, (ii) hit with a hand, (iii) hit with an object, (iv) bitten, (v) kicked or dragged, (vi) threatened with a knife, (vii) attacked with a knife or firearm, (viii) being subject to an attempt at strangulation or burning, and (ix) being raped. The occurrence of any of these at least once in the past 12 months constitutes IPV by our definition. For the purposes of this paper we did not consider the experience of emotional violence, such as controlling behaviors or threats, to be instances of IPV.

Additional individual and household-level controls used in both the child outcome equation and as explanatory variables in the first stage IPV equation include child sex, age, age-squared, the household's wealth quintile, the mother's and her partner's years of schooling, marital and cohabitation status of the mother, sex of the household head, the number of previous household members living abroad, and variables indicating the composition of the household in terms of numbers of female and male children and adults, including the presence of relatives on either the mother's side or that of her partner. In addition, we control in the second stage equations for whether or not other violence-related variables (discussed below) used in the first stage to predict mothers' intimate partner violence were missing, arguing that a woman's ability to report such information may relate to the presence or absence of a partner, how well she knows her partner, or other non-excludable aspects of the context. Community-level controls include regional dummy variables and municipality averages for a wealth index, years of education of adult males and females, the child-woman ratio, the percentage of female-headed households, the percentage of the population abroad, the percentage of women in wage and salary employment, the proportion of the male and female workforce in formal employment, the percentage of households with piped water and sewage disposal, and the percentage of households cooking

with firewood. All these municipality-specific variables were calculated by averaging over the DHS sample in each municipality.

Estimation methods. We use five different approaches to estimating the effect of intimate partner violence on our measures of children's human capital. The first three are parametric methods: Probit, IV-Probit, and IV-Regress are used for the four binary dependent variables, and Poisson, IV-Poisson, and IV-Regress are used for an analysis of grade attainment, which is count data. The last two are non-parametric methods: propensity score matching with kernel matching and a non-parametric-IV local average treatment effect (NPLATE) method due to Frolich (2007). NPLATE is particularly useful in cases when the endogenous regressor is binary and when the validity of the IV is conditional on the presence of other covariates. Standard errors are bootstrapped for all of the non-parametric methods. They are also bootstrapped for the parametric IV-Poisson, because we use a two-stage technique with the presence of a predicted regressor in the second stage. Since we use all children in the sample, both the analytical standard errors and the bootstrapped standard errors allow for intragroup correlation for children in the same household.

Data and Sample

The sample includes all children ages 6-14 living in households where the mother is present, is under the age of 50, and has responded to the domestic violence module in the 2005 Demographic and Health Survey for Colombia. The DHS 2005 sample includes 31,140 children between the ages of 6 and 14. Of those, 23,253 lived with a mother who was between the ages of 15 and 49 and who was selected for interview for the domestic violence module. The final sample includes 21,827 children because of losses due to mothers who could not be safely interviewed in private or who had never been married or in a de facto union. As shown in Table 2, there is a noticeable bivariate negative association between the presence of IPV in a household and children's educational outcomes. For example, children in households with IPV had, on average, more than one-third of a year less in terms of grade attainment. In addition, our chosen instruments, the maltreatment of the male partner when he was a child and the mother witnessing

violence among her parents, are both strongly associated in a bivariate sense with the incidence of IPV in the household (Tables 3 and 4).[3]

The descriptive statistics for our dependent and explanatory variables are shown in Table 5.

Estimation Details and Results for School Attendance

In what follows, we discuss summary Tables 6 and 7 and accompanying Appendix Tables A1 to A7, first with respect to each dependent variable, then comparing results across methods used. We will begin by discussing the results for the first dependent variable – child's school attendance – from the various estimation methods used and then move to a comparison of the results for the other dependent variables in the next section. Table 6 shows the summary results for the marginal effect of IPV and Appendix Table 1 shows the full regressions for the three parametric models (Probit, IV-Probit and IV-regress).

Parametric methods: non-IV and IV. The simplest estimation approach assumes that IPV is exogenous to child human capital outcomes and uses IPV as a binary regressor in a Probit model. Results using this approach show that IPV has a negative effect on the probability of school attendance that is statistically significant at the 5 percent level. As shown in the first column of Table 6, this method shows that a reference child who has average values for continuous regressors and zero values for dummy regressors and whose predicted probability of school attendance is 82.8 percent, experiences a 2.7 percentage point reduction in his/her probability of attendance if his/her mother is subjected to IPV.[4]

Given the possible endogeneity of IPV, we estimate an instrumental variable Probit model (IV-Probit). We used the full set of IVs in the first stage, which include the mother's partner experiencing violence as a child and the mother witnessing violence among her parents. Before discussing the results, we examine two issues with respect to the validity of the instruments. One

[3] All three bivariate associations are statistically significant at the 1% level.

[4] The detailed results from the parametric estimation methods are shown in Appendix Table 1. The first row in the table shows the base probability and the subsequent row shows the marginal effects of each regressor. For the Probit and IV-probit models, the base probability is calculated for a reference individual with all continuous variables set at the mean and all dummy variables set at zero. For the linear IV-Regress model, the base probability is the mean probability of school attendance.

is whether they have sufficient explanatory power in the first stage equation. A Chi-squared test of the joint significance of the instruments in the first stage shows that they are jointly highly significant.[5] The second issue is whether the instruments are excludable from the second stage. While there is no over-identification test for use with IV-Probit, we conducted tests using a conventional linear two-stage least squares specification, which sustained the exclusion restriction.[6]

The IV-Probit and IV-regress models produce results of a similar order of magnitude to those of the Probit regression, but the coefficient of IPV in both models is statistically insignificant. The marginal effect for a reference child is a reduction in the school attendance probability of 3.9 percentage points for the IV-Probit model and of 2.1 percentage points for the IV-regress model. A test of the endogeneity of IPV failed to reject exogeneity in both the IV-Probit and IV-Regress models.[7] This suggests that the use of a non-IV Probit model is appropriate.

Non-parametric methods: non-IV and IV. The non-parametric non-IV method we use is propensity score matching (PSM) using Epanechnikov kernel matching, which has become a standard in the matching literature. The treatment variable here is whether the mother of the index child has experienced IPV. The outcome is, as before, the child's school attendance. PSM assumes that selection into treatment (i.e., mother experiencing IPV) depends solely on observables. In other words, mother's IPV is exogenous to child school attendance – an assumption that was supported by the parametric estimation above.[8]

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[5] Joint test of instruments: chi2(2) = 236.24, p-value = 0.0000. We also ran a linear 2-stage least squares model (IV-Regress), which treats both the dependent variable and the endogenous regressor as continuous, and conducted an F-test on the power of the instruments in the first stage. This produced an F statistic of 117.84, well above the typical cut-off considered acceptable in 2-stage least squares estimation, which is 30. Test results for this and other dependent variables are shown in Table 7.

[6] To test the excludability of the instruments from the second stage, we used the Sargan and Basmann overidentification tests. In both cases, the tests are insignificant, suggesting that our exclusion assumption is justified. See Table 7.

[7] For the IV-Probit model, a Wald test yielded a test statistic chi2(1) =0.02, p-value=0.875 and for the IV-Regress model, an F-test yielded a test-statistic F(1)=0.07, p-value=0.789 (see Table 7).

[8] We used the user-written STATA ado file PSMATCH2 v4.04 to carry out the propensity score matching estimations. See Leuven and Sianesi (2003).

All the explanatory variables and instruments discussed above are included in the Probit propensity score equation. The matching process resulted in all covariates being balanced and all observations being on the common support, meaning that all treated and untreated observations were used in the matching process. The PSM results show that the average treatment effect on the treated (ATT) is a reduction of 1.3 percentage points that is statistically significant at the 5 percent level (See Table 6). That is IPV reduces the probability of school attendance for the children whose mothers are subjected to violence by 1.3 percentage points from 93.1 percent (for a matched control group) to 91.8 percent (for the treated group).

To address the potential endogeneity of mother's IPV, we use a non-parametric IV estimator developed by Frolich (2007) and operationalized in STATA by Frolich and Melly (2010). This estimator, the non-parametric local average treatment effect (NPLATE), requires the same exclusion and monotonicity assumptions of other IV approaches but makes much weaker assumptions on functional form.

The NPLATE estimator yields a positive but highly insignificant effect of IPV on school attendance (see Table 6)[9] Again, the likely exogeneity of mother's IPV makes it unnecessary to use IV methods.

Overall, we find the Probit and matching results convincing. Given that the tests documented in Table 7 failed to rejected exogeneity of mother's IPV, it is appropriate to use the Probit and matching models. Moreover, in a qualitative sense all the results tend to agree. The IV results, while insignificant, are similar.

Comparison of Results for All Dependent Variables

The effect of IPV on three other limited dependent variables – grade advancement conditional on staying in school (vs. repeating), recent drop-out, and unconditional grade advancement (vs. repeating or dropping-out) was estimated using the same five methods as reported for school attendance. Results are again reported in Table 6. For each of these three dependent variables the IV-Probit, IV-Regress, and NPLATE models produced statistically insignificant estimates of

[9] That is the case whether we use analytical or bootstrapped standard errors.

the effect of mother's IPV on the child's educational outcome. However, in each case the tests of endogeneity reveal that exogeneity cannot be rejected (see Table 7), so it is appropriate to focus on the results of the Probit and matching models.

Mother's IPV has no discernible effect on the likelihood that children dropped out of school in the year prior to the survey. The two grade advancement measures do, however, seem to be affected. IPV reduces grade advancement conditional on continued attendance at school by 1.5 and 1.9 percentage points, respectively, according to the matching and Probit estimators. Unconditional grade advancement – a combination of the drop-out and unconditional advancement variables – is reduced by 2.1 and 2.8 percentage points, respectively, based on the same two estimators. All four estimates are statistically significant at higher than the 1 percent level. The fact that results differ for conditional and unconditional advancement may indicate that there is, in fact, increased drop-out due to IPV, but that it is imprecisely estimated.

