Girls vs. Boys: Who is Dropping Out of School Because of Bullying?

Adan Silverio-Murillo *

May 3, 2019

Abstract

Despite the rising interest in bullying, there is little evidence about its effects on dropping out of school, and this evidence suffers from the problem of omitted variable bias. To understand the effect of bullying on dropping out of school, I exploit a rich data set of adolescents between 13 and 17 years old from families participating in the Mexican conditional cash transfer program PROGRESA. Boys experience higher rates of bullying than girls, but bullying affects only girls' probability of dropping out of school. In particular, a one standard deviation increase of being bullied increases girls' probability of dropping out of school by 5 percentage points. To address the problem of omitted variables, I implement a bounding strategy following Oster (2017). In addition, I conducted an instrumental variable approach following Lewbel (2012). The bounding and instrumental variable strategies suggest that this result is robust to omitted variable bias.

Keywords: education; bullying; adolescents; gender

JEL: I20, J16.

*Department of Public Administration and Policy, American University. E-mail: asmurillo@american.edu

1 Introduction

Bullying is a problem that exists in many countries around the world. It ranges from 9 percent in Italy to 74 percent in Samoa among adolescents between 13 and 15 years old (Unicef, 2014). Alarmingly, bullying has been associated with increasing levels of depression (Ttofi et al., 2011), problems of low self-esteem (Kopasz and Smokowski, 2005), and affecting academic performance (Nakamoto and Schwartz, 2010). Despite the overall negatives effects of bullying on the well-being of adolescents, there is little research about its effects on dropout rates in schools.

To understand the effect of bullying on the probability of dropping out of school, I exploit a rich data set of adolescents between 13 and 17 years old from families participating in the Mexican conditional cash transfer program PROGRESA. The results show that boys experience higher rates of bullying than girls, but bullying has consequences for dropping out of school only for girls. In particular, one standard deviation increase in being bullied increases the probability of girls dropping out of school by 5 percentage points. As a robustness test for omitted variable bias, I use a bounding strategy following Altonji et al. (2005) and Oster (2017). In addition, I conducted an instrumental variable approach following Lewbel (2012). The bounding and instrumental variable strategies suggest that the result is robust to omitted variable bias.

To the best of my knowledge, there are only two papers that analyze the relationship between bullying and dropping out of school. Cornell et al. (2013), using data from 276 Virginia public schools in the United States, suggest that one standard deviation increase in being bullied is associated with 16.5% increase in the number of dropouts. Townsend et al. (2008), using data from 1,470 students in Cape Town, South Africa, find that when facing bullying, girls - but not boys - are more likely to drop out of school.[1] While these papers control for several well-known variables related with dropping out of school, their results could potentially be biased as a consequence of important omitted variables affecting both bullying and dropping out of school. For example, factors related with the adolescents' personality can help them to cope with - an even minimize - bullying, but this information is not completely observed in the data.

This paper contributes to the literature showing that bullying has important consequences for dropping out of school. In particular, I find that bullying increases the dropout rate of girls, but not of boys, and that these results are robust to the problem of omitted variable bias. This finding supports the "gender paradox effect" of bullying proposed by Loeber and Keenan (1994). The gender paradox effect establishes that boys experience higher rates of bullying than girls, but bul-

[1] In particular, using a logistic regression, they report an odds ratio of 2.60

lying affects more negatively the well-being of girls than of boys.

The rest of the paper is organized as follows: Section 2 introduces the data and the empirical strategy; Section 3 presents the results; and Section 4 concludes.

2 Data and Empirical Methods

2.1 Description of Data

To analyze the effects of bullying on dropping out of the school, I use a database that was developed in 2010 to analyze the conditions of families living in poverty who were participating in Mexico's PROGRESA conditional cash transfer program.[2] The survey collected information on the non-cognitive skills of adolescents and their parents. A random sample of 2,112 households was selected from families participating in the program in both rural and urban areas. In the case of the adolescents, it was decided to collect information from those between 13 and 17 years old. The survey collected information from 1,091 of these adolescents, who lived in 837 households. Two children who never went to school were excluded, so

[2]PROGRESA offers monthly cash transfers to families living in poverty on the condition that they send their school-age children to school. The program changed its name to *Oportunidades* in 2002 and to Prospera in 2015. The scholarship amounts increase as the school-age children reach higher-grade levels. The size of the scholarship under PROGRESA is designed to cover the opportunity cost to the family of keeping their children in school.

the final sample for this study is 1,089 adolescents.

