



# **Bullying and Educational Outcomes: Panel estimates from Chile**

Tesis para optar al grado de  
**MAGÍSTER EN ANÁLISIS ECONÓMICO**

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Santiago, Abril 2017

# Bullying and educational outcomes: Panel estimates from Chile

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April 26, 2017

## Abstract

Bullying is one of the most important social problems faced by students at the school. However, there is scant research in the economic literature about this subject, particularly for developing countries. This paper explores the effect of being a victim of different types of bullying (physical, verbal, social, cyber) on standardized test scores using a unique panel dataset from Chile. Moreover, we are able to see if bullying influences grade retention rates and college admission tests. Fixed effect estimates indicates that being bullied decreases student's standardized test score. For instance, being cyber bullied every day decreases math and reading scores in 0.13 and 0.08 S.D respectively. The more frequent bullying is, the more detrimental effects has on school performance. On top of this, we find that being bullied increases grade retention probability and decreases college admission test scores. Our results suggests that bullying must be an important matter in policy makers agenda in developing countries, since development is heavily influence by the cognitive skills acquire at school.

**Keywords.** Bullying; Education; Human Capital; Chile

**JEL Classification:** I21, J24.

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## 1 Introduction

There is substantial evidence that economic development is heavily influenced by the cognitive skills acquired at school ([Hanushek and Woessmann, 2008, 2012a,b](#)). For that reason, most of the developing countries have tried to apply policies that ensure access to schooling. However, after achieving this goal, the challenge has been quality in education, what has been linked to what happens at the classroom level.

In this context, one variable that may affect individuals' learning process and that has been less considered in the economic debate is bullying. Nowadays, bullying is a widespread behavioral phenomenon at schools around the world. In fact, 45% of 4th grade students participating in the Trends in International Mathematical and Science Studies 2015 (TIMSS) declared being bullied at least on a monthly basis ([Mullis et al., 2016](#))<sup>1</sup>. Thus, research is needed in order to determine its effect on human capital acquisitions, particularly in developing countries.

Our paper studies the effect of being bullied on student's standardized test score, using a unique administrative panel dataset from Chile. Bullying is an important subject in Chile since, according to TIMSS 2015, 40% of 4th grade students reported being bullied at least on a monthly basis ([Mullis et al., 2016](#)). Moreover, Chile is a highly unequal country,

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<sup>1</sup>57 countries participated in this study.

what has been associated with more prevalence of bullying ([Contreras et al., 2015](#))<sup>2</sup>.

The scant economic research about this subject has shown a negative relationship among bullying at school, educational and labor outcomes ([Brown and Taylor, 2008](#); [Ponzo, 2013](#); [Eriksen et al., 2014](#); [Sarzos and Urzúa, 2015](#)). However, it has been mostly focus in developed countries such as U.K., Italy, Denmark and Korea<sup>3</sup>. Moreover, most of the evidence comes from datasets that do not allow to control by individual non-observed heterogeneity<sup>4</sup>. Additionally, much of the analysis have not been focus on the different types of bullying and its frequency.

With this in mind, our paper estimate the relationship among the frequency of different types of bullying (physical, verbal, social and cyber), math and reading standardize test score using a big sample of 120,000 students observed in 8th and 10th grade. Importantly, our empirical framework includes year, school and individual fixed effects. The former allows to control by non-observed variables constant over-time that might affect individuals performance each year. On the other hand, the school fixed effects controls by non-observed characteristics of the school such as the type (public, private subsidized, private), its socio-economics

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<sup>2</sup>The Chilean income GINI is 0.495.

<sup>3</sup>Nevertheless, there are some recent social science articles that have tackled this issue in Latin America countries ([Román and Torrecilla, 2011](#); [Contreras et al., 2016](#); [Delprato et al., 2017](#)).

<sup>4</sup>An exception is [Sarzos and Urzúa \(2015\)](#) who uses structural models to provide evidence of the negative effect of both being a bully and bullied on standardized test score and other health and psychological outcomes for a sample of Korean students.

level, and the rules of selection they might apply. Finally, individuals fixed effects controls by non-observed heterogeneity constant over-time that may be correlated with both performance and being bullied, like personality traits and innate abilities.

Our results suggest that there is a substantial overestimation of the negative relationship between bullying and school performance when individuals fixed effects are not considered. Moreover, all types of bullying have detrimental effects on the standardized test scores. On the other hand, the negative effect of each type of bullying increases with its frequency. For instance, being cyber bullied every day decreases math and language test performance in 0.13 and 0.08 S.D. respectively. Several robustness checks are presented to corroborate the central findings.

Additionally, our dataset has information of the college admissions test scores measured at the end of 12th grade and about individuals school trajectories including grade retention. Using a value-added framework, we find that physical, social and cyber bullying have significant effects over math and reading college admission test scores. For example, being cyber bullied every day decreases math and reading test performance in 0.19 and 0.30 S.D., respectively. On the other hand, being bullied increases the probability of grade retention. For instance, being cyber bullied every day in 8th and 10th grade is associated with an in-

crease in the probability of grade retention by 116 and 50% respectively.

The main contributions of our paper are first, it shows evidence for a developing country like Chile, which has particular characteristics such as selection by schools and parents, and a highly decentralized system; second, the effect of bullying is analyzed according to frequency and type of bullying (physical, verbal, social and cyber); third, we use panel data to try solve identification problems; and finally, in addition to analyzing the effect on short-term results, we analyzed the effect on medium-term outcomes (PSU) and school retention.

The next section describes the Chilean educational system. Section 3 presents a theoretical framework that discusses how bullying can affect academic performance. Section 4 describes the dataset and the main variables we are going to use in this study. Section 5 presents the empirical strategy used to estimate the effect of bullying on school performance. Section 6 presents the main results and the robustness check. Section 7 expands the research by estimating the effect of bullying on college admission tests and grade retention. Section 7 concludes.