Overall, we consider school attendance to be the most interesting measure of school success among these four. Instead of only capturing transitions in the past two years, it may reflect a longer history of household violence.

Finally, our fifth dependent variable, grade attainment, is appropriately treated as count data and therefore requires different estimation methods. Using a Poisson model[10], mother's IPV is estimated to reduce grade attainment by 0.06 years conditional on the child remaining in school. The predicted number of years attained for a reference 10-year old child is 3.2 years, suggesting that IPV results in a reduction in grades attained of 2 percent. Another way of assessing the magnitude of the effect is to compare it to the standard deviation of grade attained for ten-year olds, which is 1.2. The impact of IPV on grade attainment is therefore equal to 5 percent of the standard deviation.

Grade attainment was also estimated using IV-Poisson, IV-Regress, matching, and NPLATE models. Like the the binary dependent variables discussed above, tests of the endogeneity of IPV

[10] We also estimated a negative binomial model. The negative binomial differs from the Poisson model by a parameter alpha, which measures data dispersion. When alpha equals zero, the negative bionomial reduces to a Poisson. In our case the estimated alpha was small enough to be effectively zero, so we did do not present results from this model.

could not reject exogeneity, leading us to focus on the Poisson and matching models.[11] The matching model yielded a larger negative effect of IPV on grade attainment than that obtained by the Poisson model, with mother's IPV leading to a 0.09 year reduction in grade attainment, or 7.5 percent of one standard deviation for a ten-year old child. For grade attainment, the IV results were qualitatively different, being positive rather than negative, but all were statistically insignificant.[12]

A note on matching model methodology

In all but one of the results for IPV discussed above, matching model estimates are statistically significant at the 5 percent level, the exception being recent dropout. We conducted a sensitivity analysis on the choice of matching methodology used to assess the robustness of our results (See Table A7.) All the methods are based on a mean difference between the outcome for each treated observation and a weighted average of the outcomes of untreated observation, with the weights depending on a distance measure in the propensity score space. Matching estimators differ in the weight they assign to each untreated observation in the comparison group. For instance, nearest-neighbor matching puts a weight of 1 on the closest untreated observation in terms of propensity score and zero on all other untreated observations. Similarly n-nearest neighbor matching uses any chosen number (n) of nearest neighbors and assigns to them equal weight. Kernel matching uses a kernel function that places higher weight on untreated observations that are closer to the treated observation and lower weight on more distant ones (Heckman, Ichimura and Todd 1998). The kernel function we use is either Epanechnikov (the default), Normal, or Uniform.[13]

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[11] A test of endogeneity in the 2SLS model yields a test-statistic of F(1)=1.963, p-value=0.161. See Table 7.

[12] Standard errors for the IV-Poisson needed to be bootstrapped because, in the second stage, the analytical standard errorswere not corrected for the inclusion of a predicted regressor. Bootstrapped SEs are shown in Table 6.

[13] The kernel function K(u) is a function of the distance measure $u = \left(p_i - p_j \middle/ h \right)$ where p_i is the propensity score of the treated observation and p_j is the propensity score of the untreated observations and h is a pre-specified bandwidth (set to a default of 0.06 in PSMatch2). For the Epanechnikov kernel $K(u) \propto (1-u^2)$ if $|u \leq 1|$, $K(u) = 0$, otherwise. The Normal Kernel is based on $K(u) \propto \exp(-u^2/2)$ and uses all untreated observations. The uniform kernel uses equal weights for all observations falling within the bandwidth h. See Sianesi (2001).

The results shown in Table 6 are based on the kernel matching method with an Epanechnikov kernel function. They are also shown in the first results column of Table A7. We also show results using the Normal and uniform kernel functions and for one-to-one mathing and five-nearest neighbors matching. We can see from Table A7 that the results for "attending school", "grade advancement or not" and "advance or drop out/repeat" are highly robust to the choice of matching method. The results for "recent drop out", which were statistically insignificant using the Epanechnikov method, become larger and statistically significant when using the one-to-one and five-nearest-neighbors methods. The results for grade attainment are somewhat less robust, with the Epanechnikov and uniform kernel functions yielding similar results, the Normal kernel function yielding larger and more statistically significant effects, and the one-to-one and five-nearest-neighbors matching methods yielding smaller and insignificant estimates.

After matching, balancing tests for all covariates were conducted. Ideally, means of covariates for the treated should be the same as for the matched untreated observations. In the Epanechnikov and uniform kernel methods, all covariates were balanced, suggesting a good match. That was mostly the case for five-nearest-neighbors matching as well, except for the case of grade attainment. The Normal kernel function matching and one-to-one matching typically had unbalanced covariates, suggesting that the matching was less successful in these cases. As a final note on the matching methods, all treated observations were on the common support for all the methods used, meaning that at least one match was found for all of them.

Other results

With respect to estimated effects of other variables on the educational outcomes, the results were remarkably consistent across the different parametric estimation methods in terms of signs and levels of significance (See Tables A1 to A5). A few variables stand-out. The effect of the child being female is positive across all dependent variables except drop-out, which is insignificant. As is typical in such analyses, mother's education always has positive effects on educational outcomes, as does partner's education for attendance and grade attainment. Municipality-level averages of female education had the expected effects in most cases (attendance, drop-out and unconditional attainment). Oddly enough, higher municipality-level education averages for adult males increased drop-out. If the household had migrated, children's educational outcomes were

negatively affected. Wealth consistently improved outcomes except in the case of conditional grade advancement, where the effect is insignificant. The household's numbers of 0-5 year-olds had negative effects on all educational outcomes for children 6-14. Even the municipality level child-woman ratio had negative effects on grade advancement (conditional and unconditional) and grade attainment. Clearly, caring for young children is among the responsibilities of 6-14 year-olds in Colombia – except, perhaps, when the household includes multiple women ages 18-64, whose presence has positive effects on children's school attendance and grade attainment.

Conclusions and policy implications

Very few studies have considered the effects of family violence on children's human capital formation. Those studies that do almost never take account of the possibility of endogeneity, as we do using cross-sectional data and as Emery (2011) has done in a rare study using panel data. A series of careful tests do not reject exogeneity, so we report results from matching models and Probit or Poisson models – noting, however, that almost all our estimates of the effect of a mother's experience of intimate partner violence with respect to a particular dependent variable are qualitatively similar.

A woman's experience of intimate partner violence has a negative effect on school attendance, decreasing it by 1 to 3 percentage points. This effect sounds small but consider that 93 percent of the sampled 6-14 year olds attend school, on average. Our findings could explain a substantial portion of the non-attending 7 percent. To our knowledge, the only other study conducted in a developing country using school attendance as an outcome also found that IPV had a negative effect on education outcomes (Jayasinghe, S., P. Jayawardena, and H. Perera 2009). School attendance has not been used as an education outcome in studies with populations in the United States, probably because attending school is compulsory and compliance is extremely high.

IPV also has a negative effect on grade advancement of about 1.5 to 2 percentage points (conditional) and about 2 to 3 percentage points (unconditional) – a similar order of magnitude as for attendance. Studies conducted in Brazil (Durand et al. 2011) and the United States (Emery 2011) show similar findings.

Effects on grade attainment (conditional on continued school attendance) might be viewed as showing a cumulative effect of mother's experience of intimate partner violence on their children's educations. Our results indicate that a reference 10-year old child has lost somewhere between 0.06 and 0.09 years of schooling due to IPV. This amounts to 5 to 7.5 percent of the standard deviation of this variable.

Our results show that IPV has negative multiplier effects not only for the victims but the victims' children. Most studies in the IPV literature that look at child outcomes focus on mental, cognitive and behavioral outcomes. In part this is due to the fact that domestic violence as an area of research emerged from and has been dominated by the health field, including psychology. Scholars have shown that children as young as 3 years old who have been exposed directly or indirectly to IPV have lower intellectual abilities relative to those who have not (Huth-Bocks et al 2001). A handful of studies have demonstrated the associations between psychological outcomes and education outcomes (Durand et al 2011, Jayasinghe et al 2009, Emery 2011). IPV, human development, and economic development are generally studied separately. Likewise, policy, programming and funding streams are generally kept separate, as recently voiced by participants in the Institute of Medicine's Forum on Global Violence Prevention (Patel 2011). Violence prevention and the development of children's human capital ought to be considered concurrently and holistically in research, policy and programming if we are to improve child education outcomes. A supplement to the DHS including psychological inventories for children, for example, would allow social scientists to consider multiple effects of IPV and their interactions.

The Institute of Medicine's Forum on Global Violence Prevention (OIM) points out that we are at a critical point in domestic violence studies: it is known that the risk factors for IPV and negative outcomes for children are similar, yet there is no clear path as to how to diminish IPV and how to intervene in ongoing IPV. The U.S. literature has focused on providing psychosocial support for mothers, thus reducing stress and depression, which will improve mothering response and quality and thus child outcomes. The OIM recommends (1) parenting training for IPV workers – assuming they exist (there are none in Colombia); (2) parenting programs that promote couples' communication skills; and (3) using media to change social norms. In addition we note that screening for child maltreatment in cases of school absenteeism could be

implemented by schools, just as medical professionals are starting to screen for violence at appointments. Last, the development of policies and interventions that are child and family-centered may prove positive in mitigating the negative human capital effects of IPV on children. A recent intervention program in Brazil challenges gender norms related to manhood by engaging men and communities and teaching the use of non-violent forms of child education and discipline. These authors report that men who support more equitable gender norms are less likely to be IPV perpetrators (Pulerwitz and Barker 2008).

Given Colombia's high prevalence rates of IPV and negative effects IPV has on child human capital outcomes, preventing IPV is critical to advancing the human development of current and future generations of Colombians.