Of these 1,089 young people between the ages of 13 and 17, 80% were currently attending school and 20% had dropped out of school (see Table 1). For those who were attending the school, the 80% can be divided into 65% who were attending school and not working outside the home, and 15% who were attending the school and working outside the home. The 20% who dropped out of the school can be divided into 12% who were working outside the home and not attending school, and 8% who were neither working outside the home nor attending school.[3]

Regarding bullying, I develop an index based on principal components. The bullying index is based on Rigby (1998). This test was adapted by Palomar (2012) in Mexico. The questions have the following categorical answers: "always", "frequently", "rarely" and "never". I aggregate those answers into scales using principal component analysis, retaining only the first latent factor.[4] I then standardized

[3]The survey asked these adolescents about their current labor-education situation. The adolescents responded by selecting the group that they were most closely related to, i.e. attending school and not working outside the home, working outside the home and not attending school, working outside the home and attending school; and neither working outside the home nor attending school.

[4]I present the results of the principal component analysis in Table 7 of the appendix. Column 1 presents the scales with its eigenvalues, Column 2 presents the questions used to build each scale, and Column 3 shows the loading associated with each question. In addition, I use this methodology to develop indexes for the following variables that I will use when analyzing mechanisms: self-esteem, stress, and anxiety. The self-esteem index is based on Rosenberg (1965). The measure of stress is based on Fliege et al. (2005). Finally, the anxiety scale is based on Achenbach and Rescorla (2001).

the value of the latent variable to have a mean of zero and a standard deviation of one. The results show that, on average, boys experience higher levels of bullying than girls (see Table 1). It is also presented information regarding other variables that will be used as controls: sex, age, pregnancy, sexual abuse, number of siblings, half-siblings, death of a father, death of a mother, abandonment by the father, abandonment by the mother, parents' use of drugs, parents in prison, change of work by parents, address change in the last 12 months, violence within the household, having social support, self-esteem, stress, and anxiety.

2.2 Identification Strategy

This paper analyzes the effects of bullying on the probability of dropping out of school for adolescents participating in PROGRESA. The model to estimate is given by:

$$\mathrm{Y} = \beta_0 + \beta_1 \mathrm{T} + \gamma_1 X + \epsilon \tag{1}$$

Where Y is the outcome of interest (a dummy variable indicating whether an adolescent has dropped out of school), T is the variable of interest (bullying), X is a vector of observed control variables, and ϵ is an error term with mean zero.

A study of this type presents several econometric challenges. First, the measure of bullying is a proxy variable, so there is a potential problem of measurement error. It is well-known that when regressors are measured with random error, the parameters estimated tend to be biased toward zero. Second, bullying may be correlated with other psychological variables not present in the data. If such variables are correlated with the outcome of interest, then they are in the error term ϵ and their correlation with T will generate bias in the estimated impacts of bullying. Finally, although reverse causality is likely to be minimal, it can be a potential problem. In the case of students who dropped out of school, the questions regarding bullying refers to the time when the adolescents were attending school. A potential problem of reverse causality can occur if these dropouts return to school and doing so affects the level of bullying. However, using data from Mexico, Baron et al. (2016) find that once young people between 15 and 18 years old leave school, it is very unlikely that they will return; this minimizes the possibility that not attending school can affect the level of bullying.

To address the problem of omitted variable bias, I use a recently developed bounding methodology developed by Oster (2017) and an instrumental variable approach proposed by Lewbel (2012). Consider first Oster's methodology. Altonji

et. al. (2005) observed that a common approach to evaluate robustness to omitted variable bias is to include additional control variables on the right hand side of the regression. If such additions do not affect the coefficient of interest, then this coefficient can be considered unlikely to be biased. This strategy implicitly assumes that using information from observed covariates is informative about unobserved variables. Oster formalizes this idea, and provides conditions for bounds and identification. If the bounds exclude zero, then the results from the regression can be considered to be robust to omitted variable bias.[5]

[5]Following the notation in Oster, the full model has the form:

Y= β T + X_1 + X_2 +ϵ.

where T is the variable of interest, X_1 contains the *observed* control variables multiplied by their coefficients, i.e. $X_1 = \sum_{j=1}^{J_o} X_j^o \gamma_j^o$, and X_2 contains all *unobserved* variables multiplied by their coefficients, i.e. $X_2 = \sum_{j=1}^{J_u} X_j^u \gamma_j^u$. Finally, ϵ is a random error that represents measurement error in Y and is uncorrelated with X_1, X_2, and T. Oster suggests the following approach to account for omitted variable bias:

(1) Regress Y on T, and report the parameter on T, denoted by β^0, and the R-squared coefficient, denoted by R^0.