## **2 Chilean educational system**

In 1981, Chile introduced an important reform in the educational system that liberalized the school market. First, the educational system was

decentralized, transferring the administration of public schools from the Ministry of Education to the Municipalities. Second, a demand-driven voucher system was established allowing parents to choose the school for their children. As a result, the educational system was divided in three types of schools: Public schools financed by the voucher and administrated by the municipalities; Private subsidized schools, funded by the voucher and administrated by privates; and private fee-paying schools, funded and administered by privates. This policy generate an increase in the participation of private subsidized schools in the educational market, from a 15% in 1981 to a 54.7% in 2016. Moreover, in 1993 a law was enacted allowing to private subsidized schools to charge a fee in order to further finance this types of school.

Empirical evidence suggest that this policy increased educational attainment ([Bravo et al., 2010](#); [Patrinos and Sakellariou, 2011](#)). However, there is no evidence that the quality of the system increased. [Hsieh and Urquiola \(2006\)](#) do not find an effect on school performance at the municipality level. They argue that the voucher program increased sorting in private subsidized schools, leaving the “worst” students in the public schools. On the other hand, some studies find that school performance in private subsidized schools are marginally better than in public schools, and that this effect tends to vanish when estimates account for peer ef-



fect and school selection (McEwan and Carnoy, 2000; McEwan, 2001; Carnoy and McEwan, 2003; Contreras et al., 2010). On the top of this, evidence indicates that the current educational system has high levels of social segregation (Elacqua, 2012; Valenzuela et al., 2014).

To measure the quality of Chilean education, the SIMCE is applied throughout the country for selected levels. All children who attend these levels and attend regular establishments must give it up. The test is applied in the first days of October, when the academic year is already ending (in Chile the school year starts in February and ends the first days of December) to measure the progress of the current year. In addition to the test, questionnaires are collected from parents and students asking for different elements related to their characteristics. One of the questions in the student questionnaire is related to bullying, this allows us to know if in the current year has received bullying.

### **3 Theoretical framework**

Bullying is commonly defined as an intentional action whose purpose is to cause damages whether physical or psychological or both on a victim who is weak or unable to defend himself (Olweus, 1993, 1997; Rigby and Cox, 1996). There may be different forms or types of bullying, and in this paper we will focus on four in specific. Physical, verbal, social

or cyber bullying ([Wang et al., 2009](#)). Physical bullying (e.g., hitting, pushing, and kicking), verbal bullying (e.g., name-calling and teasing in a hurtful way) and social bullying (e.g., social exclusion, spreading rumors) are common forms of bullying. Cyber bullying (e.g., text messaging, calling, photos, email) is a concept coined in recent years with the greatest importance of cell phones, social networks, tablets and personal computers, and can be defined as an outward aggressive act that is portrayed through technological devices such as phones and the Internet ([Slonje and Smith, 2008](#)).

From the psychology has been realized an important amount of studies that show that students who receive bullying are likely to demonstrate low self-esteem, self-harm, suicidal intention, depression, loneliness and physical illhealth ([Barker et al., 2008](#); [Fekkes et al., 2006](#)). We also know that to be a victim of bullying is closely related to harassment and violence ([Zeldin et al., 2011](#)), which in turn could be related to negative long-term consequences, which could imply that the results of the labor market are indirectly related to bullying.

In that sense, bullying can impact the academic performance because (i) victims are more likely to feeling unhappy, lonely and have fewer friends ([Boulton and Underwood, 1992](#)), (ii) victims are likely to develop new psychosomatic and psychosocial problems ([Kumpulainen](#)

et al., 2001), (iii) The victims experience a lot of tension, and that may produce negative emotions such as anger, frustration, depression or anxiety which may lead to a corrective action in terms of wrongdoing, selfharm, suicide, etc (Eriksen et al., 2012; Agnew, 1992).

From the economy, meanwhile, it can be pointed out that if bullying generates lower self-esteem and also harms the acquisition of other non-cognitive abilities, educational outcomes - and subsequently, results in the labor market - would also be affected by this channel (Heckman, 2008; Waddell, 2006).

Thus, from both psychology and economics, one can think of channels that imply a relationship between bullying and educational outcomes.

## 4 Data

We use data coming from the 2007, 2011 and 2013 Measurement System of Education Quality (SIMCE in Spanish), a national exam applied by the Ministry of Education to all school students in Chile belonging to certain grades each year. We observe the same individuals for these three years at 4th, 8th and 10th grade respectively. Besides the tests scores, we have survey information about students' characteristics and their families for each year. Additionally, we have information of their college admission test performance (PSU in Spanish) done at the end of 12th

grade. Finally, we have administrative data of their school trajectories, which allow us to measure grade retention.

#### 4.1 Outcome variables

The main outcome variables considered in this study are the math and reading standardized scores obtained in SIMCE. Additionally, we considered the math and reading standardized scores obtained in PSU. While SIMCE is a good measure of school performance, PSU is a complementary measure since its scores define the career and university where individuals may do their post-secondary studies. Therefore, individuals might exert more effort to prepare and take the exam. Finally, we take advantage of the available administrative data and use grade retention as another outcome variable.

#### 4.2 Bullying

According to [Olweus \(1997\)](#), being victimized means being repeatedly exposed to negative actions perpetrated by one or more students in a context of unequal power or strength. The students questionnaire administrated with the SIMCE tests on 8th and 10th grade measured victimization at the school using the following questions:

*During this year, how often have other students from your school bullied you or mistreated you in the following manner?:*

1. Physically; Hitting you or breaking your things.
2. Verbally; Insulting, mocking or threatening you.
3. Socially; Isolating you, speaking bad about you or humiliating you in front of others.
4. Cyberly; Threatening, humiliating or mocking you on the internet (social networks, emails) or text messages.

The possible answers for each category were “A few times a year”, “Many times a month”, “Many times a week” and “Every day”.

Descriptive statistics for each type of bullying and the outcome variables are presented in table 1. It can be seen that the most common type of bullying in 8th grade is verbal (41.07%), followed by social (32.02%), physical (20.83%) and cyber (14.90%). A similar pattern is observed for the same students in 10th grade. However, as international evidence indicates, self-report of bullying are lower than in 8th grade (see [Smith et al., 1999](#), for a review and discussion on this subject). For instance, physical bullying decreases nearly 50%, while verbal bullying decreases in 11.63 percentage points reaching a prevalence of 29.93%.