References cited

DeJonghe, E.S., G.A. Bogat, A.A. Levendosky, and A. von Eye. 2008. "Women Survivors of Intimate Partner Violence and Post-Traumatic Stress Disorder: Prediction and Prevention." *Journal of Postgraduate Medicine* 54(4):294-300.

Durand, J.G., L.B. Schraiber, I. Franca, and C. Barros. 2011. "Impact of exposure to intimate partner violence on children's behavior." *Revista De Saude Publica* 45(2):355-364.

Emery, C.R. 2011. "Controlling for Selection Effects in the Relationship Between Child Behavior Problems and Exposure to Intimate Partner Violence." *Journal of Interpersonal Violence* 26(8):1541-1558.

Evans, S.E., C. Davies, and D. DiLillo. 2008. "Exposure to Domestic Violence: A Meta-Analysis of Child and Adolescent Outcomes." *Aggression and Violent Behavior* 13:131-140.

Friedemann-Sánchez, G., Lovatón Dávila R. 2011. Domestic Violence in Colombia. (Mimeo.)

Froelich. Markus (2007): Nonparametric IV estimation of local average treatment effects with covariates. Journal of Econometrics, 139, 35-75.

Froelich, Markus and Blaise Melly (2008): Estimation of quantile treatment effects with STATA. *The Stata Journal*. Volume 10 Number 3: pp. 423-457

Garcia-Moreno, C., H. Jansen, M. Ellsberg, L. Heise, and C.H. Watts. 2006. "Prevalence of Intimate Partner Violence: Findings from WHO multi-country Study on Women's Health and Domestic Violence." *The Lancet* 368(9543):1260-1269.

Heaton, T. B. and R. Forste (2008). "Domestic Violence, Couple Interaction and Children's Health in Latin America." *Journal of Family Violence* 23(3): 183-193.

Heckman, J.J., Ichimura, H. and Todd, P.E. (1998), "Matching as an Econometric Evaluation Estimator", *Review of Economic Studies*, 65, 261-294.

Huth-Bocks, A.C., A.A. Levendosky, and M.A. Semel. 2001. "The Direct and Indirect Effects of Domestic Violence on Young Children's Intellectual Functioning." *Journal of Family Violence* 16(3):269-290.

Jayasinghe, S., P. Jayawardena, and H. Perera. 2009. "Influence of Intimate Partner Violence on Behavior, Psychological Status and School Performance in Sri Lanka." *Journal of Family Studies* 15:274-283.

Kiesel, L., Piescher, K, Edleson, J. 2011. Direct and Indirect Child Exposure to Violence: Effects on Academic Performance and Disability. (Mimeo)

Kitzmannn, K.M., N.K. Gaylord, A.R. Holt, and E.D. Kenny. 2003. " Child witnesses to domestic violence: A meta-analytic review." *Journal of consulting and Clinical Psychology* 71(2):339-352.

Kishor, S.and K. Johnson. 2004. *Profiling Domestic Violence*. Calverton: ORC Macro.

Leuven, E. and B. Sianesi. (2003). "PSMATCH2: Stata module to perform full Mahalanobis and propensity score matching, common support graphing, and covariate imbalance testing". http://ideas.repec.org/c/boc/bocode/s432001.html. This version 4.0.4, 10 November 2010.

Martin, S.L., K.E. Moracco, J. Garro, A.O. Tsui, L.L. Kupper, J.L. Chase, and J.C. Campbell. 2002. "Domestic Violence Across Generations: Findings From Northern India." *International Journal of Epidemiology* 31(3):560-572.

Matthew, P.K., F. Kapua, P.J. Soaki, and D.A.K. Watters. 1996. "Trauma Admissions in the Southern Highlands of Papua New Guinea." *Australian and New Zealand Journal of Surgery* 66(10):659-663.

Pallitto, C. C. and P. O'Campo (2004). "The Relationship Between Intimate Partner Violence and Unintended Pregnancy: Analysis of a National Sample from Colombia." *International Family Planning Perspectives* 30(4): 165-173.

Patel, D., Rapporteur. 2011. "Preventing Violecne Against Women: Workshop Summary." Washington DC: Institute of Medicine.

Peek-Asa, C., L. Maxwell, A. Stromquist, P. Whitten, M.A. Limbos, and J. Merchant. 2007. "Does parental physical violence reduce children's standardized test score performance?" *Annals of Epidemiology* 17(11):847-853.

Pulerwitz, J. and G. Barker. 2008. "Measuring Attitudes towardGender Norms among Young Men in Brazil." Men & Masculinities 10(3): 322-38.

Renzetti, C.M. 2009. "Economic Stress and Domestic Violence." *National Online Resource Center on Violence Against Women*. Available online at http://www.vawnet.org/summary.php?doc_id=2187&find_type=web_desc_AR.

Sánchez, F. 2007. *Las Cuentas de la Violencia*. Bogota: Norma.

Sánchez Lara, M., C. Gomez Lopez, J.C. Pardo Lugo, M.C. Arenas Garcia, M. Da Silva, P. Siado, and O. Concha Jurado. 2008. "Promocion y Monitoreo de los Derechos Sexuales y Reproductivos de Mujeres Víctimas de Desplazamiento Forzado con Enfasis en Violencias Intrafamiliar y Sexual." Bogotá: Defensoría del Pueblo.

Sianesi, B. (2001). "Implementing Propensity Score Matching Estimation with STATA." Paper presented at the UK STATA users group VII meeting, London. [http://fmwww.bc.edu/RePEc/usug2001/psmatch.pdf] accessed 3/22/2012.

Thompson, R.and L.A. Whimper. 2010. "Exposure to Family Violence and Reading Level of Early Adolescents." *Journal of Agression, Maltreatment and Trauma* 19(7):721-733.

Whitfield, C.L., R.F. Anda, S.R. Dube, and V.J. Felitti. 2003. "Violent Childhood Experiences and the Risk of Intimate Partner Violence in Adults." *Journal of Interpersonal Violence* 18(2):166-185.

Table 1. Prevalence of Physical Violence by Intimate Partner in Colombia (2005)

Type of violence	Past 12 months	Ever
Any physical violence	**22.1**	**39.7**
Less severe		
a. Pushed or shaken	18.2	34.0
b. Hit with a hand	13.8	29.4
c. Hit with an object	4.5	9.5
d. Biten	1.5	2.7
e. Kicked or dragged	6.1	12.9
Any form of less-severe physical violence	**20.3**	**38.2**
All forms of less-severe physical violence	**0.7**	**2.4**
More severe		
f. Threatened with a knife	4.1	8.1
g. Attacked with a knife or a firearm	2.0	4.0
h. Tried to strangle or to burn	2.0	5.0
i. Raped	6.9	11.7
Any form of more-severe physical violence	**9.6**	**16.6**
All forms of more-severe physical violence	**0.6**	**0.7**
Sample size*	**25,669**	**25,669**

* Refers to number of females 13-49 who responded to domestic violence module in the 20005 Colombia DHS.

Source: Friedemann-Sanchez and Lovaton (2011)

Table 2. School Attandence (%) by Presence of Intimate Partner Violence in Household (weighted)

	Intimate Partner Violence in HH			Sample size
	No IPV	IPV	Total	
Attending school or not	93.7	91.9	93.3	21,827
Grade advancement or not†	96.0	94.1	95.6	19,683
Recent drop out or not	2.17	2.58	2.27	20,433
Advance or drop out / repeat	92.3	89.1	91.6	20,429
Grade attainment	4.31	3.91	4.22	20,370

Table 3. Presence of Intimate Partner Violence in Household (%) by Partner Maltreatment as a Child (weighted)

	Partner Maltreated as a Child		
Intimate Partner Violence in HH	No	Yes	Total
No IPV	81.3	67.2	76.9
IPV	18.7	32.8	23.1
Total	100.0	100.0	100.0
% children whose mothers' partners maltreated as child			31.0
Sample size*	15,135	6,692	21,827

Table 4. Presence of Intimate Partner Violence in Household (%) by Mother Witnessing Violence Among Her Parents (weighted)

	Mother Witnessed Parents' Violence		
Intimate Partner Violence in HH	No	Yes	Total
No IPV	79.7	71.3	76.9
IPV	20.3	28.7	23.1
Total	100.0	100.0	100.0
% children whose mothers witnessed parents' violence			33.5
Sample size*	15,135	6,692	21,827

* Refers to children 6-14 living with mothers 15-49 who responded to the domestic violence module of the Colombia 2005 DHS.

Source: Authors' calculations from Colombia 2005 DHS.

