The Effect of School Rank on bullying and victimization

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Abstract

We study the effect of classroom rank on high-school students' bullying and victimization. We exploit idiosyncratic differences in the class distribution of earlier academic achievement within curricula, schools and grades. Such differences generate quasi-random variation in rank for students with the same initial achievement. We find a negative effect of rank on bullying which is larger for boys, students from medium-high background, migrants and students in academic curricula. On average we find no effect of rank on victimization, although higher ranked girls and students in academic curriculum are less likely to be vicimized, while boys and students from professional curriculum are more at risk of victimization if they rank high. We provide evidence that subjective wellbeing and self-confidence contribute to channel the negative effect of rank on bullying.

1. Introduction

Bullying and more general forms of misbehavior in schools are a widespread phenomenon, and most children will probably experience it at some stage, either as a witness, a victim, or by being a bully themselves. A recent cross-country study on the prevalence of school violence directed by the World Health Organization shows that, on average, 38% of the 11-years-olds who participate to the survey reported being bullied at least once in the two months before the interview (Craig et al. 2009).[1] In the US, in the years between 2005 and 2013, about one third of the students aged between 12 and 18 interviewed in the School Crime Supplement of the National Crime Victimization Survey reported to have suffered from some form of bullying at school during the school year, such as being insulted, threatened, stolen things, hurt, or forced to do something against their will (Robers et al. 2015). In Italy, about 50% of adolescents aged between 11 and 17 reported having been victim of some form of violent or disrespectful behavior in 2014; 20% reported being victim at least once a month, and 10% every week (ISTAT 2015). On top of that, forms of bullying that exploit social media are becoming year by year more serious, and many countries are taking steps to counter this growing phenomenon.[2]

Bullying intrinsically involves a relationship between two actors, with the victim being usually in a weaker position, in terms of age, social background, or physical or psychological development. Typically, bullies beat their victims, steal personal belongings, or force them to do something without consent (Olweus 2013). Being victimized has both short-term and longer-term consequences. Amongst the former, the psychological literature has traditionally looked at outcomes such as anxiety, insecurity, anti-social behavior, self-esteem, and absences from school.[3] The latter may include lower academic performance, which then possibly brings about worst labor market outcomes.

Despite its relevance in the process of human capital formation and the potentially damaging effects on subsequent labor market outcomes, school bullying has started to receive attention from the economic literature only recently, mainly thanks to both an increasing awareness of the seriousness of the problem, and to the availability of suitable micro-level data.[4] Recent attempts to identify a causal link from victimization to such outcomes include Brown and Taylor (2008), Ammermueller (2012), Ponzo (2013) and Eriksen et al. (2014). However, convincing empirical evidence on the determinants of being a victim of bullying is still relatively scarce.

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[1] This figure ranges from 14% (Sweden) to about 60% (Lithuania, Ukraine and Portugal). The survey interviewed adolescents aged between 11 and 15 in 35 participating countries in the year 2008. See Craig et al. (2009) for details.

[2] In the US, in 2013 about 6% of the students declared to have been victim of cyberbullying (Robers et al. 2015); in Italy, this figure ranges between 6 and 15% (ISTAT 2015).

[3] See Juvonen and Graham (2014) and Olweus (2013) for recent reviews.

[4] Even less investigated is the issue of adult bullying in the workplace, despite increasing policy awareness on the pervasiveness of the phenomenon and the obvious consequences on workers' productivity and well-being; see Eriksen et al. (2016).

In this paper, we investigate how the ordinal rank in the school achievement distribution in a given class affects the probability of bullying and victimization at school. We add to the existing literature on school bullying by focusing on one potential determinant of both bullying and victimization that has never been looked at before. We contribute also to a growing and relatively new literature that looks at the effect of achievement rank in education (Elsner and Isphording 2015, 2017; Murphy and Weinhardt 2014; Tincani 2015).

Our estimation framework, which includes class fixed effect, allows us to hold constant any class variable. Our data cover the entire population of Italian students enrolled in 10th grade in two different school years. Identification relies on class-to-class variation in the within-school age distribution (Elsner and Isphording 2015, 2017; Murphy and Weinhardt 2014).

We find that student's ordinal rank significantly affects the likelihood of being a bully at school. A one standard deviation increase in the relative rank is predicted to increase active bullying by around 0.024 points, or 2.5 percent of the standard deviation in bullying. The effect is larger for boys, students from medium-high background, migrants and students in academic curricula. In contrast, on average we find no effect of rank on victimization, although higher ranked girls and students in academic curriculum are less likely to be vicimized, while boys and students from professional curriculum are more at risk of victimization if they rank high.

Finally, we provide evidence that subjective wellbeing and self-confidence contribute to channel the negative effect of rank on bullying.

The rest of the paper is organized as follows. Section 2 describes the institutional setting and the data used. Section 3 presents the empirical strategy, while Sections 4 and 5 discuss the main results, present the robustness checks, and investigate relevant heterogeneities in the estimated effects. Section 6 concludes.

2. Institutional background and data

In this section, we describe the education system in Italy, the grading procedure of the final JHS examination, the data, and the outcome variables.

2.1 Education in Italy

In Italy, education is compulsory from 6 to 16 years of age. Primary school lasts five years (from age 6 to 10). Secondary education lasts 8 years and it is divided in two stages: a three-year junior high school (from age 11 to 13) and a five-year high school (from age 14 to 18). Until JHS, the educational curriculum is the same for all pupils and the subjects studied are the same. At the end of the JHS, pupils have to pass a final exam (*Esame di stato*) to access high school, where they will have new teachers and classmates.