(2) Regress Y on T and X_1, and report the parameter on T, denoted by $\tilde{\beta}$, and the R-squared coefficient, denoted by $\tilde{R}$.

(3) Define R_{max} as the overall R-squared of the model, that is the R-squared that would be obtained from a regression of Y on both, observables (T, X_1) and unobservables (X_2).

Also, define δ to be a parameter that ensures the equality $\frac{Cov(T,X_2)}{Var(X_2)} = \delta \frac{Cov(T,X_1)}{Var(X_1)}$. In other words, this relationship formalizes the idea of Altonji et al. (2005) that the magnitude and sign of the relationship between T and X_1 provides some information about the magnitude and sign of the relationship between T and X_2. For example, if $-1 \leq \delta \leq 1$, then the variable of interest (T) is no more correlated with unobservables (X_2) than it is correlated with observables (X_1). The case $0 \leq \delta \leq 1$ has a similar interpretation, with the additional assumption that the relationship between T and X_1 have the same sign as the relationship between T and X_2.

Oster shows that $\beta^* \approx \tilde{\beta} - \delta \frac{(\beta^0 - \tilde{\beta})(R_{max} - \tilde{R})}{(\tilde{R} - R^0)}$ is a consistent estimator of the effect of T on Y, β. Notice that this is a close approximation to the consistent estimator and it is used to present

The second methodology that I will use to check the robustness of the results is an instrumental variable approach. Lewbel (2012) suggests an instrumental variable called identification through heteroscedasticity. In particular, he proposes to exploit the correlation between exogenous variables and heteroscedasticity of model disturbances to achieve identification without imposing any exclusion restrictions. Following Lewbel, I first estimate the following model:

$$T = \theta_1 + \theta_2 X + \xi \tag{2}$$

Where the variable T represents the potential endogenous variable (bully-

some intuition regarding the methodology. The complete approximation is presented in Oster (2017).

In order to estimate β^*, one needs estimates of δ and R_{max}. Oster proposes assumptions for δ and R_{max} that allows one to determine whether β^* is different from zero. Oster proposes that $R_{max} = min\{1.3\tilde{R}, 1\}$, where the $\tilde{R}$ is defined above. The cut-off value of 1.3 is derived from a sample of papers that have used randomized controlled trials and nonrandomized data and published in the *American Economic Review*, *Quarterly Journal of Economics*, *The Journal of Political Economy*, and *Econometrica* from 2008-2010. She determined that using this cut-off allowed 90% of the randomized and 50% of the nonrandomized results to continue being statistically significant. After determining the value of R_{max}, Oster suggests that β^* be calculated for all the following ranges of δ: $0 \leq \delta \leq 1$. In addition, I will present the results for δ: $-1 \leq \delta \leq 0$. This allows one to construct the set $[\tilde{\beta}, \beta^*]$. If this set excludes zero, the results from the controlled regressions can be considered to be robust to omitted variable bias. In other words, the results indicate that $\beta^* \neq 0$.

Another approach is to calculate the value of δ that would be needed to derive the coefficient of interest to zero. For example, if $\delta = 2$, it indicates that to generate a zero treatment effect, unobservables should be twice as important as observables. Oster (2017) suggest that $\delta = 1$ would be an appropriate cut-off, i.e. unorbservables variables explain as much of the outcome as the actual controls.

ing). X are as defined in equation (1) and ξ is the error term. The heteroscedasticity-based identification strategy assumes the existence of heteroscedasticity in ξ (and as a consequence on T). In particular, it is assumed that: $cov(X,\xi^2) \neq 0$. Lewbel suggest using $[X - E(X)]\hat{\xi}$ as an instrument for T in estimating (1). Where $\hat{\xi}$ is the predicted residuals obtained by estimating equation (2). Finally, Lewbel points out that the condition $cov(X,\xi^2) \neq 0$ need to hold only for a subset Z of the vector X. More detailed explanations can be found in Lewbel (2012).