Table 5. Descriptive Statistics, Children Ages 6-14, Colombia, DHS 2005 (Weighted)

Variable	Mean	Standard Deviation
Dependent variables:		
school attendance (or not)	0.933	0.250
grade advancement (vs. repeat, conditional on staying in school)	0.956	0.205
recent dropout (or not)	0.021	0.144
grade advancement (vs. drop-out / repeat)	0.916	0.278
grade attainment	4.220	2.477
Instrumental variables:		
partner beaten when a child	0.310	0.462
missing: partner beaten as child	0.122	0.327
mother's parents' violence	0.335	0.472
missing: mother's parents' violence	0.039	0.193
Endogenous regressor:		
mother's intimate partner physical violence	0.310	0.462
Child variables:		
child is female	0.495	0.500
child's age	9.923	2.545
child's age-squared	1.050	0.511
child is son/daughter of HH head	0.845	0.362
Mother variables:		
mother's age when child was age 6	31.778	5.806
mother's age squared/100 (when child was 6)	10.440	3.828
mother's years of education completed	7.036	4.147
mother cohabitating (reference category)	0.432	0.495
mother is married	0.364	0.481
mother is widow	0.030	0.171
mother is divorced etc.	0.174	0.379
Partner-of-mother variables:		
partner's years of education completed	6.732	4.458
missing: partner's years of education	0.028	0.165
Household variables:		
HH has migrated	0.148	0.355
wealth quintile 1 (reference category)	0.227	0.419
wealth quintile 2	0.222	0.416
wealth quintile 3	0.206	0.405
wealth quintile 4	0.187	0.390
wealth quintile 5 (richest)	0.158	0.364
Household composition [§] *variables:*		
mother has relatives in HH	0.164	0.370
partner has relatives in HH	0.051	0.221
# children ages 0-5	0.642	0.856
# girls ages 6-11	0.725	0.766
# boys ages 6-11	0.726	0.756

Table 5. Descriptive Statistics, Children Ages 6-14, Colombia, DHS 2005 (Weighted) Continued

Variable	Mean	Standard Deviation
Household composition [§] *variables:*		
mother has relatives in HH	0.164	0.370
partner has relatives in HH	0.051	0.221
# children ages 0-5	0.642	0.856
# girls ages 6-11	0.725	0.766
# boys ages 6-11	0.726	0.756
# girls ages 12-14	0.335	0.545
# boys ages 12-14	0.365	0.562
# girls ages 15-17	0.161	0.404
# boys ages 15-17	0.179	0.432
# women ages 18-64	1.360	0.693
# men ages 18-64	1.149	0.762
# women ages 65+	0.086	0.292
# men ages 65+	0.069	0.256
Geographic variables:		
rural (vs. urban)	0.309	0.462
Central (reference category)	0.164	0.370
Atlantic region	0.227	0.419
Oriental region	0.194	0.396
Pacific region	0.169	0.374
Bogota region	0.134	0.341
Territories region	0.112	0.315
Municipality-level variables:		
average wealth factor score	-0.021	0.061
average years of education, women 25-64	7.139	1.524
average years of education, men 25-64	7.123	1.726
child-woman ratio (0-4 / f 15-49)	0.386	0.114
% of HHs female-headed	29.687	5.844
% of population living abroad[§§]	1.186	1.361
% of employed women in formal work	23.784	10.333
% of employed men in formal work	20.063	11.411
% HHs with access to piped water	85.092	17.048
% HHs with access to sewer	68.508	26.378
% HHs cooking with firewood etc.	18.836	20.960
Sample size		21,827

Notes: [§]includes the index child

[§§]individuals abroad / individuals present in municipality

Table 6. Marginal Effects of Intimate Partner Violence on Children's Human Capital, Multiple Models, Colombia, DHS 2005, with Standard Errors in Parentheses

Dependent Variable	Probit	IV Probit	IV Regress	Matching §	NPLATE	N
Attending school or not	-0.0272	-0.0390	-0.0214	-0.0128	0.0097	21,827
(SE)	(0.0112) *	(0.0763)	(0.0319)	(0.0046) **	(0.0692)	
(B.S. S. E.)				*(0.0062)* *	*(0.0400)*	
Grade advancement or not†	-0.0185	-0.0292	-0.0144	-0.0151	-0.0344	19,683
(SE)	(0.0056) ***	(0.0375)	(0.0262)	(0.0043) ***	(0.0738)	
(B.S. S. E.)				*(0.0046)* **	*(0.0385)*	
Recent drop out or not	0.0100	0.0127	0.0087	0.0052	0.0025	20,433
(SE)	(0.0067)	(0.0445)	(0.0184)	(0.0028) +	(0.066)	
(B.S. S. E.)				*(0.0036)*	*(0.0298)*	
Advance or drop out / repeat	-0.0284	-0.0376	-0.0246	-0.0208	-0.0288	20,429
(SE)	(0.0078) ***	(0.0511)	(0.0327)	(0.0053) ***	(0.075)	
(B.S. S. E.)				*(0.0057)* ***	*(0.0481)*	
	Poisson	**IV Poisson**	**IV Regress**	**Matching**	**NPLATE**	**N**
Grade attainment	-0.0586	0.0919	0.1280	-0.0914	0.0504	20,370
(SE)	(0.0176) ***	(0.1079)	(0.1427)	(0.0438) *	(0.1809)	
(B.S. S. E.)		*(0.1039)*		*(0.0259)* ***	*(0.2150)*	

Note: *** p ≤ 0.001, ** p ≤ 0.01, * p ≤ 0.05, + p<=0.1

Analytical standard errors (S.E.) are in parentheses and Bootstrapped standard errors (B.S. S.E.) are in parentheses and in italics Standard errors are corrected for the clustering of children in the same household. Bootstrapped standard errors are based on 100 replications.

† Conditional on staying in school.

§ Matching results are based on Kernel matching using an Epanechnikov function. All treated and untreated observations are on the common support and all covariates are balanced in all the matching results

Table 7. Results of Tests for Goodness of Fit, Over-identification, and Endogeneity

	Test Statistic	Attending school or not	Grade advancement or not†	Recent drop out or not	Advance or drop out / repeat	Grade attainment
First Stage Goodness of Fit	F(2, C-1)†	117.84	113.05	118.48	118.43	115.49
	p-value	0.0000	0.0000	0.0000	0.0000	0.0000
	Adj. R-Squ.	0.0741	0.0699	0.0709	0.0708	0.0711
Sargan Over-identification test	Chi2(1)	1.4133	0.0200	0.4129	0.0130	1.0810
	p-value	0.2345	0.8875	0.5205	0.9093	0.2985
Bassman Over-identification test	Chi2(1)	1.4101	0.0199	0.4118	0.01293	1.0783
	p-value	0.2350	0.8877	0.5210	0.9094	0.2991
Test of Endogeneity	F (1, C-1)	0.0716	0.0018	0.0459	0.0153	1.9639
(H0: variables are exogenous)	p-value	0.7890	0.9658	0.8303	0.9015	0.1611
Number of Observations	N	21,827	19,683	20,433	20,429	20,370
Number of Clusters	C	13,182	12,365	12,713	12,710	12,620

Notes:

All tests are conducted using the IV regress two-stage least squares model.

All tests except for the overidentification tests are adjusted for clustering at the household level.

† C= number of clusters (households)

Appendix Tables

For Reviewers and (if possible) electronic publication

Table A1. Attending School or Not, Colombia, DHS 2005, Parametric Models, Marginal Effects and Standard Errors

Variable	Probit	IV Probit (2nd stage)	IV Regress
Base Probability	0.828	0.829	0.933
Endogenous regressor:			
mother's intimate partner physical violence	-0.0272*	-0.0390	-0.0214
	(0.0112)	(0.0763)	(0.0319)
Child variables:			
child is female	0.0395***	0.0404***	0.0209***
	(0.0082)	(0.0083)	(0.0040)
child's age	0.1647***	0.1680***	0.0838***
	(0.0186)	(0.0188)	(0.0060)
child's age-squared	-0.8708***	-0.8886***	-0.4501***
	(0.0970)	(0.0978)	(0.0308)
child is son/daughter of HH head	0.0349*	0.0355*	0.0189*
	(0.0159)	(0.0164)	(0.0078)
Mother variables:			
mother's age when child was age 6	0.0071	0.0072	0.0017
	(0.0065)	(0.0066)	(0.0034)
mother's age squared/100 (when child was 6)	-0.0115	-0.0118	-0.0036
	(0.0099)	(0.0101)	(0.0051)
mother's years of education completed	0.0133***	0.0136***	0.0052***
	(0.0019)	(0.0020)	(0.0006)
mother is married	0.0054	0.0050	-0.0004
	(0.0106)	(0.0114)	(0.0050)
mother is widow	-0.0081	-0.0083	-0.0020
	(0.0248)	(0.0253)	(0.0126)
mother is divorced etc.	-0.0117	-0.0101	-0.0007
	(0.0148)	(0.0184)	(0.0082)
missing: mother's parents' violence	-0.0186	-0.0194	-0.0099
	(0.0201)	(0.0206)	(0.0110)
Partner-of-mother variables:			
partner's years of education completed	0.0043**	0.0043**	0.0012*
	(0.0015)	(0.0015)	(0.0006)
missing: partner's years of education	0.0183	0.0178	0.0021
	(0.0229)	(0.0240)	(0.0151)
missing: partner's childhood violence	-0.0090	-0.0086	-0.0068
	(0.0122)	(0.0128)	(0.0069)
Household variables:			
HH has migrated	-0.0385**	-0.0391**	-0.0142*
	(0.0129)	(0.0131)	(0.0059)
wealth quintile 2	0.0509***	0.0522***	0.0344***
	(0.0130)	(0.0132)	(0.0073)
wealth quintile 3	0.0805***	0.0825***	0.0467***
	(0.0159)	(0.0162)	(0.0078)
wealth quintile 4	0.0750***	0.0769***	0.0422***
	(0.0177)	(0.0181)	(0.0086)
wealth quintile 5 (richest)	0.0570**	0.0582**	0.0307**
	(0.0201)	(0.0206)	(0.0095)
Household composition [§] variables:			
mother has relatives in HH	-0.0003	-0.0008	-0.0022
	(0.0175)	(0.0179)	(0.0076)
partner has relatives in HH	0.0071	0.0072	0.0031
	(0.0223)	(0.0228)	(0.0093)
# children ages 0-5	-0.0209***	-0.0213***	-0.0129***
	(0.0053)	(0.0054)	(0.0030)
# girls ages 6-11	-0.0104	-0.0105	-0.0073*
	(0.0064)	(0.0065)	(0.0034)
# boys ages 6-11	0.0033	0.0034	0.0021
	(0.0063)	(0.0065)	(0.0033)
# girls ages 12-14	0.0024	0.0025	0.0062
	(0.0090)	(0.0092)	(0.0042)

Table A1. Attending School or Not, Colombia, DHS 2005, Parametric Models, Marginal Effects and Standard Errors Continued