Also, it can be seen that math performance on SIMCE at 8th grade is on average lower for victims of physical, social and cyber bullying in comparison with never bullied students. The differences range be-

tween 0.08 and 0.2 S.D.<sup>5</sup>. On the contrary, there is almost no difference in the average math score when considering verbal bullying. Also, the descriptive statistic suggest that there is a greater gap on the average reading test performance between the two groups for physical and cyber bullying, reaching differences of 0.26 and 0.30 S.D. respectively. Similar patterns are observed for 10th grade. Additionally, it can be seen that SIMCE average scores at 8th and 10th grade are similar among individuals who have never and a few times a year been bullied. At the same time, the average test scores decreases monotonically with the monthly, weekly and daily bullying frequency, suggesting that bullying intensities may be important.

In regard to the average college admission test performance, results suggest there is a gap between individuals that have never and ever been bullied in 10th grade. The gap is greater for physical and cyber bullying, between 0.21 and 0.33 S.D for math and reading tests, in comparison with verbal and social bullying, with differences around 0.1 S.D.<sup>6</sup>. However, there is not a stable relationship between bullying intensities and PSU average scores. While average performance decreases with physical and verbal bullying, they do not with social and cyber bullying frequency. This may be explained partly by the small amount of ob-

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<sup>5</sup>One standard deviation is equivalent to 50 points in the test.

<sup>6</sup>One standard deviation is equivalent to 109 points in the test.

servations on those cells. Finally, grade retention rates at 8th and 10th grade are greater for bullied students. Moreover, grade retention rates seems to increase with bullying frequency.

Table 1: Descriptive statistic of bullying and outcome variables

	SIMCE						PSU			Grade retention	
	8th grade			10th grade			12th grade			8th grade	10th grade
	%	Math	Reading	%	Math	Reading	%	Math	Reading	%	%
<b>Panel A: Physical Bullying</b>											
Never victimized	79.17	270	267	88.33	276	262	88.98	479	475	1.88	5.14
Ever victimized	20.83	264	254	11.67	266	246	11.02	455	442	2.80	6.71
A few times a year	14.05	271	263	9.42	269	248	9.01	460	448	2.15	6.29
A few times a month	2.92	262	251	1.47	257	235	1.31	442	421	2.76	8.38
A few times a week	2.25	245	231	0.51	249	231	0.45	433	411	4.33	8.54
Every day	1.61	234	212	0.27	250	226	0.24	434	426	5.51	8.42
<b>Panel B: Verbal Bullying</b>											
Never victimized	58.93	268	266	70.07	275	262	70.56	480	475	1.92	5.13
Ever victimized	41.07	269	262	29.93	274	256	29.44	469	462	2.28	5.79
A few times a year	24.92	273	268	22.01	275	258	21.85	473	466	1.8	5.51
A few times a month	7.46	269	260	4.50	271	251	4.37	465	454	2.41	6.17
A few times a week	5.71	258	248	2.25	268	250	2.14	462	451	3.37	6.82
Every day	2.98	256	243	1.16	261	240	1.07	443	434	3.59	7.76
<b>Panel C: Social Bullying</b>											
Never victimized	67.98	270	266	77.55	276	261	77.91	479	474	1.82	5.14
Ever victimized	32.02	266	260	22.45	272	257	22.09	469	463	2.58	5.97
A few times a year	19.71	272	267	16.40	275	260	16.34	431	430	2.03	5.47
A few times a month	5.98	264	256	3.53	266	250	3.41	440	433	2.82	6.8
A few times a week	4.17	254	244	1.71	261	246	1.61	463	454	3.52	7.56
Every day	2.17	247	234	0.81	253	239	0.73	476	470	4.56	8.8
<b>Panel D: Cyber Bullying</b>											
Never victimized	85.10	270	267	89.09	276	262	89.65	479	474	1.86	5.12
Ever victimized	14.90	260	250	10.91	264	247	10.35	456	447	3.07	6.97
A few times a year	9.38	268	261	7.97	268	251	7.70	423	426	2.31	6.29
A few times a month	2.52	253	242	1.77	254	238	1.62	434	426	3.64	8.23
A few times a week	1.88	241	225	0.73	249	233	0.63	440	425	4.26	9.75
Every day	1.11	238	218	0.44	243	229	0.39	463	455	5.43	8.94
Total	100	269	264	100	275	260	100	477	471	2.07	5.32

Notes: Authors' calculations.

## 5 Bullying and school performance

### 5.1 Empirical Strategy

We begin our empirical analysis by estimating the effect that being bullied has on school performance in math and reading test scores. To do

so, we exploit the panel structure of our data which allow us to observe individuals performance and self-declared victimization at 8th and 10th grade. We estimate the following model:

$$Y_{ist} = \alpha_i + \lambda_s + \tau_t + \beta \text{bullied}_{ist}^T + X'_{ist} \delta + \epsilon_{ist} \quad (1)$$

where  $Y_{ist}$  is the standardized SIMCE test score of student  $i$  at school  $s$  in period  $t$ ;  $\alpha_i$ ,  $\lambda_s$  and  $\tau_t$  are the individual, school and year fixed effect respectively;  $\text{bullied}_{ist}^T$  is a binary variable that takes 1 if the individual  $i$  at school  $s$  in period  $t$  has received bullying of type  $T$  and 0 otherwise<sup>7</sup>;  $X_{ist}$  is a vector that contains the control variables of student  $i$  at school  $s$  in period  $t$ ; and  $\epsilon_{ist}$  is the error term.