3 Results

To analyze the effects of bullying on dropping out of school, I first present the results using an OLS regression, and then apply the bounding and instrumental variable strategies.

3.1 Bullying and Dropping Out of School

Table 2 column 1, presents a linear probability model (OLS regression) of the impact of bullying on the probability of dropping out of school. I control for sex, age, pregnancy, sexual abuse, siblings, and half-siblings. The results show that one standard deviation increase in being bullied increases the probability of dropping

out of school by 5.8 percentage points. To check the robustness of this result, column 2 incorporates father death, mother death, abandonment by the father or the mother, parent's use of drugs, parents in prison, parent's change of work, address change, violence within the house; and column 3 uses dummy variables for municipalities. Bullying continues to be statistically significant, although the impact is slightly diminished. In particular, ones standard deviation increase in being bullied increases the probability of dropping out of school by 5.2 percentage points (column 2) and 4.5 percentage points (column 3).

Given that bullying is measured with error, if this measurement error is random, then the estimates in Table 2 underestimate the causal effect and thus are lower bounds of bullying on dropping out of school. However, it is also possible that estimates of the impact of bullying are affected by omitted variable bias. One way to assess this problem is to add controls and analyze the stability of the parameter of interest. Yet, Oster (2017) shows that just adding controls, which is a common strategy, is not enough to avoid omitted variable bias. Table 3 present results using Oster's methodology to analyze the robustness of the results in Table 2. First, I present the results under the assumption that $0 \leq \delta \leq 1$, i.e. assuming the relationship between the variable of interest and the (aggregated) controls has the same sign as the relationship between the variable of interest and the (aggre-

gated) unobservables. Column 1 estimates bounds using the value of the R_{max} proposed by Oster (2017), which yields a very tight bounds estimate of [0.040, 0.045]. I also present the results when $-1 \leq \delta \leq 0$.[6] Using the R_{max} proposed by Oster, the bounding estimated again is very tight: [0.045, 0.050]. Finally, I estimate the value of δ that would be needed to derive the coefficient of interest to zero. I find that $\delta = 5.05$. This implies that unobservables have to be 5.05 times as important as the control variables in order to drive the coefficient associated to bullying to zero. Since this value is greater than 1, the effect can be considered robust to unobserved variables.

Table 4 presents the results using an instrumental variable constructed through heteroscedasticity following Lewbel (2012). Using this strategy the results observed using fixed effects and a bounding methodology are maintained.[7] However, it is possible that the instruments generated using this strategy are weak (the F-test of the first regression is 6.38).

[6]The case $-1 \leq \delta \leq 0$ assumes that the relationship between T and X_1 has different sign than the relationship between T and X_2.

[7]I estimate the first-stage regression in equation (2) and test for heteroscedasticity using a Breush-Pagan test. According to the test results ($chi^2 = 222$, p-value=0.00) there is strong evidence for heteroscedasticity in the first stage regression.

3.2 Heterogenous effects

In this section, I analyze heterogeneous effects by sex, age, pregnancy, and the death of a father. It is necessary to mention that for these regressions, I use a dummy variable for age. This equals 1 for ages 13 and 14, and it equals zero for ages 15, 16, and 17. Table 5 presents heterogeneous results by sex (column 1), age (column 2), pregnancy (column 3), and death of father (column 4). I find evidence of important heterogeneous effects by sex. In particular, I find that bullying affects only girl's probability of dropping out of school, but not boys. Regarding age, the results show that bullying has more negative consequences for young people between 15 and 17 years old than for those between 13 and 14 years old. Finally, there is no evidence of heterogeneous effects by pregnancy or death of the father.

3.3 Mechanisms

Bullying is an important factor explaining the probability of dropping out of school particularly for girls. However, this opens the question about what the mechanisms are by which bullying affects the dropout rates. In particular, is bullying increasing the dropout rates because of its effects on adolescents' well-being (self-esteem, anxiety, and stress)? Or is bullying increasing the probability of dropping out of school *independent* of the problems associated with the well-being of

adolescents?