Variable	Probit	IV Probit (2nd stage)	IV Regress
Household composition [§] *variables continued:*			
# boys ages 12-14	-0.0079	-0.0079	-0.0030
	(0.0089)	(0.0091)	(0.0045)
# girls ages 15-17	0.0068	0.0071	0.0059
	(0.0108)	(0.0111)	(0.0050)
# boys ages 15-17	-0.0034	-0.0033	0.0005
	(0.0095)	(0.0098)	(0.0050)
# women ages 18-64	0.0232**	0.0235**	0.0109**
	(0.0087)	(0.0090)	(0.0033)
# men ages 18-64	0.0022	0.0023	0.0030
	(0.0065)	(0.0066)	(0.0032)
# women ages 65+	0.0274	0.0279	0.0105
	(0.0185)	(0.0189)	(0.0069)
# men ages 65+	0.0102	0.0102	0.0086
	(0.0200)	(0.0206)	(0.0083)
Geographic variables:			
rural (vs. urban)	-0.0138	-0.0144	-0.0165*
	(0.0127)	(0.0131)	(0.0065)
Atlantic region	0.0880***	0.0901***	0.0484***
	(0.0141)	(0.0145)	(0.0070)
Oriental region	0.0985***	0.1012***	0.0671***
	(0.0143)	(0.0145)	(0.0073)
Pacific region	0.0877***	0.0901***	0.0607***
	(0.0136)	(0.0139)	(0.0075)
Bogota region	0.0533**	0.0551**	0.0359***
	(0.0187)	(0.0192)	(0.0091)
Territories region	0.1102***	0.1129***	0.0629***
	(0.0172)	(0.0178)	(0.0076)
Municipality-level variables:			
average wealth factor score	-0.1401***	-0.1435***	-0.0669***
	(0.0399)	(0.0407)	(0.0202)
average years of education, women 25-64	0.0481***	0.0492***	0.0247***
	(0.0106)	(0.0107)	(0.0054)
average years of education, men 25-64	-0.0144	-0.0148	-0.0025
	(0.0084)	(0.0086)	(0.0045)
child-woman ratio (0-4 / f 15-49)	-0.1135	-0.1152	-0.0987**
	(0.0603)	(0.0618)	(0.0325)
% of HHs female-headed	-0.0036***	-0.0036***	-0.0026***
	(0.0009)	(0.0010)	(0.0006)
% of population living abroad[§§]	0.0073*	0.0075*	0.0033*
	(0.0032)	(0.0033)	(0.0015)
% of employed women in formal work	0.0012	0.0012	0.0006
	(0.0009)	(0.0009)	(0.0005)
% of employed men in formal work	-0.0012	-0.0012	-0.0010*
	(0.0008)	(0.0008)	(0.0005)
% HHs with access to piped water	0.0004	0.0004	0.0001
	(0.0004)	(0.0004)	(0.0002)
% HHs with access to sewer	-0.0006	-0.0006	-0.0003
	(0.0004)	(0.0004)	(0.0002)
% HHs cooking with firewood etc.	-0.0021***	-0.0021***	-0.0011***
	(0.0006)	(0.0006)	(0.0003)
constant			0.4056***
			(0.0751)
number of observations	21827	21827	21827

Notes: *** $p \leq 0.001$, ** $p \leq 0.01$, * $p \leq 0.05$, + $p<=0.1$

[§]includes the index child

[§§]individuals abroad / individuals present in municipality

Table A2. Grade Advancement (vs. Repeat Grade), Colombia, DHS 2005, Parametric Models, Marginal Effects and Standard Errors

Variable	Probit	IV Probit (2nd stage)	IV Regress
Base Probability	0.9486	0.9451	0.9559
Endogenous regressor:			
mother's intimate partner physical violence	-0.0185**	-0.0292	-0.0144
	(0.0056)	(0.0375)	(0.0262)
Child variables:			
child is female	0.0191***	0.0202***	0.0198***
	(0.0047)	(0.0049)	(0.0042)
child's age	-0.0029	-0.0031	-0.0035
	(0.0057)	(0.0061)	(0.0050)
child's age-squared	0.0203	0.0215	0.0233
	(0.0294)	(0.0309)	(0.0260)
child is son/daughter of HH head	-0.0071	-0.0077	-0.0066
	(0.0068)	(0.0072)	(0.0060)
Mother variables:			
mother's age when child was age 6	0.0036	0.0037	0.0030
	(0.0030)	(0.0031)	(0.0030)
mother's age squared/100 (when child was 6)	-0.0066	-0.0069	-0.0058
	(0.0045)	(0.0048)	(0.0046)
mother's years of education completed	0.0033***	0.0035***	0.0029***
	(0.0007)	(0.0008)	(0.0005)
mother is married	0.0114**	0.0117*	0.0097*
	(0.0043)	(0.0046)	(0.0040)
mother is widow	-0.0059	-0.0063	-0.0054
	(0.0107)	(0.0112)	(0.0109)
mother is divorced etc.	-0.0013	-0.0000	-0.0016
	(0.0058)	(0.0076)	(0.0070)
missing: mother's parents' violence	0.0108	0.0112	0.0122
	(0.0076)	(0.0080)	(0.0084)
Partner-of-mother variables:			
partner's years of education completed	0.0010	0.0010	0.0008
	(0.0006)	(0.0006)	(0.0005)
missing: partner's years of education	-0.0106	-0.0120	-0.0136
	(0.0118)	(0.0128)	(0.0135)
missing: partner's childhood violence	-0.0064	-0.0063	-0.0075
	(0.0057)	(0.0061)	(0.0061)
Household variables:			
HH has migrated	-0.0064	-0.0066	-0.0061
	(0.0051)	(0.0054)	(0.0048)
wealth quintile 2	0.0016	0.0019	0.0054
	(0.0054)	(0.0057)	(0.0061)
wealth quintile 3	0.0080	0.0086	0.0112
	(0.0066)	(0.0070)	(0.0069)
wealth quintile 4	0.0091	0.0096	0.0104
	(0.0074)	(0.0078)	(0.0072)
wealth quintile 5 (richest)	0.0160	0.0168	0.0100
	(0.0085)	(0.0090)	(0.0078)

Table A2. Grade Advancement (vs. Repeat Grade), Colombia, DHS 2005, Parametric Models, Marginal Effects and Standard Errors Continued

Variable	Probit	(2nd stage)	IV Regress
Household composition[§] variables continued:			
mother has relatives in HH	-0.0049	-0.0055	-0.0049
	(0.0072)	(0.0076)	(0.0061)
partner has relatives in HH	-0.0154	-0.0162	-0.0125
	(0.0106)	(0.0111)	(0.0083)
# children ages 0-5	-0.0068**	-0.0071**	-0.0085***
	(0.0022)	(0.0023)	(0.0025)
# girls ages 6-11	-0.0039	-0.0040	-0.0041
	(0.0029)	(0.0031)	(0.0030)
# boys ages 6-11	-0.0018	-0.0018	-0.0027
	(0.0027)	(0.0028)	(0.0028)
# girls ages 12-14	-0.0051	-0.0053	-0.0053
	(0.0038)	(0.0040)	(0.0038)
# boys ages 12-14	-0.0123**	-0.0128**	-0.0128**
	(0.0038)	(0.0040)	(0.0039)
# girls ages 15-17	0.0019	0.0022	0.0026
	(0.0044)	(0.0047)	(0.0044)
# boys ages 15-17	-0.0022	-0.0022	-0.0020
	(0.0039)	(0.0041)	(0.0041)
# women ages 18-64	0.0010	0.0009	0.0015
	(0.0034)	(0.0035)	(0.0030)
# men ages 18-64	0.0052	0.0056	0.0047
	(0.0030)	(0.0032)	(0.0028)
# women ages 65+	0.0008	0.0008	0.0012
	(0.0070)	(0.0074)	(0.0058)
# men ages 65+	0.0131	0.0136	0.0121*
	(0.0081)	(0.0086)	(0.0061)
Geographic variables:			
rural (vs. urban)	-0.0077	-0.0083	-0.0079
	(0.0056)	(0.0059)	(0.0055)
Atlantic region	0.0105	0.0109	0.0105
	(0.0057)	(0.0060)	(0.0055)
Oriental region	0.0078	0.0084	0.0083
	(0.0060)	(0.0063)	(0.0056)
Pacific region	-0.0007	-0.0007	-0.0024
	(0.0063)	(0.0066)	(0.0061)
Bogota region	0.0119	0.0128	0.0125
	(0.0087)	(0.0092)	(0.0069)
Territories region	0.0001	-0.0005	0.0011
	(0.0069)	(0.0075)	(0.0065)
Municipality-level variables:			
average wealth factor score	0.0015	0.0016	0.0071
	(0.0156)	(0.0164)	(0.0161)
average years of education, women 25-64	-0.0014	-0.0015	-0.0001
	(0.0043)	(0.0045)	(0.0047)
average years of education, men 25-64	-0.0058	-0.0062	-0.0059
	(0.0038)	(0.0040)	(0.0039)
child-woman ratio (0-4 / f 15-49)	-0.0881**	-0.0920**	-0.0920**
	(0.0296)	(0.0311)	(0.0286)
% of HHs female-headed	0.0002	0.0002	-0.0001
	(0.0004)	(0.0004)	(0.0005)
% of population living abroad[§§]	0.0002	0.0002	0.0001
	(0.0014)	(0.0015)	(0.0013)
% of employed women in formal work	0.0003	0.0003	0.0002
	(0.0004)	(0.0004)	(0.0004)
% of employed men in formal work	0.0003	0.0003	0.0001
	(0.0004)	(0.0004)	(0.0004)
% HHs with access to piped water	0.0003	0.0003	0.0004
	(0.0002)	(0.0002)	(0.0002)
% HHs with access to sewer	-0.0001	-0.0002	-0.0002
	(0.0002)	(0.0002)	(0.0002)
% HHs cooking with firewood etc.	0.0002	0.0002	0.0002
	(0.0002)	(0.0002)	(0.0002)
constant			0.9520***
			(0.0624)
number of observations	19,683 #	19,683	19,683