There are three main curricula: *liceo*, technical and vocational. *Liceo* curriculum is specifically designed to prepare students for tertiary education. The education received is mostly theoretical (with a

specialization in a specific field of studies such as humanities or science). Technical curriculum offers both a theoretical education and a specialization in a particular field of studies (e.g. accounting or technology). It gives students the possibility to pursue either an occupation or additional education. Vocational curriculum offers education oriented towards practical subjects in the service and industry/craft sector (e.g. chemistry or tourism) and it prepares students for an occupation upon graduation.[5]

Within curriculum, socio-economic backgrounds and learning levels tend to be homogeneous and different from the other curricula along a hierarchy, with *liceo* at the top and vocational schools at the bottom (Schizzerotto and Barone 2006). Our empirical strategy will address concerns for identification related to students sorting in different curricula.

2.2 The JHS final mark

The JHS final evaluation consists of four written exams (Italian language, math and two EU foreign languages), an oral examination and a national standardized test administered by INVALSI (math and Italian language constitute the subjects tested).[6] INVALSI tests not only students' knowledge, but also a large set of skills that students should acquire at school over time, including how they use the acquired knowledge to deal with practical problems. The INVALSI test may contain multiple choice and open questions, from which a comprehensive score is computed, as in the Program for International Student Assessment (PISA) and in the Trends in International Mathematics and Science Study assessment (TIMSS).

The final mark of the JHS national evaluation is the arithmetic mean of the marks obtained by the student in the four written exams (each on them graded by a different teacher), in the oral examination, in the INVALSI tests and in a baseline evaluation of the overall average performance of the student during the school year. The final mark ranges between 6 and 10 with distinction (that we convert into 11).

A concern is that this mark is not entirely based on a standardized assessment. In this case, two students with the same mark belonging to different JHS classes would not necessarily have the same baseline achievement. However, we believe that the JHS final mark that we are using is a reliable measure for various reasons. First, different teachers grade the written and oral exams; second, the baseline mark is established collectively by all the student's teachers; finally, during the evaluation period one or more external examiners (depending on the number of students in the school) supervise the exam's administration and the grading process.

[5] However, any curriculum grants access to university.

[6] INVALSI administers yearly a national assessment based on standardized tests to the entire student population in grades 2, 5, 8 and 10 to provide a statistical framework on student achievement to both policy makers and school principals. Math and Italian language constitute the subjects tested and they serve as key indicators of students' performance.

Furthermore, compared to standardized test, the achievement measure that we are using is unaffected by non-systematic errors, for instance related to an exceptionally good or bad performance during the exam administration, because the JHS mark should reflect students' overall performance throughout the school year.

For all the previous reasons, we believe that the JHS final mark is an objective and comparable measure of achievement. Despite of this, in the robustness check section we will provide further corroborating evidence on the validity of this assumption.

2.3 Data

We use administrative data provided by INVALSI (the Italian National Institute for the Evaluation of the Education System) for the universe of Italian students in their second year of high school (grade 10) in two different school years. These data contain information on the scores obtained by students in the national standardized test administered by INVALSI itself in the same grade (both math and Italian language) in addition to information on socio-demographic students' characteristics such as gender, age, citizenship and parents' education and occupation. Furthermore, after the completion of the math and Italian language tests, students have to fill a questionnaire that we are able to merge with the administrative dataset. The questionnaire is used to gather information about students and their parental background. Moreover, these data contain both retrospective information on the JHS mark and the grade 10 class identifier. For our analysis, we selected students attending grade 10 in the school year 2013/2014 and 2014/2015 (around 815,000 students) because for these waves the questionnaire includes a set of questions that can be used to measure bullying.

Notably, starting in school year 2012/2013, INVALSI makes it possible to link students' data across grades for a subsample of students through an encoded student number (to ensure anonymity). Merging these students across grade 8 and grade 10, we are able to observe both their JHS final mark and the scores obtained in the INVALSI national standardized test taken in grade 8 (both math and Italian language) during the JHS final examination, then providing information on retrospective standardized students' achievement.[7]

Finally, we will also use administrative *ad hoc* data provided by the Italian Ministry of Education on the universe of students attending grade 8 in the school year 2013/2014 containing both information on the JHS mark and on the grade 8 INVALSI test score.

2.4 Outcome variables

[7] Despite this advantage, compared to cross-sectional INVALSI data the longitudinal dataset does not cover all Italian regions and it has more missing values because the merging procedure does not allow us to follow the universe of students over time. The rank variable could be correctly computed only for classes with few missing values on the JHS mark.

There are many different bullying behaviors. They can be grouped into four broad groups, namely verbal bullying, psychological bullying, and physical bullying. The INVALSI questionnaire includes a set of questions regarding all four types of bullying. Moreover, the survey distinguishes between bullying and victimization. Students are asked how often, during the current school year, they i) mock/have been mocked by other students ii) insult/ have been insulted by other students iii) isolate or exclude/have been isolated/excluded by other students iv) beat up/ have been beaten up by other students. The possible answers are: "Never", "Sometimes", "Every week", "Every day". The first two questions refer to verbal bullying, the third to psychological bullying and the last to physical bullying.

Table 1 displays the distribution of the bullying variables. If we consider bullying behaviors those taking place regularly at least once a week, the most frequent kind of bullying is mocking (8.5 percent), followed by insulting (7.6 percent), excluding/isolating (4.4 percent) and beating up (3.5 percent). As regards victimization, 8 percent of students have been mocked at least once a week, 6.5 percent have been insulted, 5 percent have been excluded/isolated and 2.6 percent have been beaten up. Overall, 13.8 percent of the sample is a bully and 11.9 percent is a victim.