Table 6 presents the results when self-esteem (column 1), stress (column 2), and anxiety (column 3) are considered as a mechanism between bullying and dropping out of school. After including these variables, the coefficient associated with bullying continues almost stable. So, it appears that there is a strong direct effect of bullying on dropouts. Another interpretation of this result is that mechanisms other than those used above have an indirect effect on dropout rates.

4 Conclusion

This paper finds evidence that bullying leads to increased drop out rates in adolescents participating in the Mexican conditional cash transfer program PROGRESA, specially among girls. The previous literature that has analyzed this relationship has faced the problem of omitted variable bias. To address this problem, I use two newly methodologies: a bounding approach developed by Oster (2017) and an instrumental variable strategy proposed by Lewbel (2012). The bounding and instrumental variable strategies suggest that the result is robust to omitted variable bias.

This result supports the "gender paradox effect" of bullying proposed by Loeber and Keenan (1994). This paradox states that boys experience higher rates of bullying than girls, but bullying has more negative consequences on the well-being of girls than on boys. Regarding the mechanisms, I analyze whether bullying affects girls' probability of dropping out of school through self-esteem, anxiety, and stress. However, I do not find strong evidence that self-esteem, anxiety, and stress are the mechanisms.

PROGRESA is a successful conditional cash transfer program that has increased the enrollment of adolescents living in poverty. Unfortunately, the condition of poverty has been associated with increasing rates of being bullied. Thus, on the one hand PROGRESA reduces the cost of attending the school for these adolescents; but, on the other hand, bullying increases the chances that these adolescents drop out of school. While the results of this paper apply to the case of PROGRESA, it would be very useful to explore whether this situation is happening in other conditional cash transfers programs around the world.

References

Achenbach, T. and L. Rescorla (2001): "Manual for the ASEBA School-age Forms Profiles. Burlington, VT: University of Vermont," *Research Centre for Children, Youth Families*, 4.

Altonji, J. G., T. E. Elder, and C. R. Taber (2005): "Selection on Observed and Unobserved Variables: Assessing the Effectiveness of Catholic Schools," *Journal of Political Economy*, 113, 151–184.

Baron, J., A. Popova, and A. M. Sanchez Diaz (2016): "Following Mexican youth : a short-run study of time use decisions," .

Cornell, D., A. Gregory, F. Huang, and X. Fan (2013): "Perceived Prevalence of Teasing and Bullying Predicts High School Dropout Rates," *Journal of Educational Psychology*, 105, 138.

Fliege, H., M. Rose, P. Arck, O. B Walter, R.-D. Kocalevent, C. Weber, and B. Klapp (2005): "The Perceived Stress Questionnaire (PSQ) Reconsidered: Validation and Reference Values From Different Clinical and Healthy Adult Samples," *Psychosomatic medicine*, 67, 78–88.

Kopasz, K. H. and P. R. Smokowski (2005): "Bullying in School: An Overview of Types, Effects, Family Characteristics, and Intervention Strategies," *Children Schools*, 27, 101–110.

Lewbel, A. (2012): "Using Heteroscedasticity to Identify and Estimate Mismeasured and Endogenous Regressor Models," *Journal of Business & Economic Statistics*, 30, 67–80.

Loeber, R. and K. Keenan (1994): "Interaction between conduct disorder and its comorbid conditions: Effects of age and gender," *Clinical Psychology Review*, 14, 497 – 523.

Nakamoto, J. and D. Schwartz (2010): "Is Peer Victimization Associated with Academic Achievement? A Meta-analytic Review," *Social Development*, 19, 221–242.

Oster, E. (2017): "Unobservable Selection and Coefficient Stability: Theory and Evidence," *Journal of Business & Economic Statistics*, 0, 1–18.

Palomar, J. (2012): "Identificación de un Modelo de Resiliencia y su Relación con la Movilidad Social en Beneficiarios del Programa Oportunidades," *México, D.F. Universidad Iberoamericana*.

Rigby, K. (1998): "Manual for the Peer Relations Questionnaire," *University of South Australia*.

Rosenberg, M. (1965): "Society and the Adolescent Self-image," *Society and the Adolescent Self-Image*.

Townsend, L., A. J. Flisher, P. Chikobvu, C. Lombard, and G. King (2008): "The Relationship between Bullying Behaviours and High School Dropout in Cape Town, South Africa," *South African Journal of Psychology*, 38, 21–32.