Notes: *** p ≤ 0.001, ** p ≤ 0.01, * p ≤ 0.05, + p<=0.1

[§]includes the index child

[§§]individuals abroad / individuals present in municipality

Table A3. Drop Out or Not, Colombia, DHS 2005, Parametric Models, Marginal Effects and Standard Errors

Variable	Probit	IV Probit (2nd stage)	IV Regress
Base Probability	0.0455	0.0474	0.0227
Endogenous regressor:			
mother's intimate partner physical violence	0.0100	0.0127	0.0087
	(0.0067)	(0.0445)	(0.0184)
Child variables:			
child is female	-0.0091	-0.0095	-0.0060*
	(0.0049)	(0.0051)	(0.0024)
child's age	-0.0268**	-0.0277**	-0.0176***
	(0.0091)	(0.0093)	(0.0035)
child's age-squared	0.1687***	0.1743***	0.1084***
	(0.0500)	(0.0512)	(0.0187)
child is son/daughter of HH head	-0.0017	-0.0017	-0.0023
	(0.0085)	(0.0089)	(0.0044)
Mother variables:			
mother's age when child was age 6	-0.0017	-0.0017	-0.0005
	(0.0039)	(0.0040)	(0.0019)
mother's age squared/100 (when child was 6)	0.0015	0.0016	0.0006
	(0.0059)	(0.0061)	(0.0028)
mother's years of education completed	-0.0042***	-0.0043***	-0.0016***
	(0.0012)	(0.0012)	(0.0004)
mother is married	-0.0024	-0.0024	0.0001
	(0.0056)	(0.0060)	(0.0027)
mother is widow	0.0103	0.0106	0.0049
	(0.0145)	(0.0149)	(0.0076)
mother is divorced etc.	0.0149	0.0149	0.0041
	(0.0100)	(0.0124)	(0.0049)
missing: mother's parents' violence	0.0020	0.0021	0.0020
	(0.0111)	(0.0115)	(0.0063)
Partner-of-mother variables:			
partner's years of education completed	-0.0010	-0.0010	-0.0002
	(0.0009)	(0.0009)	(0.0003)
missing: partner's years of education	-0.0046	-0.0046	0.0022
	(0.0120)	(0.0127)	(0.0089)
missing: partner's childhood violence	0.0054	0.0055	0.0028
	(0.0075)	(0.0079)	(0.0043)
Household variables:			
HH has migrated	0.0361**	0.0372**	0.0143***
	(0.0114)	(0.0118)	(0.0038)
wealth quintile 2	-0.0173*	-0.0179*	-0.0145***
	(0.0074)	(0.0076)	(0.0041)
wealth quintile 3	-0.0234**	-0.0243**	-0.0168***
	(0.0088)	(0.0091)	(0.0046)
wealth quintile 4	-0.0261**	-0.0271**	-0.0181***
	(0.0098)	(0.0101)	(0.0047)
wealth quintile 5 (richest)	-0.0225*	-0.0233*	-0.0160**
	(0.0102)	(0.0105)	(0.0051)
Household composition[§] variables:			
mother has relatives in HH	0.0037	0.0039	0.0016
	(0.0104)	(0.0108)	(0.0045)
partner has relatives in HH	-0.0056	-0.0058	-0.0022
	(0.0117)	(0.0121)	(0.0047)
# children ages 0-5	0.0098**	0.0101**	0.0059**
	(0.0034)	(0.0035)	(0.0019)
# girls ages 6-11	-0.0002	-0.0003	0.0009
	(0.0034)	(0.0035)	(0.0019)
# boys ages 6-11	-0.0076	-0.0079	-0.0037*
	(0.0039)	(0.0040)	(0.0018)
# girls ages 12-14	-0.0036	-0.0038	-0.0027
	(0.0051)	(0.0052)	(0.0024)

Table A3. Drop Out or Not, Colombia, DHS 2005, Parametric Models, Marginal Effects and Standard Errors Continued

Variable	Probit	(2nd stage)	IV Regress
Household composition [§] *variables continued:*			
# boys ages 12-14	0.0018	0.0018	0.0008
	(0.0055)	(0.0057)	(0.0028)
# girls ages 15-17	-0.0087	-0.0090	-0.0038
	(0.0061)	(0.0064)	(0.0028)
# boys ages 15-17	0.0034	0.0035	0.0013
	(0.0052)	(0.0054)	(0.0030)
# women ages 18-64	-0.0048	-0.0049	-0.0024
	(0.0047)	(0.0049)	(0.0020)
# men ages 18-64	0.0002	0.0002	-0.0009
	(0.0034)	(0.0036)	(0.0017)
# women ages 65+	-0.0253*	-0.0262*	-0.0087*
	(0.0124)	(0.0128)	(0.0038)
# men ages 65+	0.0060	0.0063	0.0029
	(0.0103)	(0.0106)	(0.0049)
Geographic variables:			
rural (vs. urban)	0.0039	0.0041	0.0042
	(0.0065)	(0.0067)	(0.0033)
Atlantic region	-0.0343***	-0.0356***	-0.0277***
	(0.0097)	(0.0100)	(0.0046)
Oriental region	-0.0298***	-0.0310***	-0.0258***
	(0.0088)	(0.0091)	(0.0050)
Pacific region	-0.0296***	-0.0307***	-0.0243***
	(0.0087)	(0.0089)	(0.0047)
Bogota region	-0.0275**	-0.0286**	-0.0228***
	(0.0106)	(0.0109)	(0.0058)
Territories region	-0.0342**	-0.0355**	-0.0279***
	(0.0105)	(0.0109)	(0.0053)
Municipality-level variables:			
average wealth factor score	0.0597*	0.0617*	0.0354**
	(0.0250)	(0.0257)	(0.0118)
average years of education, women 25-64	-0.0120*	-0.0124*	-0.0058
	(0.0060)	(0.0062)	(0.0031)
average years of education, men 25-64	0.0131*	0.0135*	0.0056
	(0.0060)	(0.0062)	(0.0030)
child-woman ratio (0-4 / f 15-49)	0.0132	0.0135	0.0153
	(0.0351)	(0.0366)	(0.0199)
% of HHs female-headed	-0.0001	-0.0001	-0.0002
	(0.0005)	(0.0005)	(0.0003)
% of population living abroad[§§]	-0.0038*	-0.0039*	-0.0025***
	(0.0019)	(0.0019)	(0.0007)
% of employed women in formal work	-0.0008	-0.0008	-0.0006*
	(0.0004)	(0.0004)	(0.0002)
% of employed men in formal work	0.0003	0.0003	0.0003
	(0.0005)	(0.0005)	(0.0003)
% HHs with access to piped water	-0.0002	-0.0002	-0.0001
	(0.0002)	(0.0002)	(0.0001)
% HHs with access to sewer	-0.0002	-0.0002	-0.0001
	(0.0002)	(0.0002)	(0.0001)
% HHs cooking with firewood etc.	0.0013**	0.0013**	0.0007***
	(0.0004)	(0.0004)	(0.0002)
constant			0.1540***
			(0.0428)
number of observations	20433	20433	20433

Notes: *** $p \leq 0.001$, ** $p \leq 0.01$, * $p \leq 0.05$, + $p<=0.1$

[§]includes the index child

[§§]individuals abroad / individuals present in municipality

Table A4. Grade Advancement vs. Drop Out or Repeat, Colombia, DHS 2005, Parametric Models, Marginal Effects and Standard Errors

Variable	Probit	IV Probit (2nd stage)	IV Regress
Base Probability	0.8861	0.8806	0.915
Endogenous regressor:			
mother's intimate partner physical violence	-0.0284***	-0.0376	-0.0246
	(0.0078)	(0.0511)	(0.0327)
Child variables:			
child is female	0.0349***	0.0363***	0.0280***
	(0.0068)	(0.0070)	(0.0050)
child's age	0.1124***	0.1161***	0.0873***
	(0.0136)	(0.0138)	(0.0073)
child's age-squared	-0.5272***	-0.5448***	-0.4095***
	(0.0661)	(0.0673)	(0.0364)
child is son/daughter of HH head	-0.0071	-0.0076	-0.0052
	(0.0104)	(0.0108)	(0.0078)
Mother variables:			
mother's age when child was age 6	0.0078	0.0080	0.0059
	(0.0045)	(0.0047)	(0.0038)
mother's age squared/100 (when child was 6)	-0.0127	-0.0132	-0.0100
	(0.0069)	(0.0071)	(0.0058)
mother's years of education completed	0.0074***	0.0077***	0.0051***
	(0.0011)	(0.0012)	(0.0007)
mother is married	0.0190**	0.0193**	0.0127*
	(0.0066)	(0.0070)	(0.0050)
mother is widow	-0.0090	-0.0093	-0.0074
	(0.0156)	(0.0161)	(0.0126)
mother is divorced etc.	-0.0094	-0.0084	-0.0056
	(0.0095)	(0.0122)	(0.0087)
missing: mother's parents' violence	0.0136	0.0138	0.0123
	(0.0128)	(0.0134)	(0.0110)
Partner-of-mother variables:			
partner's years of education completed	0.0016	0.0016	0.0009
	(0.0009)	(0.0009)	(0.0006)
missing: partner's years of education	-0.0096	-0.0107	-0.0122
	(0.0172)	(0.0183)	(0.0162)
missing: partner's childhood violence	-0.0151	-0.0152	-0.0137
	(0.0089)	(0.0094)	(0.0075)
Household variables:			
HH has migrated	-0.0317***	-0.0326***	-0.0234***
	(0.0088)	(0.0091)	(0.0063)
wealth quintile 2	0.0182*	0.0190*	0.0213**
	(0.0085)	(0.0088)	(0.0075)
wealth quintile 3	0.0270**	0.0281**	0.0264**
	(0.0102)	(0.0106)	(0.0084)
wealth quintile 4	0.0321**	0.0333**	0.0276**
	(0.0115)	(0.0119)	(0.0089)
wealth quintile 5 (richest)	0.0311*	0.0321*	0.0219*
	(0.0131)	(0.0136)	(0.0097)
Household composition[§] variables:			
mother has relatives in HH	-0.0120	-0.0127	-0.0087
	(0.0113)	(0.0118)	(0.0079)
partner has relatives in HH	-0.0103	-0.0106	-0.0069
	(0.0142)	(0.0146)	(0.0098)
# children ages 0-5	-0.0123***	-0.0127***	-0.0121***
	(0.0034)	(0.0035)	(0.0031)
# girls ages 6-11	-0.0060	-0.0061	-0.0054
	(0.0044)	(0.0046)	(0.0036)
# boys ages 6-11	0.0008	0.0009	-0.0003
	(0.0043)	(0.0044)	(0.0034)
# girls ages 12-14	-0.0043	-0.0044	-0.0024
	(0.0060)	(0.0062)	(0.0046)