Table 1

In the following, in order to obtain a single measure of bullying and victimization, we perform principal component analysis on the four correspondent variables. In both cases, one component is retained with eigenvalue, respectively, equal to 2.3 and 2.4.

2.5 Relative rank variable and identifying variation

We use the final marks obtained at the JHS national examination to compute students' relative rank among new high school peers. Notably, at the end of JHS in Italy students choose a curriculum and a school and move on, often without any peer with whom they shared a class in junior high. This implies that students have very little interactions with their high school peers before they start high school.[8]

The rank variable that we are using can be considered a measure of students' relative ability when starting high school. Students (and high school teachers) are aware of their own mark and it is very common that they share among their new peers this information when starting high school. In essence, the JHS mark is one of the first information that high school students acquire about their new schoolmates. This implies that students actually observe their rank.

Computing the rank among high school peers using the mark obtained at the end of the JHS (where students had almost completely different peers) reduces concerns about reflection and unobserved common shocks affecting simultaneously current achievement and personality traits.

[8] To obtain evidence on this point, we use INVALSI longitudinal data on pupils attending grade 8 in school year 2013/2014 and grade 10 in school year 2015/2016. More than half students (56%) have no peer in common with JHS and, on average, the share of new peers is 95%.

In order to obtain a comparable rank measure across classes of different size, we compute the following percentile rank measure (Brown et al., 2008):

$$Percentile\ rank_{i,c} = \frac{Rank_{i,c} - 1}{class\ i\ size - 1}$$

Where $Rank_{i,c}$ is the rank of student i within class c. The percentile rank ranges between 0 (for the lowest ranked students) to 1 (for the highest ranked students).

Our identification strategy exploits idiosyncratic differences in the class distribution of academic achievement within grades, schools and curricula for given initial achievement. One concern may be that, conditional on baseline achievement, the variation in rank across classrooms is not enough for identification. In Figure 1, we plot the relationship between the students' JHS final mark and the relative rank within the class. The figure shows a positive relation between the two variables. However, conditional on a certain level of achievement, there is large variation in the relative rank. Students can be ranked at any point of the rank distribution whathever the JHS mark. Hence, Figure 1 provides evidence that students with the same baseline achievement may rank differently depending on the mark distribution in their class.

Figure 1

It may be argued that such relationship is driven by students sorting into different curricula. Actually, ability distribution is much more similar within specific curriculum, with *liceo* curriculum generally attracting the best students and vocational and technical curricula having on average students with a lower previous academic achievement. Figure 2 shows the relation between the JHS final mark and relative rank by curriculum. The figure confirms that high ability students tend to be more concentrated in the *liceo* curriculum. Furthermore, conditional on initial baseline achievement, variation in the relative rank is larger in *liceo* than in technical and vocational schools for relatively high ability individuals, but some variation emerges also in technical and vocational schools, particularly for students with a relatively low initial level of ability (i.e., with a JHS final mark of 8 or lower). Overall, Figure 2 highlights variation in rank also within specific curriculum.

Figure 2

2.6 Descriptive statistics

Table 2 reports summary statistics of the main variables by victim status and intensity of bullying/victimization (above and below median value). On average bullying is less widespread among girls, better achieving students and among students attending academic curriculum. It is more common

in professional schools while parental background and migrant status seem unrelated to bullying behavior. Victimization seems slightly more widespread among males and students from academic curriculum.

Table 2

In Figure 3 we plot the distribution of rank for students above and below the median value of the bullying variables. The figure shows that the rank distribution of students above the median value of both the bullying and the victimization variables lie to the left of that of below-median students, suggesting a negative relationship between rank and both bullying and victimization.

Figure 3

Further descriptive evidence on the relationship between rank and bullying can be obtained from Figure 4, which shows the relationship between rank and the bullying variables averaged by rank values along with the linear prediction plot. In both cases, we observe a negative correlation between the average bullying variables and rank.

Figure 4

III. Estimation strategy

We estimate the effect of relative rank on bullying and victimization by exploiting differences in the achievement distribution across classes within schools, curricula and grades. Association between rank and bullying is insufficient evidence of a causal relationship. Such relationship may be spurious because there may be variables or common shocks affecting both rank and bullying, so that they correlate. In the remaining part of this section, we explain how the adopted specification addresses the main threats to identification.

In our empirical analysis we estimate the following equation for both bullying and victimization:

$$Y_{itsgc} = \alpha + \beta_1 rank_{itsgc} + \beta_2 JHS\ mark_{itsgc} + \beta_3 X_{itsgc} + \delta_c + \varepsilon_{itsgc} \qquad (1)$$

Where Y_{itsgc} is the outcome for student *i,* in curriculum (track) *t*, school *s* and class *c*. *Rank* is the relative rank among current classmates, *JHS mark* is a set of dummies for the mark obtained in the final exam at the end of the JHS, *X* is a vector of individual characteristics and δ_c are class fixed effects. The vector X includes dummies for gender, migrant status, age in month, and parental educational background.

The inclusion of baseline achievement (JHS mark) is necessary to avoid that the effect or relative rank on personality traits simply reflects the impact of cognitive ability and baseline personality traits. Indeed, the JHS final mark is mechanically related to rank, but it is also the outcome of baseline achievement,

which in turn is related to subsequent outcomes (e.g. bullying and victimization). The lack of this control would leave information on baseline achievement in the rank variable, leading to biased estimates of the rank effect. Put differently, through the inclusion of the JHS mark in the regression equation we control for students' achievement immediately before the beginning of high school. In order to completely control away the influence of achievement, we use a flexible specification including a dummy variable for each possible mark. This means that we are comparing students in different classes with the same baseline achievement and different rank (Murphy and Weinhardt, 2018).