Ttofi, M. M., D. Farrington, F. Lösel, and R. Loeber (2011): "Do the victims of school bullies tend to become depressed later in life? A systematic review and meta-analysis of longitudinal studies," .

Unicef (2014): "Hidden in Plain Sight: A Statistical Analysis of Violence Against Children," *United Nations*.

5 Appendix

Table 1: Descriptive statistics

	Total	Girls	Boys
Dropping out: 1 Yes 0 No	0.20	0.20	0.20
Bullying (Std)	0.00	-0.18	0.14
Age	14.92	14.91	14.92
Pregnancy: 1 Yes 0 No	0.05	0.06	0.04
Sexual abuse: 1 Yes 0 No	0.01	0.01	0.01
Siblings	2.67	2.62	2.71
Half-Siblings	0.20	0.21	0.18
Father death: 1 Yes 0 No	0.04	0.05	0.03
Mother death: 1 Yes 0 No	0.01	0.01	0.02
Abandonment by the father: 1 Yes 0 No	0.07	0.08	0.06
Abandonment by the mother: 1 Yes 0 No	0.03	0.03	0.02
Drugs use (parents): 1 Yes 0 No	0.02	0.01	0.02
Prison (parents): 1 Yes 0 No	0.04	0.05	0.04
Change of work (parents): 1 Yes 0 No	0.11	0.12	0.10
Address change: 1 Yes 0 No	0.09	0.11	0.07
Violence inside your house: 1 Yes 0 No	0.04	0.05	0.03
Social support (Std)	0.00	0.16	-0.12
Self-esteem (Std)	0.00	0.00	0.00
Stress (Std)	0.00	-0.02	0.02
Anxiety (Std)	0.00	0.14	-0.11

Source: Survey of Resilience and Social Mobility (Progresa-Oportunidades Program)

Table 2: OLS Estimates: Effects of Bullying on Whether Adolescents Dropped Out of School

	(1)	(2)	(3)
Dependent variable: Dropping Out			
Bullying (Std)	0.058***	0.052***	0.045***
	(0.017)	(0.018)	(0.017)
Sex (Female=1)	0.002	0.007	-0.001
	(0.019)	(0.020)	(0.020)
Age	0.061***	0.060***	0.065***
	(0.010)	(0.010)	(0.010)
Pregnancy: 1 Yes 0 No	0.137**	0.131**	0.136**
	(0.062)	(0.059)	(0.057)
Sexual abuse: 1 Yes 0 No	-0.107	-0.147*	-0.154
	(0.102)	(0.074)	(0.095)
Siblings	0.032***	0.031***	0.026***
	(0.008)	(0.008)	(0.008)
Half-siblings	0.001	-0.003	-0.023
	(0.027)	(0.027)	(0.029)
Father death: 1 Yes 0 No		0.232***	0.186**
		(0.082)	(0.087)
Mother death: 1 Yes 0 No		0.189	0.235*
		(0.144)	(0.139)
Abandonment by the father: 1 Yes 0 No		0.055	0.088**
		(0.039)	(0.040)
Abandonment by the mother: 1 Yes 0 No		-0.021	-0.019
		(0.075)	(0.080)
Drugs use (parents): 1 Yes 0 No		-0.055	-0.079
		(0.072)	(0.074)
Prison (parents): 1 Yes 0 No		0.044	0.038
		(0.055)	(0.056)
Change of work (parents): 1 Yes 0 No		-0.033	-0.034
		(0.033)	(0.034)
Address change: 1 Yes 0 No		-0.044	-0.038
		(0.047)	(0.045)
Violence inside your house: 1 Yes 0 No		-0.003	-0.008
		(0.059)	(0.062)
Social support (Std)		-0.026**	-0.028**
		(0.012)	(0.013)
Municipality FE	No	No	Yes
R^2	0.09	0.12	0.21
Observations	1038	1038	1038

Note: Clustered standard errors displayed in parenthesis at the municipality level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Bounding methodology

	Oster ($R_{max} = 1.3\tilde{R}$)	δ for ($\beta = 0$)
Bullying ($0 \leq \delta \leq 1$):	[0.040, 0.045]	5.05
Bullying ($-1 \leq \delta \leq 0$):	[0.045, 0.050]	5.05
Controls	Yes	Yes
Municipality FE	Yes	Yes

Note: Interval in squares brakets are the bounds. The control variables are: sex, age, health problems, pregnancy, sexual abuse, brothers, step brothers, father death, mother death, abandonment by father, abandonment by mother, drugs use (parents), parents in prison, change of work, address change, violence inside the house, and having social support.