Table A4. Grade Advancement vs. Drop Out or Repeat, Colombia, DHS 2005, Parametric Models, Marginal Effects and Standard Errors Continued

Variable	Probit	IV Probit (2nd stage)	IV Regress
Household composition[§] variables continued:			
# boys ages 12-14	-0.0176**	-0.0182**	-0.0139**
	(0.0059)	(0.0061)	(0.0049)
# girls ages 15-17	0.0073	0.0077	0.0063
	(0.0069)	(0.0072)	(0.0052)
# boys ages 15-17	-0.0044	-0.0045	-0.0030
	(0.0062)	(0.0065)	(0.0052)
# women ages 18-64	0.0059	0.0060	0.0050
	(0.0053)	(0.0055)	(0.0038)
# men ages 18-64	0.0077	0.0080	0.0065*
	(0.0044)	(0.0045)	(0.0033)
# women ages 65+	0.0082	0.0083	0.0058
	(0.0111)	(0.0115)	(0.0075)
# men ages 65+	0.0094	0.0095	0.0075
	(0.0119)	(0.0123)	(0.0083)
Geographic variables:			
rural (vs. urban)	-0.0213*	-0.0222*	-0.0183**
	(0.0087)	(0.0090)	(0.0066)
Atlantic region	0.0391***	0.0404***	0.0307***
	(0.0092)	(0.0095)	(0.0074)
Oriental region	0.0466***	0.0485***	0.0416***
	(0.0095)	(0.0098)	(0.0076)
Pacific region	0.0332***	0.0345***	0.0261***
	(0.0092)	(0.0095)	(0.0077)
Bogota region	0.0006	0.0010	0.0047
	(0.0137)	(0.0143)	(0.0105)
Territories region	0.0404***	0.0415***	0.0345***
	(0.0107)	(0.0113)	(0.0086)
Municipality-level variables:			
average wealth factor score	-0.0567*	-0.0587*	-0.0397*
	(0.0256)	(0.0265)	(0.0201)
average years of education, women 25-64	0.0082	0.0085	0.0077
	(0.0069)	(0.0071)	(0.0057)
average years of education, men 25-64	-0.0168**	-0.0173**	-0.0126**
	(0.0063)	(0.0065)	(0.0049)
child-woman ratio (0-4 / f 15-49)	-0.1462***	-0.1505**	-0.1281***
	(0.0443)	(0.0461)	(0.0356)
% of HHs female-headed	0.0003	0.0004	0.0002
	(0.0006)	(0.0007)	(0.0006)
% of population living abroad[§§]	0.0051*	0.0053*	0.0037*
	(0.0024)	(0.0025)	(0.0015)
% of employed women in formal work	0.0010	0.0011	0.0007
	(0.0006)	(0.0006)	(0.0005)
% of employed men in formal work	0.0003	0.0004	0.0001
	(0.0006)	(0.0007)	(0.0005)
% HHs with access to piped water	0.0005*	0.0005*	0.0005*
	(0.0003)	(0.0003)	(0.0002)
% HHs with access to sewer	0.0002	0.0002	0.0001
	(0.0002)	(0.0003)	(0.0002)
% HHs cooking with firewood etc.	-0.0006	-0.0006	-0.0004
	(0.0004)	(0.0004)	(0.0003)
constant			0.3353***
			(0.0828)
number of observations	20429	20429	20429

Notes: *** $p \leq 0.001$, ** $p \leq 0.01$, * $p \leq 0.05$, + $p<=0.1$

[§]includes the index child

[§§]individuals abroad / individuals present in municipality

Table A5. Grade Attainment Conditional on Remaining in School, Colombia, DHS 2005, Parametric Models, Marginal Effects and Standard Errors

Variable	Poisson	IV Poisson	IV Regress
Predicted # of Years Attained by Reference Person	3.234	3.192	4.227
Endogenous regressor:			
mother's intimate partner physical violence	-0.0586***	0.0919	0.1280
	(0.0176)	(0.1079)	(0.1427)
Child variables:			
child is female	0.1863***	0.1835***	0.2488***
	(0.0159)	(0.0158)	(0.0198)
child's age	2.2482***	2.2215***	0.8227***
	(0.0245)	(0.0242)	(0.0261)
child's age-squared	-7.5122***	-7.4225***	0.0789
	(0.1157)	(0.1143)	(0.1372)
child is son/daughter of HH head	0.0013	0.0048	0.0258
	(0.0254)	(0.0252)	(0.0331)
Mother variables:			
mother's age when child was age 6	0.0536***	0.0535***	0.0596***
	(0.0128)	(0.0126)	(0.0147)
mother's age squared/100 (when child was 6)	-0.0826***	-0.0809***	-0.0845***
	(0.0197)	(0.0194)	(0.0220)
mother's years of education completed	0.0496***	0.0493***	0.0675***
	(0.0022)	(0.0022)	(0.0030)
mother is married	0.1315***	0.1372***	0.1659***
	(0.0165)	(0.0169)	(0.0224)
mother is widow	-0.0204	-0.0197	-0.0299
	(0.0418)	(0.0414)	(0.0556)
mother is divorced etc.	-0.0619**	-0.0829**	-0.1153**
	(0.0234)	(0.0281)	(0.0388)
missing: mother's parents' violence	0.0398	0.0440	0.0422
	(0.0387)	(0.0383)	(0.0472)
Partner-of-mother variables:			
partner's years of education completed	0.0159***	0.0162***	0.0219***
	(0.0020)	(0.0020)	(0.0028)
missing: partner's years of education	-0.0433	-0.0316	-0.0277
	(0.0566)	(0.0572)	(0.0689)
missing: partner's childhood violence	-0.0571*	-0.0631**	-0.0739*
	(0.0240)	(0.0240)	(0.0310)
Household variables:			
HH has migrated	-0.1214***	-0.1223***	-0.1538***
	(0.0195)	(0.0193)	(0.0246)
wealth quintile 2	0.3141***	0.3085***	0.3368***
	(0.0299)	(0.0297)	(0.0343)
wealth quintile 3	0.4393***	0.4321***	0.4947***
	(0.0328)	(0.0327)	(0.0383)
wealth quintile 4	0.4481***	0.4430***	0.5328***
	(0.0356)	(0.0353)	(0.0419)
wealth quintile 5 (richest)	0.3473***	0.3465***	0.4481***
	(0.0387)	(0.0383)	(0.0466)
Household composition [§] variables:			
mother has relatives in HH	0.0495	0.0534*	0.0566
	(0.0272)	(0.0270)	(0.0353)
partner has relatives in HH	0.0691*	0.0687*	0.0966*
	(0.0353)	(0.0348)	(0.0443)
# children ages 0-5	-0.1086***	-0.1073***	-0.1087***
	(0.0110)	(0.0108)	(0.0126)
# girls ages 6-11	-0.0840***	-0.0846***	-0.1370***
	(0.0122)	(0.0121)	(0.0158)
# boys ages 6-11	-0.0865***	-0.0864***	-0.1048***
	(0.0121)	(0.0120)	(0.0157)
# girls ages 12-14	-0.0880***	-0.0875***	-0.0481*
	(0.0158)	(0.0156)	(0.0207)

Table A5. Grade Attainment Conditional on Remaining in School, Colombia, DHS 2005, Parametric Models, Marginal Effects and Standard Errors Continued