Then, we turn to analyze if bullying frequency matters, by estimating the following model:

$$Y_{ist} = \alpha_i + \lambda_s + \tau_t + \beta_1 \text{few\_times\_year}_{ist}^T + \beta_2 \text{many\_times\_month}_{ist}^T + \beta_3 \text{many\_times\_week}_{ist}^T + \beta_4 \text{every\_day}_{ist}^T + X'_{ist} \delta + \epsilon_{ist} \quad (2)$$

where  $\text{few\_times\_year}$  is a binary variable that takes 1 if the individual  $i$  at school  $s$  in period  $t$  has received bullying type  $T$  a few times a year

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<sup>7</sup>where  $T$  can be physical, verbal, social and cyber



and 0 otherwise; *may\_times\_month* is a binary variable that takes 1 if the individual  $i$  at school  $s$  in period  $t$  has received bullying type  $T$  many times a month and 0 otherwise; *many\_times\_week* is a binary variable that takes 1 if the individual  $i$  at school  $s$  in period  $t$  has received bullying type  $T$  many times a week and 0 otherwise; *every\_day* is a binary variable that takes 1 if the individual  $i$  at school  $s$  in period  $t$  has received bullying type  $T$  every day and 0 otherwise<sup>8</sup>.

Our main goal is to estimate  $\beta_j \forall j = 1, \dots, 4$ , that is, the effect of the intensity of being bullied on standardized test scores holding all others variables constant. To account for the fact that unobserved individual level factors, that remain constant over-time, may determine both school performance and being bullied, like personality traits and innate abilities, we include individuals fixed effects. Additionally, we include school fixed effect to control by non-observed constant characteristics of the school that are correlated with both individuals school performance and being bullied, such as the type (public, private subsidized, private), its socio-economics level and the rules of selection that they may apply. Also, we include year fixed effects to account for any non-observed systematic differences between years.

While the fixed effects are a good strategy to estimate the parameters of interest, it's estimates may be biased if there are time-varying individ-

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<sup>8</sup>The omitted category is never being bullied

ual factors that are correlated with being bullied. Therefore, we include a big set of control variables that vary over time at the school and family level such as average years of schooling of the peer’s parents at the class level, parent’s years of schooling, natural logarithm of household income and number of books at the household<sup>9</sup>. The underlying identifying assumption is that there are not important time-varying individual factors that are correlated with variation of the bullying levels. We discuss the value of this claim in section 5.3.

Finally, a concern derived from the use of panel is the inability to observe students who are not in both periods <sup>10</sup>. If the student is not in both periods for random reasons there should be no bias in the estimate. If, on the other hand, it is no longer for reasons associated with bullying and academic performance, there may be a bias. One important reason why we fail to observe students is grade retention. Since repeat students have worse academic performance and, as shown later in the paper, have greater bullying, there will be associated bias. The important thing, then, is to determine the sign of bias. If bullying increases the likelihood of repetition, which in turn is related to a worse score,

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<sup>9</sup>Some of our control variables are missing for the sample under consideration. In order to do not lose observations, the average level of the variable at the school level for that year were imputed. We analyzed the robustness of this strategy by running the same estimates with dummies identifying the missing values. Results were qualitatively and quantitatively similar.

<sup>10</sup>The SIMCE bases have about 250 thousand observations that decrease to 210 when only valid observations are taken. Then, when only those students who were in both periods are taken the number drops to 130,004 per period. Some reasons why the number falls are: in one of the periods the students or their parents did not answer the SIMCE questionnaires, the student could not give the SIMCE test because they missed school that day, the student repeated 8th or 9th grade.

then we fail to observe the less able students. Thus, if the observed average effect of bullying is negative, it could be concluded that it should be even more negative since the group with the lowest performance is not observed. The above, therefore, would be a bias that would reinforce the conclusions of the paper in terms of the negative effect of bullying.

## 5.2 Results

The estimation results of equations (1) and (2) are shown in Table 2. To illustrate the importance of including individual, school and year fixed effects, we present the estimates excluding and including individuals fixed effects. For instance, column (1) show that being physically bullied every day decreases school performance in 0.7 S.D. when we exclude the individual fixed effects. In contrast, column (2) show that being physically bullied every day decreases school performance in 0.14 S.D when we include the individual fixed effects. As it can be seen, neglecting individual fixed effect heavily bias the estimates.

Columns (2), (4), (6) and (8) of Table 2 presents the effect that physical, verbal, social and cyber bullying has on SIMCE standardize scores respectively. It can be seen that each type of victimization decreases school performance in both math and reading. The estimated parameters range between -0.015 and -0.062 S.D..

The estimation results of equation (2) suggest that bullying intensities

matters. For instance, being physically and cyberlly bullied a few times a year decreases the math score on 0.027 and 0.022 S.D. on average (Panel A of Table 2). In contrast, being verbally or socially bullied a few times a year is not correlated with students performance. On the other hand, the more frequent each type of bullying is the bigger-in absolute value- the point estimate is. In fact, the estimated parameters associated to being bullied every day are statistically different, at 5% level, than the ones of being bullied a few times a month and a few times a year. Moreover, results suggest that physical and cyber bullying are the most damaging types of bullying in terms of math performance. For example, being physically and cyberlly bullied every day decreases math performance on 0.14 and 0.13 S.D respectively.

Similar results are found when we analyze the reading standardized test scores estimates (Panel B of Table 2). All types of bullying are negatively correlated with the test score. Moreover, the more frequent each type of bullying is the bigger -in absolute value- the point estimate is. As in the case of math, the estimated parameters associated to being bullied every day are statistically different, at 5% level, than the ones of being bullied a few times a month and a few times a year. In particular, the effect of being bullied every day ranges between -0.08 and -0.11 S.D across bullying types.

In summary, including individuals fixed effects diminish the potential bias in the estimates generated by omitted variables that remains constant over time. Also, it seems important to take into consideration the frequency of bullying, since the overall effect of being bullied hides important heterogeneity. For instance, being bullied a few times a year, what is the most common answer, seems to have a relative small effect in reading and math scores in comparison with being bullied a few times a week and every day<sup>11</sup>.

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<sup>11</sup>The difference in the estimated parameter of being bullied a few times a week and being bullied every day with respect to being bullied a few times a year are statistically significant at a 5% level.

Table 2: F.E. estimate of the relationship between being bullied and SIMCE standardized scores.