In the Italian educational system, at the end of junior high school students and their family choose the curriculum and the school to attend. As shown in the descriptive analysis, students from *liceo* have a better family background and academic performance as compared to students from technical and vocational high schools. This implies that on average two students with the same JHS final mark will rank systematically differently depending on the type of curriculum attended.

As regards class sorting, the specific institutional setting characterizing high school education, prohibiting class choice within schools, allows us to address the potential selection due to non-random classroom formation. In Italy, once families have chosen the curriculum for their siblings, students are assigned to a certain class regardless of families or students' preferences for specific teachers or schoolmates, because the Italian law prescribes this. In any case, sorting within classes would threat identification if sorting were based on ranking, for instance because parents try to select classes for their children depending on how they will be ranked within them. This requires parents having ex-ante information on the distribution of peer characteristics in the different classes (which is basically impossible). Moreover, in general parents are more likely to try to choose classes with better quality peers, where their children will on average rank worse (Murphy and Weinhardt 2018).[9] This would produce, if any, a downward bias to our estimates. Furthermore, there might exist unobserved classroom level confounders influencing all students in a specific class, such as teacher quality, that may affect simultaneously individual students' personality traits and rank.

We address these potential threats to our identification including classroom fixed effects δ_c. The classroom fixed effects control for any unobservable class-level confounder and absorb curriculum and school fixed effects as well as class observed characteristics, fully accounting for potential selection by curriculum, school and class. Overall, we believe that after conditioning on class fixed effect, we can

[9] Cullen et al. (2013) show that as a consequence of an admission rule establishing that all students in Texas who graduated in the top 10% of their high school classes were guaranteed admission to any public higher education institution, students tend to choose a high school with lower-achieving peers to increase their chances of being in the top 10%. However, no similar admission mechanism is present in Italy, where there are no incentives to choose strategically high school based on rank.

work under the operative assumption that class composition is as good as random.[10] In all estimates, we cluster standard error at the curriculum and school level.[11]

IV. Results

A. Main results

Table 3 reports our main estimates of the effect of relative rank on both bullying and victimization. Results show that the probability of being a bully is decreasing with the class rank. Moving from the bottom to the top of the rank distribution is correlated with a decrease of bullying by 0.08 points (8.5 percent standard deviations). In terms of standard deviations, this implies that a one standard deviation increase in the relative rank is predicted to increase active bullying by around 0.024 points, or 2.5 percent of the standard deviation in bullying. Estimates show that boys are much more likely to be bullies (the probability of being a bully is 0.41 standard deviation higher for boys as compared to girls). Bullying behavior is increasing with parental background and with age, while students who attended pre-school are less likely to bullies.

Table 3

When considering victimization, we find that school rank has no effect on the probability of being victimized. Male, migrants, younger students and students from higher family background are more likely to be victimized. Having attended pre-school is negatively correlated with the probability of being bullied.

B. Heterogeneity and extensions

Previous estimates showed that school rank is negatively related to bullying while it has no effect of victimization. The next point that we investigate is whether the effect of rank on both bullying and victimization differs depending on students' gender, family background, migrant status and curriculum. To this aim, we re-estimated the previous specification interacting the rank variable with the correspondent student's characteristic. Results are in Figure 5. When

[10] In order to obtain corroborating evidence on this assumption, we performed balancing tests by regressing pre-treatment characteristics (that is gender, citizenship, parental background and repeater) on rank, baseline achievement and class fixed effects, and we found no statistically significant relationship with rank. Results are available upon request.

[11] In the majority of the Italian high schools, there is only one curriculum, then clustering at the school and curriculum level is the same as clustering at the school level. However, we estimated the previous equations clustering at the more conservative school level as well.

considering bullying (panel A), we find etherogeneous rank effect along all the four dimensions considered. More specifically, the rank effect is larger for boys than for girls, for students from medium-high background as compared to low background and for migrants. Bullying behavior is not affected by rank in professional curriculum, while the effect is significant and negative in both the technical and academic curricula, where we find the highest (negative) effect.

Figure 5a

Figure 5b

We now explore whether the effect of rank on victimization differs by students' characteristics. The first interesting result is that while on average we do not find a significant effect of rank on victimization, rank is significantly related to passive bullying for both boys and girls, although with an opposite sign: while higher ranked girls are less likely to be vicimized, our results show that the probability of being bullied is increasing with rank for boys. Rank appears to be positively related to the probability of being bullied only for students with a low parental background, although the effect is small. High ranked migrant are more likely to be victimized. Finally, the effect of rank on victimization varies considerably across curricula: while students from professional curriculum are more at risk of victimization if they rank high, we find the opposite effect for students in the academic curriculum, while in technical school students' probability of being bullied is unaffected by rank.

Finally, we test whether gender specific rank has a different effect on bullying behavior. Our assumption is that students may be more affected by how they rank among their same-gender peers. However, while our results confirm a negative effect of gender specific rank on bullying, the rank coefficient is smaller. As regards victimization, similarly to the case of general rank on average we do not find significant effects.

V. Robustness

Our results show a positive and significant effect of relative rank on students' conscientiousness. Still, one concern is related to potential measurement error, namely that the JHS final mark does not measure correctly students' baseline achievement. Although the institutional setting described in Section 2 suggests that this is unlikely to occur, in the following we provide evidence that the JHS mark is a reliable and comparable measure of achievement.