Variable	Poisson	IV Poisson	IV Regress
Household composition [§] *variables continued:*			
# boys ages 12-14	-0.0955***	-0.0960***	-0.1117***
	(0.0159)	(0.0158)	(0.0209)
# girls ages 15-17	-0.0426*	-0.0445*	-0.0629**
	(0.0177)	(0.0176)	(0.0242)
# boys ages 15-17	-0.0733***	-0.0739***	-0.1000***
	(0.0175)	(0.0174)	(0.0236)
# women ages 18-64	0.0288*	0.0297*	0.0329*
	(0.0119)	(0.0118)	(0.0162)
# men ages 18-64	-0.0223*	-0.0229*	-0.0360*
	(0.0111)	(0.0110)	(0.0147)
# women ages 65+	-0.0205	-0.0178	-0.0057
	(0.0258)	(0.0255)	(0.0351)
# men ages 65+	0.0041	0.0073	-0.0028
	(0.0302)	(0.0299)	(0.0390)
Geographic variables:			
rural (vs. urban)	-0.0677**	-0.0632**	-0.0510
	(0.0244)	(0.0241)	(0.0306)
Atlantic region	-0.0965***	-0.0920***	-0.1217***
	(0.0228)	(0.0227)	(0.0305)
Oriental region	0.1285***	0.1233***	0.1462***
	(0.0242)	(0.0242)	(0.0316)
Pacific region	-0.0950***	-0.0952***	-0.1229***
	(0.0240)	(0.0237)	(0.0319)
Bogota region	-0.3346***	-0.3361***	-0.5048***
	(0.0279)	(0.0276)	(0.0389)
Territories region	0.0346	0.0443	0.0527
	(0.0249)	(0.0255)	(0.0347)
Municipality-level variables:			
average wealth factor score	0.0631	0.0668	0.1102
	(0.0685)	(0.0679)	(0.0864)
average years of education, women 25-64	0.0453*	0.0441*	0.0514*
	(0.0189)	(0.0187)	(0.0232)
average years of education, men 25-64	0.0201	0.0202	0.0219
	(0.0162)	(0.0160)	(0.0200)
child-woman ratio (0-4 / f 15-49)	-0.5483***	-0.5535***	-0.6184***
	(0.1237)	(0.1222)	(0.1495)
% of HHs female-headed	-0.0128***	-0.0131***	-0.0147***
	(0.0021)	(0.0021)	(0.0025)
% of population living abroad[§§]	0.0127	0.0129	0.0148
	(0.0069)	(0.0068)	(0.0091)
% of employed women in formal work	-0.0028	-0.0029	-0.0044*
	(0.0016)	(0.0016)	(0.0020)
% of employed men in formal work	-0.0045*	-0.0046*	-0.0045
	(0.0019)	(0.0019)	(0.0024)
% HHs with access to piped water	0.0049***	0.0047***	0.0049***
	(0.0008)	(0.0008)	(0.0010)
% HHs with access to sewer	-0.0013*	-0.0012	-0.0017*
	(0.0007)	(0.0007)	(0.0009)
% HHs cooking with firewood etc.	0.0050***	0.0049***	0.0065***
	(0.0010)	(0.0010)	(0.0013)
constant			-5.8419***
			(0.3269)
number of observations	20370	20370	20370

Notes: *** $p \leq 0.001$, ** $p \leq 0.01$, * $p \leq 0.05$, + $p<=0.1$

[§]includes the index child

[§§]individuals abroad / individuals present in municipality

Table A6. Coefficient Estimates from First Stage Regressions for IV and Matching Models[†]

Dependent Variable: Whether or not mother experienced physical intimate partner violence in past 12 months

	IV Models (1st stage) Linear (OLS)	Matching (1st stage) Probit
Instruments		
mother's partner experienced violence as child	0.1195 ***	0.4220 ***
	(0.0062)	(0.0222)
missing data on mother's partner childhood experience of violence	0.0836 ***	0.3041 ***
	(0.0085)	(0.0300)
mother witnessed violence among her parents	0.0568 ***	0.2018 ***
	(0.0059)	(0.0211)
missing data on mother witnessing violence among her parents	-0.0133	-0.0471
	(0.0135)	(0.0498)
Child variables:		
child is female	0.0028	0.0098
	(0.0073)	(0.0264)
child's age	-0.0152	-0.0552
	(0.0095)	(0.0345)
child's age-squared	0.0477	0.1727
	(0.0481)	(0.1752)
child is son/daughter of HH head	-0.0319 **	-0.1129 **
	(0.0104)	(0.0370)
Mother variables:		
mother's age when child was age 6	-0.0054	-0.0054
	(0.0047)	(0.0172)
mother's age squared/100 (when child was 6)	-0.0013	-0.0275
	(0.0071)	(0.0264)
mother's years of education completed	-0.0031 **	-0.0120 ***
	(0.0009)	(0.0034)
mother is married	-0.0464 ***	-0.1975 ***
	(0.0066)	(0.0251)
mother is widow	-0.0018	-0.0090
	(0.0166)	(0.0618)
mother is divorced etc.	0.1497 ***	0.4789 ***
	(0.0090)	(0.0313)
Partner-of-mother variables:		
partner's years of education completed	-0.0013	-0.0057 +
	(0.0009)	(0.0032)
missing: partner's years of education	-0.0593 ***	-0.1969 **
	(0.0179)	(0.0640)
Household variables:		
HH has migrated	0.0163 *	0.0567 *
	(0.0074)	(0.0266)
wealth quintile 2	0.0092	0.0264
	(0.0092)	(0.0332)
wealth quintile 3	0.0081	0.0205
	(0.0110)	(0.0399)
wealth quintile 4	-0.0051	-0.0302
	(0.1259)	(0.0460)
wealth quintile 5 (richest)	-0.0166	-0.0905 +
	(0.0146)	(0.0544)
Household composition[§] variables:		
mother has relatives in HH	-0.0388 ***	-0.1348 ***
	(0.0108)	(0.0390)
partner has relatives in HH	-0.0040	-0.0058
	(0.0136)	(0.0501)
# children ages 0-5	0.0013	0.0024
	(0.0034)	(0.0124)
# girls ages 6-11	0.0103 *	0.0352 *
	(0.0043)	(0.0154)
# boys ages 6-11	0.0065	0.0215
	(0.0043)	(0.0154)
# girls ages 12-14	0.0032	0.0148
	(0.0057)	(0.0208)

Table A6. Coefficient Estimates from First Stage Regressions for IV and Matching Models[†] Continued

Dependent Variable: Whether or not mother experienced physical intimate partner violence in past 12 months

	IV Models (1st stage) Linear (OLS)	Matching (1st stage) Probit
Household composition[§] variables continued:		
# boys ages 12-14	0.0115 *	0.0440 *
	(0.0056)	(0.0203)
# girls ages 15-17	0.0137 *	0.0506 *
	(0.0066)	(0.0241)
# boys ages 15-17	0.0087	0.0305
	(0.0063)	(0.0230)
# women ages 18-64	-0.0115 *	-0.0410 *
	(0.0050)	(0.0185)
# men ages 18-64	0.0078 +	0.0278 +
	(0.0042)	(0.0154)
# women ages 65+	-0.0057	-0.0320
	(0.0112)	(0.0411)
# men ages 65+	-0.0210 +	-0.0806 +
	(0.0119)	(0.0447)
Geographic variables:		
rural (vs. urban)	-0.0172 *	-0.0651 *
	(0.0087)	(0.0313)
Atlantic region	-0.0043	-0.0233
	(0.0087)	(0.0321)
Oriental region	0.0148	0.0576 +
	(0.0095)	(0.0346)
Pacific region	0.0155	0.0524
	(0.0096)	(0.0347)
Bogota region	0.0373 **	0.1267 **
	(0.0138)	(0.0492)
Territories region	-0.0754 ***	-0.2737 ***
	(0.0107)	(0.0399)
Municipality-level variables:		
average wealth factor score	-0.0621 *	-0.1942 *
	(0.0242)	(0.0887)
average years of education, women 25-64	0.0087	0.0247
	(0.0067)	(0.0242)
average years of education, men 25-64	-0.0036	-0.0048
	(0.0059)	(0.0213)
child-woman ratio (0-4 / f 15-49)	0.0401	0.1720
	(0.0419)	(0.1527)
% of HHs female-headed	0.0032 ***	0.0108 ***
	(0.0006)	(0.0022)
% of population living abroad[§§]	-0.0025	-0.0070
	(0.0024)	(0.0087)
% of employed women in formal work	0.0007	0.0023
	(0.0006)	(0.0022)
% of employed men in formal work	0.0009	0.0030
	(0.0006)	(0.0023)
% HHs with access to piped water	0.0007 **	0.0026 **
	(0.0003)	(0.0010)
% HHs with access to sewer	-0.0003	-0.0010
	(0.0002)	(0.0009)
% HHs cooking with firewood etc.	-0.0006	-0.0018
	(0.0004)	(0.0013)
constant	0.2663 **	-0.8130 *
	(0.1030)	(0.3751)
number of observations	21,827	21,827

Notes:

[†] IV models include IV probit, IV regress, and IV Poisson. See Table 6

This is the first stage for the "in school or not" regression. The first for the other dependent variables is very similar

[§§]individuals abroad / individuals present in municipality

*** p ≤ 0.001, ** p ≤ 0.01, * p ≤ 0.05, + p<=0.1

Table A7. Marginal Effects of Intimate Partner Violence on Children's Human Capital, Multiple Models, Colombia, DHS 2005, with standard errors in parentheses

Dependent Variable	Kernel Epanechnikov	Kernel Normal	Kernel Uniform	One-to-One	Five Nearest Neighbors
Attending school or not	-0.0128 **	-0.0141 ** §(5)	-0.0130 **	-0.0170 ** § (3)	-0.0152 **
(SE)	(0.0046)	(0.0045)	(0.0046)	(0.0061)	(0.005)
Grade advancement or not	-0.0152 ***	-0.0158 *** § (5)	-0.0154 ***	-0.0167 ** § (2)	-0.0160 ***
(SE)	(0.0043)	(0.0042)	(0.0043)	(0.0056)	(0.0046)
Recent drop out or not	0.0052 +	0.0056 * § (5)	0.00525 +	0.0089 ** § (3)	0.0084 **
(SE)	(0.0028)	(0.0027)	(0.0028)	(0.0034)	(0.0029)
Advance or drop out / repeat	-0.0208 ***	-0.0220 *** § (5)	-0.0210 ***	-0.0245 *** § (2)	-0.0211 ***
(SE)	(0.0053)	(0.0053)	(0.0053)	-(0.0071)	(0.0058)
Grade Attainment	-0.0914 *	-0.1297 ** § (5)	-0.0988 *	-0.0627 § (1)	-0.0808 + § (3)
(SE)	(0.0438)	(0.043)	(0.0436)	(0.0600)	(0.0468)

Notes: *** p ≤ 0.001, ** p ≤ 0.01, * p ≤ 0.05, + p<=0.1

All treated and untreated observations are on the common support and all covariates are balanced unless otherwise noted

§ Number of covariates that are not balanced are in parentheses