Table 4: Lewbel's Instrumental Variables

	(1)
Bullying (Std):	.047**
	(.018)
Controls	Yes
Municipality FE	Yes
R^2	0.21
Observations	1,038
F-statistic first stage	6.38

The control variables are: sex, age, health problems, pregnancy, sexual abuse, brothers, step brothers, father death, mother death, abandonment by father, abandonment by mother, drugs use (parents), parents in prison, change of work, address change, violence inside the house, and having social support. Clustered standard errors displayed in parenthesis at the municipality level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Heterogeneous effects with respect to sex, age, pregnancy, and father death

	(1)	(2)	(3)	(4)
Dependent variable: Dropping Out				
Bullying (Std)	0.029	0.068***	0.046***	0.046***
	(0.018)	(0.022)	(0.016)	(0.017)
Bullying*Sex	0.052**			
	(0.026)			
Bullying*Age		-0.050*		
		(0.025)		
Bullying*Pregnancy			-0.064	
			(0.081)	
Bullying*Father death				-0.022
				(0.056)
Sex (Female=1)	0.005	0.001	0.001	0.000
	(0.020)	(0.019)	(0.020)	(0.020)
Age: 1 (years: 13 and 14) 0 (years: 15,16, and 17)	-0.151***	-0.152***	-0.152***	-0.152***
	(0.025)	(0.025)	(0.025)	(0.025)
Pregnancy: 1 Yes 0 No	0.126**	0.127**	0.119**	0.127**
	(0.060)	(0.059)	(0.059)	(0.059)
Sexual abuse: 1 Yes 0 No	-0.135	-0.141	-0.137	-0.141
	(0.096)	(0.100)	(0.095)	(0.096)
Siblings	0.027***	0.028***	0.027***	0.027***
	(0.008)	(0.008)	(0.008)	(0.008)
Half-siblings	-0.020	-0.021	-0.020	-0.019
	(0.029)	(0.028)	(0.028)	(0.028)
Father death: 1 Yes 0 No	0.200**	0.196**	0.189**	0.194**
	(0.090)	(0.087)	(0.089)	(0.089)
Mother death: 1 Yes 0 No	0.222	0.214	0.229	0.219
	(0.139)	(0.140)	(0.142)	(0.140)
Abandonment by the father: 1 Yes 0 No	0.084**	0.080**	0.085**	0.084**
	(0.039)	(0.039)	(0.040)	(0.039)
Abandonment by the mother: 1 Yes 0 No	-0.005	0.009	-0.007	-0.006
	(0.082)	(0.077)	(0.080)	(0.081)
Drugs use (parents): 1 Yes 0 No	-0.074	-0.070	-0.078	-0.074
	(0.074)	(0.075)	(0.076)	(0.075)
Prison (parents): 1 Yes 0 No	0.034	0.035	0.034	0.034
	(0.058)	(0.059)	(0.058)	(0.058)
Change of work (parents): 1 Yes 0 No	-0.026	-0.026	-0.025	-0.027
	(0.035)	(0.035)	(0.035)	(0.035)
Address change: 1 Yes 0 No	-0.049	-0.050	-0.054	-0.052
	(0.047)	(0.046)	(0.046)	(0.047)
Violence inside your house: 1 Yes 0 No	-0.010	-0.020	-0.010	-0.010
	(0.063)	(0.060)	(0.061)	(0.060)
Social support (Std)	-0.024*	-0.024*	-0.024*	-0.024*
	(0.013)	(0.013)	(0.013)	(0.013)
Municipality FE	Yes	Yes	Yes	Yes
R^2	0.20	0.20	0.20	0.20
Observations	1038	1038	1038	1038

Note: Clustered standard errors displayed in parenthesis at the municipality level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Mechanisms: Effects of Bullying on Whether Adolescents Dropped Out of School