Unfortunately, official INVALSI data do not contain information on both the JHS mark and the INVALSI test scores for grade 8 students. However, thanks to *ad hoc* data provided by the Italian Education Ministry on the universe of grade 8 students in the school year 2013/2014, we could regress the standardized JHS mark on the standardized score obtained by students in the INVALSI test, which is part of the overall examination. We find a very high (0.70) and highly statistically significant coefficient (standard error 0.0009), suggesting a large correlation between these two achievement measures.

As a further check, we use longitudinal INVALSI data on a sample of students who attended grade 8 in the school year 2012/2013 and grade 10 in the school year 2014/2015. This data contain both information on the JHS final mark and on the scores obtained by students in the national standardized test administered by INVALSI in grade 8 (both math and Italian language). This allows us to estimate our specification for bullying and victimization controlling for an objective achievement measure captured by the INVALSI assessment (average score obtained in the Italian and math tests) in addition to the JHS final mark.[12] Our results are confirmed, showing a negative effect of rank of bullying and no effect on victimization.

Overall, then, these results provide evidence that the JHS final mark is actually a good measure of students' baseline achievement.

VI. Mechanisms

The key finding of this paper is that rank discourages bullying and it protects from victimization for given groups of students. We now try to disentangle potential underlying mechanisms that explain our main results. We can think of two channels through which rank may affect bullying and victimization. These are mental wellbeing and self-confidence.

As regards wellbeing, the psychological literature has shown that bullying and victimization are also consequences of emotional difficulties. In view of this, if having a low relative rank is a depressogenic experience, the negative effect of rank on bullying might also be channeled by individual wellbeing. To attempt to isolate the wellbeing mechanism, we exploit a set of questions asking students how often in the last few months they have felt well, happy and relaxed (responses are on a five-item scale ranging from "never" to "very often"). To summarize the available information, we run a principal component analysis on these variables and only one factor was retained (eigenvalue = 2.2) loading all three components. We regress this single measure of wellbeing on rank and we find a positive correlation, providing a piece of evidence in favor of the assumption that individual wellbeing mediates the negative effect of rank on school bullying.

[12] Given that it was not possible to match all grade 8 students to grade 10 students, for some grade 10 students we do not observe the entire class. To keep the sample size large, we use the sample of students for whom we observe at least 80 percent of the class. In this sample, the observed average class size is 20.4 while the actual average class size is 18.7. Moreover, in this merged sample we do not observe students who repeated their grade 9 because they attended grade 10 in the following school year (2015/2016).

The second channel is related to self-confidence. Research in psychology has shown that peer victimization is negatively associated with self-esteem and a negative association was also found between bullying behavior and self-esteem (Tsaousis, 2016). If students' self-esteem is increasing with their rank, a high rank may reduce both bullying and victimization. In order to test whether rank contributes to shape students' school specific self-esteem, we use a set of questions asking students whether they agree that i) they learn quickly Italian language/math topics; ii) they understand also the most difficult Italian language/math topics. The possible answers are on a four-item scale ranging from "not at all" to "a lot". We perform principal component analysis on the four correspondent variables and we regress rank on the retained component (eigenvalue=1.6). We find a very high and significant correlation, suggesting that perceived ability is an important mediator of the negative effect of rank on bullying.

VII. Conclusions

Social comparison is a fundamental psychological phenomenon. It influences evaluation of self and others and it can have behavioral consequences. Several studies have provided evidence of its effect on many individual outcomes such as job effort provision or labor market participation (Falk and Ichino, 2006; Azmat and Iriberri, 2010; Clark, Masclet, and Villeval 2010; Gill et al. 2017 among others).

This paper looks at whether relative achievement rank at school, where children experience for the first time regular social comparison, affects bullying and victimization. Our results provide causal evidence of a negative effect of rank on bullying and on victimization for specific groups of students. Further analysis suggests that the main channels through which relative rank affects bullying are mental wellbeing and self-esteem.

We believe that this paper provides clean evidence on one important determinant of both bullying and victimization. This is an important issue to study because there is increasing evidence suggesting that bullying is very costly and it has both short and long-run negative effects on cognitive and non-cognitive outcomes, but also on labor market performance and health. By learning more about the factors that shape teenagers' bullying and victimization, teachers and school staff can identify more at-risk students and design appropriate targeted interventions.

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Table 1. Prevalence of bullying and victimization

	Bullying			
	Mocking	Insulting	Isolating/excluding	Beating
Never	43.94	58.62	70.24	87.88
Sometimes	47.54	33.78	25.42	8.63
Every week	3.83	3.95	2.33	1.57
Every day	4.68	3.65	2.01	1.92
	Victimization			
	Mocking	Insulting	Isolating/excluding	Beating
Never	50.66	64	74.49	93.14
Sometimes	41.32	29.49	20.47	4.3
Every week	4.67	3.71	2.85	1.21
Every day	3.34	2.8	2.19	1.35

Table 2. Summary statistics by bullying status

	Bully		Victim		All
	Below median	Above median	Below median	Above median	
Girl	0.61	0.39	0.47	0.53	0.50
JHS mark	7.90	7.57	7.60	7.85	7.74
Parental background					
Low	0.18	0.19	0.19	0.18	0.18
Medium	0.47	0.47	0.46	0.47	0.47
High	0.35	0.34	0.35	0.35	0.35
Migrant	0.08	0.10	0.11	0.07	0.09
Curriculum					
Academic	0.58	0.42	0.45	0.55	0.50
Technical	0.27	0.35	0.33	0.29	0.31
Professional	0.15	0.23	0.22	0.16	0.19