	Physical		Verbal		Social		Cyber	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<b>Panel A: Math</b>								
Bullied	-0.0279*** (0.00467)	-0.0618*** (0.00453)	0.0489*** (0.00349)	-0.0384*** (0.00357)	-0.0166*** (0.00380)	-0.0466*** (0.00377)	-0.0993*** (0.00488)	-0.0418*** (0.00485)
A few times a year	-0.0455*** (0.00606)	-0.0274*** (0.00576)	0.0418*** (0.00447)	-0.00514 (0.00443)	-0.00253 (0.00464)	-0.00381 (0.00469)	-0.118*** (0.00647)	-0.0217*** (0.00635)
Many times a month	-0.183*** (0.0124)	-0.0591*** (0.0123)	-0.0375*** (0.00788)	-0.0336*** (0.00789)	-0.122*** (0.00866)	-0.0312*** (0.00854)	-0.304*** (0.0124)	-0.0427*** (0.0125)
Many times a week	-0.399*** (0.0160)	-0.0747*** (0.0159)	-0.151*** (0.00996)	-0.0563*** (0.00947)	-0.231*** (0.0111)	-0.0387*** (0.0108)	-0.511*** (0.0162)	-0.116*** (0.0161)
Every day	-0.701*** (0.0196)	-0.140*** (0.0195)	-0.220*** (0.0140)	-0.0620*** (0.0135)	-0.384*** (0.0160)	-0.0879*** (0.0160)	-0.602*** (0.0209)	-0.129*** (0.0217)
<b>Panel B: Reading</b>								
Bullied	-0.128*** (0.00553)	-0.0411*** (0.00527)	-0.00569 (0.00403)	-0.0165*** (0.00412)	-0.0674*** (0.00418)	-0.0152*** (0.00429)	-0.216*** (0.00567)	-0.0396*** (0.00562)
A few times a year	0.0259*** (0.00510)	-0.0505*** (0.00493)	0.0749*** (0.00389)	-0.0267*** (0.00383)	0.0236*** (0.00426)	-0.0367*** (0.00414)	-0.0366*** (0.00561)	-0.0332*** (0.00548)
Many times a month	-0.0611*** (0.0109)	-0.0863*** (0.0104)	0.0479*** (0.00704)	-0.0560*** (0.00677)	-0.0380*** (0.00787)	-0.0632*** (0.00731)	-0.157*** (0.0114)	-0.0489*** (0.0107)
Many times a week	-0.228*** (0.0134)	-0.0973*** (0.0136)	-0.0486*** (0.00828)	-0.0809*** (0.00814)	-0.123*** (0.00939)	-0.0692*** (0.00923)	-0.279*** (0.0139)	-0.0693*** (0.0139)
Every day	-0.374*** (0.0165)	-0.111*** (0.0177)	-0.0831*** (0.0116)	-0.0835*** (0.0117)	-0.242*** (0.0135)	0.0960*** (0.0140)	-0.360*** (0.0184)	-0.0838*** (0.0195)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
School fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual fixed effects	No	Yes	No	Yes	No	Yes	No	Yes
Single observations	121.513	113.337	121.470	113.268	120.791	112.056	121.282	112.926

**Notes:** Authors' calculations. All regressions controls by parent's years of schooling, average parent's years of schooling at the class level, natural logarithm of household income and quantity of books at home. Standard errors are clustered at the student level.  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

### 5.3 Robustness Check

Results shown in the previous section are valid under the assumption that being bullied is unrelated to time-varying non-observed variables. In order to study the robustness of our results to this assumption, we estimate to what extent lagged SIMCE standardized scores predicts being bullied in the next period. To do so, we take advantage of the measure of students performance at 4th grade. Therefore, we estimate the following model:

$$bullied_{ist}^T = \alpha_i + \lambda_s + \tau_t + \gamma Y_{is,t-1} + X'_{is,t} \delta + \epsilon_{ist} \quad (3)$$

where  $bullied_{ist}^T$  is a binary variable that takes value 1 if the individual  $i$  at the school  $s$  and grade  $t$  (8th or 10th grade) has received bullying type  $T$ ;  $Y_{is,t-\tau}$  is the lag of the SIMCE standardize scores of math and reading (4th or 8th grade); and  $X'_{is,t}$  is the vector of control variables.

The results of this exercise are shown in Table 3. Interestingly, both previous math and reading standardize scores seems to positively predict being bullied. While the results are statistically significant, the magnitude seems to be economically unimportant. For example, increasing one S.D. in reading raise the probability of being a victim of social bullying in 2.39 percentage points, what means an increase of 8% (2.39/27) on the probability of being socially bullied<sup>12</sup>. On the other hand, these results suggest that the findings of our previous section might be bias toward zero, since having better school performance predicts being bullied.

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<sup>12</sup>27% is average rate of being socially bullied in the period under consideration.

Table 3: F.E. estimate of the relationship between lagged SIMCE standardized scores and being bullied

	Physical (1)	Verbal (2)	Social (3)	Cyber (4)
Standardize lagged math score	0.0193*** (0.00187)	0.0190*** (0.00226)	0.0199*** (0.00239)	0.00607*** (0.00177)
Standardize lagged reading score	0.0173*** (0.00186)	0.0176*** (0.00228)	0.0239*** (0.00239)	0.00520*** (0.00178)
Year fixed effects	Yes	Yes	Yes	Yes
School fixed effects	Yes	Yes	Yes	Yes
Individual fixed effects	Yes	Yes	Yes	Yes
Observations	99.759	99.405	99.707	98.650

**Notes:** Authors' calculations. All regressions controls by parent's years of schooling, average parent's years of schooling at the class level, natural logarithm of household income and quantity of books at home. Standard errors are clustered at the student level.

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

In the same line, and to quantify the bias due to the possible correlation between the bullying of the period and the performance of the past period, a montecarlo experiment was performed.