	(1)	(2)	(3)
Dependent variable: Dropping Out			
Bullying (Std)	0.043***	0.046***	0.044***
	(0.012)	(0.012)	(0.012)
Self-esteem (Std)	-0.017		
	(0.012)		
Stress (Std)		-0.004	
		(0.012)	
Anxiety (Std)			0.003
			(0.012)
Sex (Female=1)	-0.003	-0.001	-0.002
	(0.022)	(0.022)	(0.023)
Age	0.065***	0.065***	0.065***
	(0.009)	(0.009)	(0.009)
Pregnancy: 1 Yes 0 No	0.136**	0.136**	0.137**
	(0.053)	(0.053)	(0.054)
Sexual abuse: 1 Yes 0 No	-0.158	-0.152	-0.156
	(0.108)	(0.108)	(0.108)
Siblings	0.026***	0.026***	0.026***
	(0.007)	(0.007)	(0.007)
Half-siblings	-0.024	-0.022	-0.023
	(0.028)	(0.028)	(0.028)
Father death: 1 Yes 0 No	0.186***	0.186***	0.186***
	(0.060)	(0.060)	(0.060)
Mother death: 1 Yes 0 No	0.234**	0.236**	0.235**
	(0.097)	(0.097)	(0.097)
Abandonment by the father: 1 Yes 0 No	0.085*	0.088*	0.089*
	(0.046)	(0.046)	(0.046)
Abandonment by the mother: 1 Yes 0 No	-0.015	-0.018	-0.020
	(0.074)	(0.074)	(0.074)
Drugs use (parents): 1 Yes 0 No	-0.076	-0.080	-0.080
	(0.090)	(0.090)	(0.090)
Prison (parents): 1 Yes 0 No	0.041	0.038	0.038
	(0.057)	(0.057)	(0.057)
Change of work (parents): 1 Yes 0 No	-0.034	-0.034	-0.035
	(0.036)	(0.036)	(0.036)
Address change: 1 Yes 0 No	-0.038	-0.038	-0.039
	(0.040)	(0.040)	(0.040)
Violence inside your house: 1 Yes 0 No	-0.015	-0.008	-0.009
	(0.058)	(0.058)	(0.058)
Social support (Std)	-0.021*	-0.029**	-0.027**
	(0.013)	(0.012)	(0.012)
Municipality FE	Yes	Yes	Yes
R^2	0.21	0.21	0.21
Observations	1037	1038	1038

Note: Clustered standard errors displayed in parenthesis at the municipality level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Latent variable scales

Scale Name	Survey Question	Factor Loading
Bullying	[1] Other students bother me (pulling hair, throwing objects, etc.)	0.3948
Eigenvalue: 2.9	[2] Other students called me bad names	0.4499
	[3] Other students left me out of an activity intentionally	0.4596
	[4] Other students threatened to hurt me	0.4686
	[5] I was beaten or kicked	0.4592
Self-esteem	[1] I am satisfied with myself	0.3678
Eigenvalue: 2.1	[2] I am able to do things as well as others	0.4358
	[3] I am a worthy person	0.4845
	[4] I have good qualities	0.4720
	[5] I have a positive attitude toward myself	0.4661
Stress	[1] I realize that I get into conflict situations	0.1523
Eigenvalue: 4.6	[2] I feel overwhelmed with responsibilities	0.2282
	[3] I feel mentally tired	0.2917
	[4] I feel physically tired	0.2900
	[5] I'm feeling down	0.3237
	[6] I feel frustrated	0.3251
	[7] I feel pressured by other people	0.3087
	[8] I feel tense	0.3213
	[9] My problems seem to be accumulating	0.3130
	[10] I feel like I'm doing things because I should, not because I want to	0.2362
	[11] I'm afraid I can not achieve my goals	0.2689
	[12] I have to make many decisions	0.2014
	[13] I have difficulty to relax	0.2826
Anxiety	[1] I cry a lot	0.2904
Eigenvalue: 3.7	[2] I'm afraid of some animals, situations or places	0.2273
	[3] I'm afraid to go to school	0.2414
	[4] I'm afraid to do something bad	0.1661
	[5] I feel like I have to be perfect	0.1746
	[6] I feel like nobody loves me	0.3359
	[7] I feel inferior to others	0.3307
	[8] I'm nervous or tense	0.3048
	[9] I am very fearful or anxious	0.3064
	[10] I feel very guilty	0.3318
	[11] I get bored or easily embarrassed	0.2933
	[12] I think about killing myself	0.2686
	[13] I worry a lot	0.2653