Table 3. Rank and bullying

	(1) Bullying	(2) Victimization
Rank	-0.082***	-0.003
	-0.014	-0.015
JHS mark		
7	-0.030***	-0.051***
	-0.006	-0.006
8	-0.020**	-0.092***
	-0.01	-0.01
9	-0.009	-0.122***
	-0.014	-0.014
10	0.016	-0.130***
	-0.019	-0.019
10 with distinction	0.094***	-0.066***
	-0.023	-0.023
Boy	0.398***	0.106***
	-0.004	-0.004
Migrant	0.016**	0.132***
	-0.006	-0.006
Pre-school	-0.017***	-0.052***
	-0.003	-0.003
Low parental education	-0.061***	-0.040***
	-0.004	-0.005
Medium parental education	-0.053***	-0.060***
	-0.003	-0.003
Age in months	0.006***	-0.001***
	0	0
Observations	578443	577511
R-squared	0.213	0.148

Table 4. Channels

VARIABLES	Wellbeing	Self-esteem
Rank	0.068***	0.229***
	(0.014)	(0.012)
Observations	585264	583483
R-squared	0.146	0.281

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 1. Rank and JHS mark

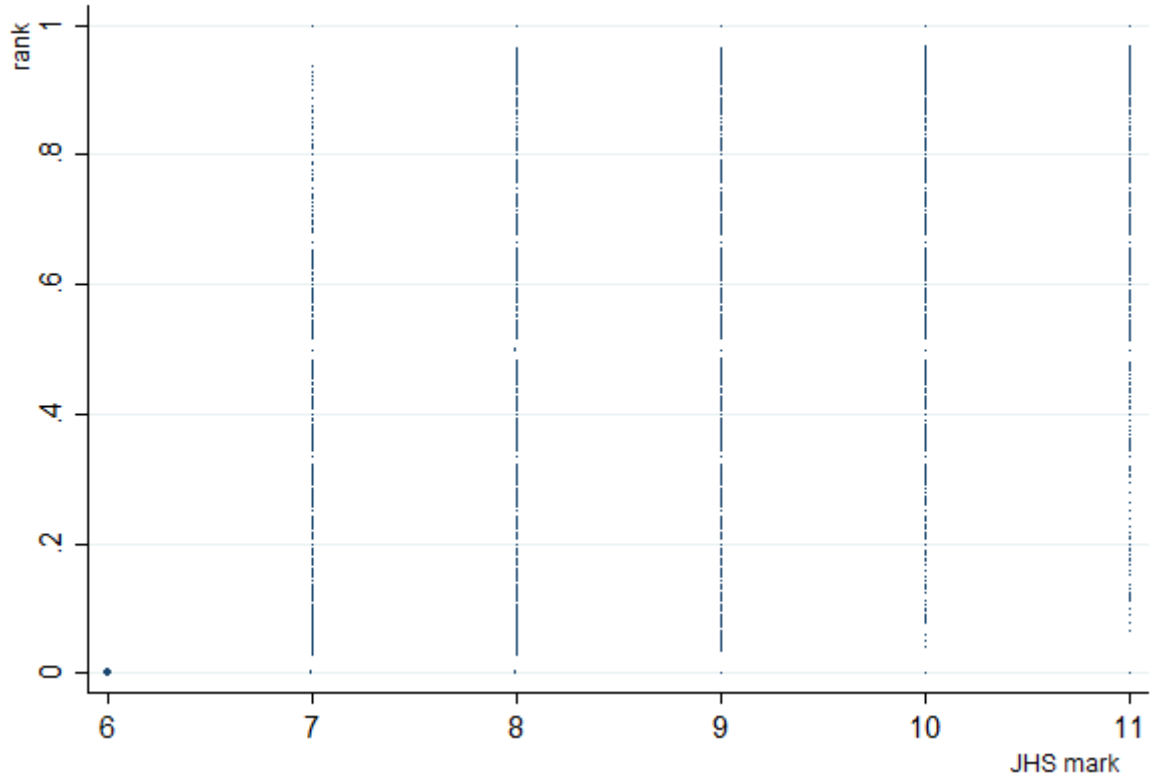