It was defined as true parameters those estimated by the model. That is, a school performance coefficient against bullying of -0.06 standard deviations and a relationship between bullying in the period and yield in the past period of 0.04 deviations, which is reflected in the correlation between the estimated errors. Finally, after estimating with 1000 replicates, the average estimator obtained is -0.019. This would account for a bias of -0.04 deviations from the true parameter. This negative bias can be interpreted in favor of the exposed results since the effect found would be only a lower level of the true effect, which would imply a greater decrease of the academic results due to the bullying.

A second concern has to do with the fact that nearly 53% of the stu-



dents were forced to change of school after 8th grade in 2011, because their schools imparted class only until that grade. Moreover, students might choose to change of school. Thus, individuals may self-select themselves according to their prior experience of bullying. Therefore, our results might be bias because the selection to the treatment is not at random. In order to explore this issue, we analyze the sensitivity of our results in a subsample of individuals that did not change of school. As it can be seen in Table 4, results remain qualitatively stable, i.e., being bullied decreases the standardized SIMCE scores. However, the size of the estimates are higher than in the previous estimates. In summary, this robustness check suggest that our results are not driven by self-selection when individuals change of school.

Table 4: F.E. estimate of the relationship between being bullied and SIMCE math standardized score.

	Physical		Verbal		Social		Cyber	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<b>Panel A: Math</b>								
Bullied	-0.0184** (0.00829)	-0.109*** (0.00802)	0.0285*** (0.00577)	-0.0687*** (0.00614)	-0.0109* (0.00621)	-0.0738*** (0.00641)	-0.0929*** (0.00842)	-0.0485*** (0.00856)
A few times a year	0.0188** (0.00879)	-0.0900*** (0.00870)	0.0469*** (0.00632)	-0.0471*** (0.00657)	0.0193*** (0.00678)	-0.0603*** (0.00696)	-0.0454*** (0.00940)	-0.0347*** (0.00947)
Many times a month	-0.0271 (0.0190)	-0.150*** (0.0192)	0.0344*** (0.0117)	-0.109*** (0.0117)	-0.0294** (0.0135)	-0.0916*** (0.0128)	-0.145*** (0.0194)	-0.0516*** (0.0195)
Many times a week	-0.201*** (0.0256)	-0.180*** (0.0271)	-0.0524*** (0.0139)	-0.156*** (0.0147)	-0.103*** (0.0167)	-0.117*** (0.0169)	-0.250*** (0.0276)	-0.104*** (0.0285)
Every day	-0.352*** (0.0343)	-0.202*** (0.0366)	-0.101*** (0.0219)	-0.139*** (0.0226)	-0.230*** (0.0230)	-0.168*** (0.0168)	(0.0380)	(0.0400)
<b>Panel B: Reading</b>								
Bullied	-0.106*** (0.00979)	-0.0373*** (0.00907)	-0.0184*** (0.00679)	-0.0151** (0.00679)	-0.0460*** (0.00721)	-0.00626 (0.00708)	-0.188*** (0.00993)	-0.0347*** (0.00963)
A few times a year	-0.0397*** (0.0103)	-0.0220** (0.00985)	0.0221*** (0.00731)	-0.00191 (0.00728)	0.0113 (0.00772)	0.00592 (0.00764)	-0.104*** (0.0109)	-0.0134 (0.0107)
Many times a month	-0.153*** (0.0224)	-0.0793*** (0.0226)	-0.0445*** (0.0132)	-0.0327** (0.0132)	-0.113*** (0.0149)	-0.0249* (0.0146)	-0.305*** (0.0225)	-0.0588*** (0.0227)
Many times a week	-0.403*** (0.0302)	-0.0690** (0.0307)	-0.156*** (0.0169)	-0.0643*** (0.0169)	-0.198*** (0.0189)	-0.0386** (0.0194)	-0.448*** (0.0330)	-0.104*** (0.0320)
Every day	-0.667*** (0.0407)	-0.132*** (0.0412)	-0.250*** (0.0269)	-0.0924*** (0.0255)	-0.387*** (0.0321)	-0.0961*** (0.0309)	-0.641*** (0.0424)	-0.181*** (0.0425)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
School fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual fixed effects	No	Yes	No	Yes	No	Yes	No	Yes
Single observations	45.909	45.839	45.885	45.793	45.668	45.359	45.838	45.697

**Notes:** Authors' calculations. All regressions controls by parent's years of schooling, average parent's years of schooling at the class level, natural logarithm of household income and quantity of books at home. Standard errors are clustered at the student level.  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

A third concern about the reliability of our results is related with the possibility of class sorting according to bullying. It might be argued that individuals with bullying antecedents may not be randomly assigned to its classroom, thus, the negative relationship between bullying and school performance might be a result that all bullied individuals are assigned to the same class. SIMCE parent's and teacher's questionnaires do not assess if there is sorting in the school of consideration. Therefore, to rule out the existence of this system we implemented the strategy used by

Clotfelter et al. (2006). In particular, we test if there are statistically different proportion of students bullied in each course for schools that have more than one class. The results indicate that only 8.3 and 9.1% of student in 8th and 10th grade respectively present evidence of sorting in terms of bullying. In order to take into account this concern, we run the same estimates of the previous section adding a dummy variable that identifies the classes were there is evidence of sorting. Our results, available upon request, are not sensitive to this control.

## 6 Other outcomes

### 6.1 College admission test scores

Our rich dataset allows us to see if there are long run effects of being bullied in 8th and 10th grade on the college admission test done at the end of 12th grade. To answer this question, we adopt a valued-added approach<sup>13</sup> (Todd and Wolpin, 2003, 2007). In this context, student's performance is a function of the history of home-based inputs, school based inputs, students endowments, and a time varying error term. Since, the history of home and school inputs and student's endowments are not typically observed, a lag measure of student's performance can work as an approximation.

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<sup>13</sup>It should be noted that the methodology must be changed because no panel data is available for the dependent variable. The student cohort only performs the PSU once.

In our case, we observed our outcome variable at the end of 12th grade, we have information about the family from 10th grade SIMCE questionnaire and we have bullying information from 8th and 10th grade. Moreover, we have students performance information before each measurement of bullying at 4th and 8th grade respectively. Therefore, we estimate the following equation to see if 8th grade bullying has an effect on college admission test scores:

$$Y_{is,12} = \lambda_s + \beta_1 \text{few\_times\_year}_{is,8}^T + \beta_2 \text{many\_times\_month}_{is,8}^T + \beta_3 \text{many\_times\_week}_{is,8}^T + \beta_4 \text{every\_day}_{is,8}^T + \phi Y_{is,4} + X'_{is,10} \delta + \epsilon_{is,12}$$

where  $Y_{is,12}$  is the standardized PSU test score of student  $i$  at school  $s$ ;  $Y_{is,4}$  is the standardized SIMCE score at 4th grade; and the other variables are the same used in the previous section measured at the grade indicate in the subindex.

The estimation of the relationship between being bullied at 8th grade and college admission test scores are shown in Panel A of Table 5. A general overview of the results suggest that being bullied at 8th grade has a negative effect on college admission test results. Specifically, cyber and social bullying decreases both math and reading test scores. The more bullying of these type is experienced the greater-in absolute value- are the

point estimates. For instance, being cyber-bullied every day decreases the math and reading performance in 0.19 and 0.3 S.D. respectively. On the other hand, having experienced physical bullying is associated with negative results on math and reading, when individuals faced it many times a week or more and when individuals faced it many times a month or more respectively. Finally, verbal bullying has no consistent effect over the test scores.

Table 5: OLS estimates of the relationship between being bullied and college admission test score

	Math				Reading			
	Physical (1)	Verbal (2)	Social (3)	Cyber (4)	Physical (5)	Verbal (6)	Social (7)	Cyber (8)
<b>Panel A: 8th grade</b>								
Bullied	-0.00447 (0.00698)	0.0168*** (0.00561)	-0.0154*** (0.00587)	-0.0497*** (0.00789)	-0.0310*** (0.00701)	0.0172*** (0.00564)	-0.0260*** (0.00590)	-0.0859*** (0.00793)
A few times a year	0.0223*** (0.00799)	0.0251*** (0.00648)	0.00490 (0.00691)	-0.0141 (0.00943)	0.00837 (0.00803)	0.0343*** (0.00652)	0.00252 (0.00695)	-0.0281*** (0.00948)
Many times a month	-0.00926 (0.0167)	0.0298*** (0.0108)	-0.0282** (0.0118)	-0.0915*** (0.0181)	-0.0398** (0.0168)	0.0225** (0.0108)	-0.0371*** (0.0118)	-0.131*** (0.0182)
Many times a week	-0.0984*** (0.0200)	-0.0281** (0.0124)	-0.0654*** (0.0145)	-0.128*** (0.0221)	-0.159*** (0.0201)	-0.0551*** (0.0124)	-0.110*** (0.0145)	-0.252*** (0.0222)
Every day	-0.169*** (0.0254)	-0.0124 (0.0171)	-0.0972*** (0.0204)	-0.186*** (0.0299)	-0.286*** (0.0255)	-0.0230 (0.0172)	-0.135*** (0.0205)	-0.295*** (0.0299)
Observations	89.616	89.462	89.190	87.590	89.499	89.348	89.075	87.469
<b>Panel B: 10th grade</b>								
Bullied	-0.0230** (0.00782)	-0.0164** (0.00537)	-0.0203** (0.00584)	-0.0490** (0.00794)	-0.0258*** (0.00774)	0.00277 (0.00531)	-0.0107* (0.00577)	-0.0476*** (0.00786)
A few times a year	-0.0191** (0.00852)	-0.0121** (0.00595)	-0.0116* (0.00658)	-0.0381*** (0.00907)	-0.0190** (0.00843)	0.00866 (0.00588)	-0.000845 (0.00651)	-0.0756** (0.0383)
Many times a month	-0.0262 (0.0212)	-0.0380*** (0.0119)	-0.0154 (0.0133)	-0.0619*** (0.0191)	-0.0544*** (0.0210)	-0.0234** (0.0118)	-0.0180 (0.0132)	-0.0977*** (0.0301)
Many times a week	-0.0270 (0.0359)	0.0128 (0.0168)	-0.0742*** (0.0192)	-0.0944*** (0.0304)	-0.0541 (0.0355)	0.0120 (0.0166)	-0.0700*** (0.0190)	-0.0789*** (0.0189)
Every day	-0.146*** (0.0494)	-0.0781*** (0.0235)	-0.121*** (0.0285)	-0.138*** (0.0387)	-0.0756 (0.0488)	-0.0328 (0.0233)	-0.0701** (0.0282)	-0.0355*** (0.00897)
Observations	101.038	100.989	100.933	100.941	101.038	100.989	100.933	100.941

**Notes:** Authors' calculations. All regressions controls by previous SIMCE standardize score, gender, parent's years of schooling, average parent's years of schooling at the class level, natural logarithm of household income, quantity of books at home and school fixed effects. Standard errors are clustered at the student level.

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

We performed the same exercise using bullying measured at 10th grade and standardized SIMCE performance at 8th grade as the lagged

measure of student's achievements. These estimates are presented in Panel B of Table 5. Overall, all types of bullying decreases math performance. On the other hand, verbal bullying is the only one that is not related to reading performance. In particular, cyber bullying has a negative effect on math score, which increases monotonically with its frequency. However, results are not so consistent when considering the others type of bullying. Anyway, being bullied every day has a negative effect on math score ranging between 0.08 and 0.15 S.D. depending on its type. In the case of the reading test, results suggest that cyber bullying reduce reading performance, but it does not increase monotonically with its frequency. On the other hand, social bullying decreases reading performance when it is experienced many times a week and every day.

In summary, all types of bullying negatively influence math and reading performance in both 8th and 10th grade. When we turn to analyze the role of intensities on performance, our results suggest that experiencing physical, social and cyber bullying at 8th grade decreases it, were the size of the effect increases with its frequency. On the other hand, only social and cyber bullying at 10th grade seems to have a consistent negative effect in math and reading performance. However, all types of bullying experienced every day decreases math scores.