Figure 2. Rank and school mark by curriculum

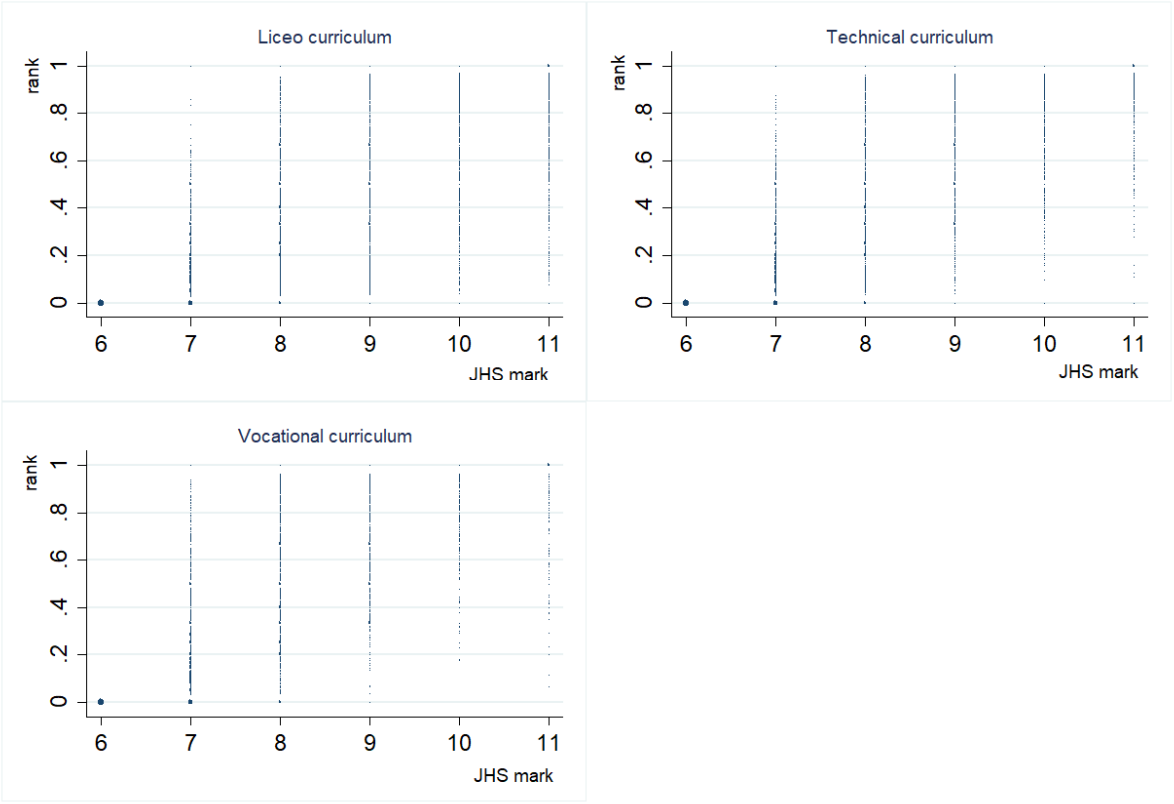

Figure 3. Rank distribution by bullying status

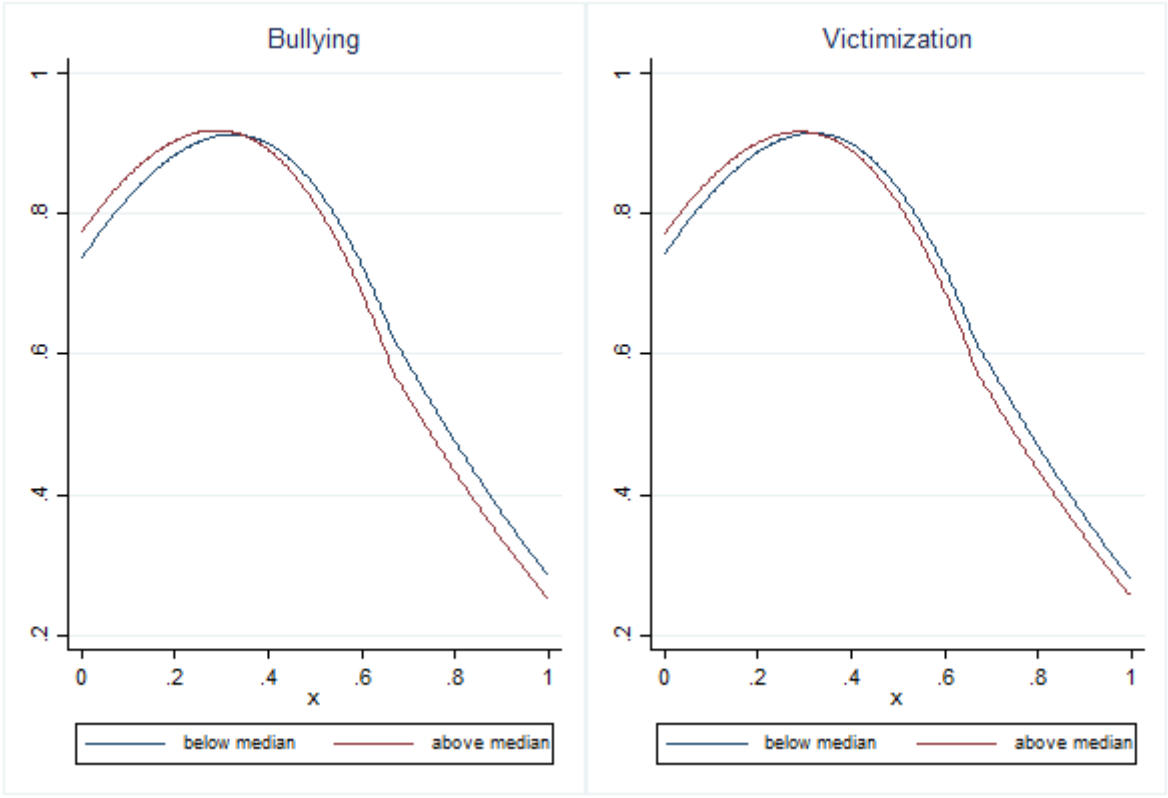

Figure 4. Rank, bullying and victimization

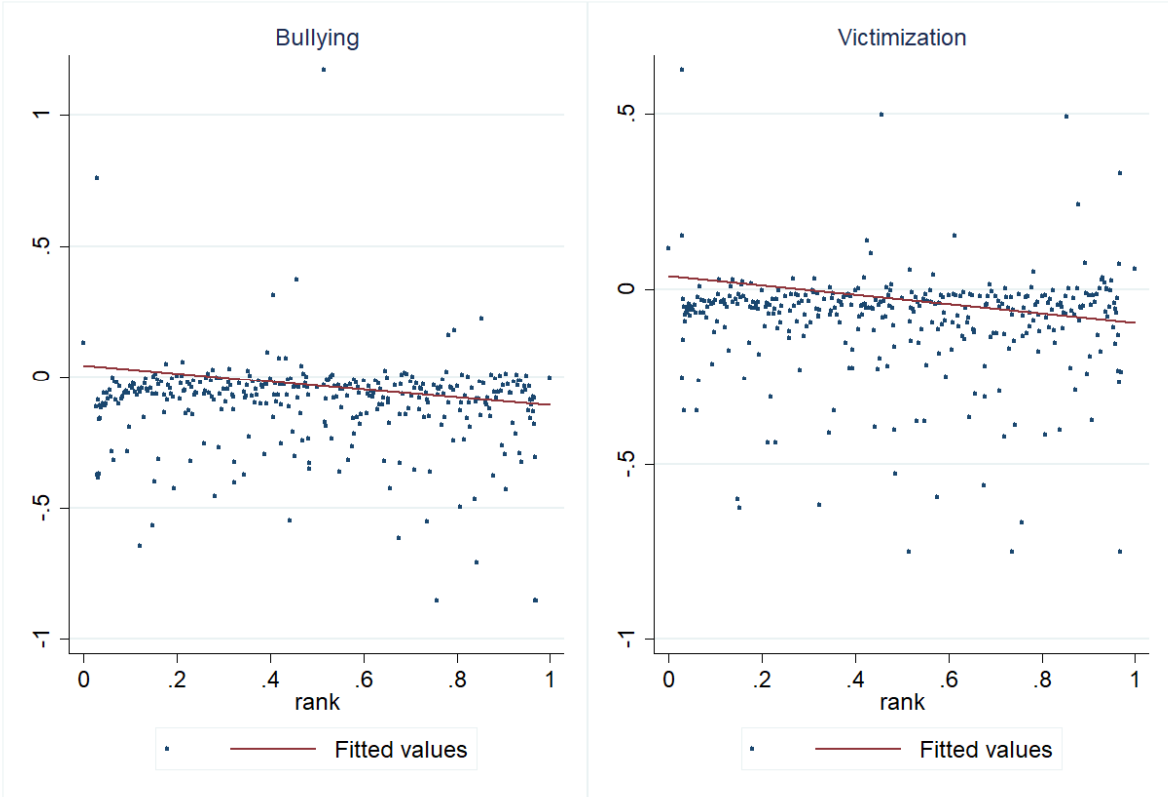

Figure 5a. Rank effect on bullying by students' characteristics

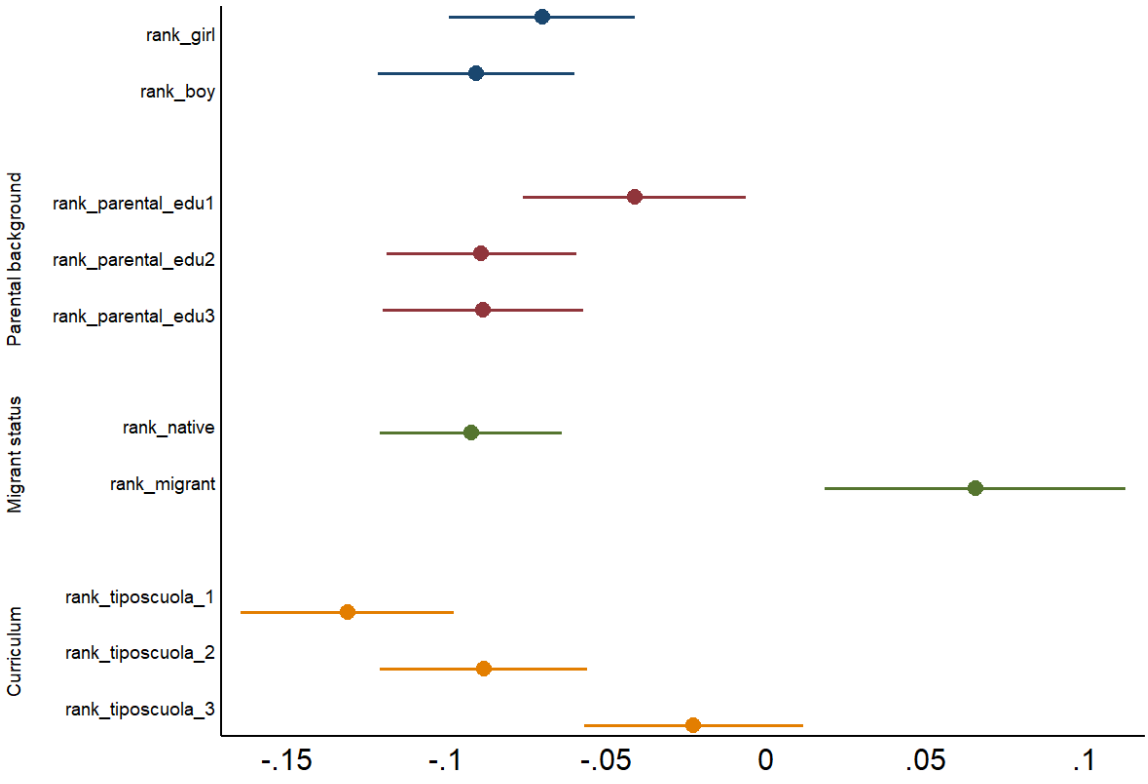

Figure 5b. Rank effect on victimization by students' characteristics