## 6.2 Grade retention

The administrative data we possess allow us to follow the students trajectories at schools. Hence, we are able to estimate the relationship between being bullied at 8th and 10th grade and the probability of grade retention in each grade.<sup>14</sup> In order to determine if bullying has a bearing on grade retention at each grade we estimate the following model:

$$\begin{aligned}
 Retention_{i,s,t} = & \lambda_s + \beta_1 few\_times\_year_{i,s,t}^T + \beta_2 many\_times\_month_{i,s,t}^T \\
 & + \beta_3 many\_times\_week_{i,s,t}^T + \beta_4 every\_day_{i,s,t}^T + \phi Y_{i,s,t-\tau} + X'_{i,s,t} \delta + \epsilon_{i,s,t}
 \end{aligned}
 \tag{4}$$

where  $Retention_{i,s,t}$  is a dummy variable that takes value 1 if the student  $i$  at the school  $s$  repeated at grade  $t$  and 0 otherwise, with  $t$  being 8th or 10th grade;  $Y_{i,s,t-\tau}$  is the lagged standardize SIMCE score of math and reading; and the others variables are the same as in the previous section.

As in the case of the value added regression, the lagged standardize SIMCE score controls by non-observed characteristics of the students that are constant over-time. Importantly, we add as a control variable previous retention which may be correlated with both current retention

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<sup>14</sup>As in the previous case, a methodology other than the main one should be used because if a student repeats, it is not observed again in the panel. Then, the best approximation allows to estimate the models of repetition for each one of the years controlling for the past performance.

and bullying (Crothers et al., 2010). In order to include school fixed effects, we estimate a linear probability model.

The estimates of the relationship between being bullied and the probability of grade retention are presented in Table 6. Results indicate that being bullied increases the probability of grade retention both in 8th and 10th grade. For instance, being cyber bullied increases the probability of grade retention in 0.8 and 1.2 percentage points respectively (Columns (4) and (8) of Table 6). Since grade retention rates in sample are 2.07% in 8th grade and 5.32% in 10th grade, the estimated effect represents an increase in the probability of 38 (0.8/2.07) and 22% (1.2/5.32) respectively.

Also, it can be seen that the point estimates increases monotonically with bullying frequency at 8th grade. A similar pattern, with some noise, can be seen in the case of 10th grade. For instance, the estimated parameters of being bullied every day and many times a week are statistically different, at 5% level, than the ones of being bullied many time a month and some times a year for for physical, verbal and social bullying in 8th grade. Additionally, social bullying show statistically different estimated parameters for each intensity level. In contrast, for 10th grade only the estimated parameter of being bullied every day are statistically different than being bullied a few times a year.



Interestingly, being socially, cyberly and physically bullied every day increases the probability of grade retention by 91 (1.89/2.07), 104 (2.16/2.07) and 116% (2.42/2.07) in 8th grade. On the other hand, being bullied every day in 10th grade increases the probability of grade retention in a range of 33 to 56% depending its type.

Table 6: OLS estimates of the relationship between being bullied and the probability of grade retention

	8th grade				10th grade			
	Physical (1)	Verbal (2)	Social (3)	Cyber (4)	Physical (5)	Verbal (6)	Social (7)	Cyber (8)
Bullied	0.00548*** (0.000999)	0.00296*** (0.000764)	0.00588*** (0.000762)	0.00831*** (0.00110)	0.00696*** (0.00204)	0.00528*** (0.00132)	0.00773*** (0.00149)	0.0121*** (0.00214)
A few times a year	0.00203* (0.00107)	0.000251 (0.00186)	0.00280*** (0.000857)	0.00375*** (0.00122)	0.00402* (0.00215)	0.00417*** (0.00144)	0.00519*** (0.00162)	0.00843*** (0.00239)
Many times a month	0.00459** (0.00228)	0.00313** (0.00146)	0.00680*** (0.00161)	0.0121*** (0.00277)	0.0182*** (0.00602)	0.00395 * (0.00305)	0.00958*** (0.00349)	0.0170*** (0.00534)
Many times a week	0.0149*** (0.00327)	0.00978*** (0.00186)	0.0112*** (0.00214)	0.0150*** (0.00332)	0.0187* (0.0102)	0.0128*** (0.00448)	0.0177*** (0.00576)	0.0324*** (0.00904)
Every day	0.0216*** (0.00388)	0.0113*** (0.00266)	0.0189*** (0.00325)	0.0242*** (0.00472)	0.0278** (0.0140)	0.0179*** (0.00668)	0.0300*** (0.00864)	0.0265** (0.0110)
School fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	172.152	171.788	171.209	168.049	124.323	124.122	123.796	123.844

**Notes:** Authors' calculations. All regressions controls by previous grade retention, previous SIMCE standardize score, gender, parent's years of schooling, average parent's years of schooling at the class level, natural logarithm of household income and quantity of books at home. Standard errors are clustered at the student level.

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

## 7 Conclusions

In this paper we provide evidence of the negative relationship between being bullied and school performance, college admission test scores and grade retention probability for Chilean students. These results are interesting as they show a relationship between both short and medium term, which would account for a persistence already suggested in the

previous literature. Moreover, effects on school repetition could account for effects even in the acquisition of human capital. It would certainly be interesting to determine whether there are effects on wages, and it is a challenge for future research when this generation reaches the labor market.

Our results suggest that also is important the type of bullying. If the bullying is physical, verbal, cyber or social has different effects on the school outcomes. Moreover, bullying intensities have statistically different impact on the outcomes variables. Most frequent bullying has a greater impact on educational outcomes, and the estimated effects are large for the individuals that have been bullied on a weekly or daily basis.

The policy makers have to address this issue in order to decrease the cost that victims of bullying face. It is necessary to understand the problem in full. It is relevant both the type and the frequency with which the student receives bullying, and also, it is necessary to determine how effective the policies are being carried out at this time, and how you can continue to create policies to reduce school bullying. This is particularly important in a developing country where its economic development is influence by the cognitive skills acquired at school ([Hanushek and](#)

Woessmann, 2008, 2012a,b).

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