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The effect of school's ethnic composition on Mathematics results of students with immigrant origin in primary school

Teresa Seabra, Helena Carvalho and Patrícia Ávila

Abstract

Scientific interest in the impact of the school composition effect on student performance has been reflected in the literature for several decades (since Coleman, 1968) and has recently intensified. In Portugal, sociological research in this field has been scarce, in particular, quantitative approaches. Taking fourth-grade students and their Mathematics results as reference, the present study sought to contribute to this field. The objective was to identify the main effect and the moderating effect of school composition (socioeconomic and ethnic) on students' results, controlling the effect of individual and school variables, whose effects on school outcomes are already known, such as socioeconomic status (SES), gender, school trajectory, and school size. We particularly sought to understand whether school composition affects the students' results, and whether the effects vary with students' national origins.

The current research was supported by an extensive database containing information on 23,143 students at 522 public schools in the Lisbon Metropolitan Area. A multilevel analysis was developed, considering student and school levels. The dependent variable was the Mathematics results of fourth-grade students in the 2015 National Attainment Test. The results showed that the effect of school's social composition is more important to student performance than that of school's ethnic composition and also that students from PALOPs (non-immigrants vs. Portuguese-speaking African Countries) benefit more than any others when they attend schools with a higher average SES.

Keywords: immigrant student achievement, school ethnic composition, school socioeconomic composition, school effect, moderating effect

INTRODUCTION

With some exceptions, children descended from immigrants tend to achieve less success at school than their non-immigrant peers (OECD, 2016). The reasons why these students tend to present a lower level of academic performance are multiple and fall into different domains (societal, community, family, school and individual). In this article we explored the influence of school-related variables – i.e. the *school effect* on the academic performance of students descended from immigrants. Although the *school effect* has been debated for around fifty years now (since the Coleman Report, 1966), there are still difficulties with assessing it, and above all understanding the conditions under which it varies. We need to deepen our knowledge regarding, for example, the effect of schools' social composition or the effect of the pedagogical work of teachers on the results achieved by students, while also considering the latter's social and national origins. There is a long tradition of studies on the *school effect* in Anglo-Saxon countries (e.g. Jencks et al., 1972; Rutter et al., 1979; Smith and Tomlinson, 1989; Entwistle et al., 1997; Thrupp, 1999; Oakes, 2005), but in other places, studies on this subject have only recently been conducted (e.g. Cousin, 1998; Cervini, 2006; Szulkin & Jonsson, 2007; Portela et al, 2007; Pereira, 2010; Seabra et al., 2014). Specifically, recent research has revealed the importance of the role which the effects of school social composition play with regard to student outcomes (Agirdag, Van Houtte & Van Avermaet, 2012; Dumay & Dupriez (2008); Jensen & Rasmussen (2011); Van Houtte & Stevens, 2009).

Generally speaking, we know that students living under disadvantaged social conditions are more sensitive to the effects of the school environment, and benefit when they are in environments that are more favored from a social point of view (Duru-Bellat, 2002); but what happens in the case of students with an immigrant background? Portes and MacLeod (1999) suggest the answer varies according to immigrants' national origins: in the USA, "Mexican-American students can do significantly worse than their peers in private schools, majority white schools, but their test scores are still superior to those of their co-ethnics in minority public schools." (Portes and MacLeod, 1999: 389); while on the contrary, "students of Chinese / Korean origin appear impervious to potential handicaps in the schools they attend: they perform as well, relative to their peers, whether they attend high-status schools and poorer schools with large minority populations" (idem: 391).

In the case of Portugal, the research in this field has not yet clarified this question. It is known that foreign students have lower school results than national students, a situation that is especially pronounced in the case of students from the PALOP countries¹ (Seabra et al., 2018), and it is also known that the populations with origin in the PALOP tend to be concentrated in socially segregated territories (Hortas e Fonseca, 2013), but to our knowledge, no previous research studied how the school context, particularly the concentration of immigrant students, affects their performance.

The current research investigated the effects that school composition (socioeconomic and ethnic) can have on immigrant students' results in the Portuguese context. To this end, our research assessed the *school compositional effect*, considering both socioeconomic and ethnic composition and seeking to understand their influence on the academic results of the students in general and of the students' descended from immigrants.

The idea is thus to use those results to discuss a range of questions, including whether it would benefit the academic performance of students descended from immigrants to attend schools with a low concentration of students with immigrant backgrounds, or whether it would be more beneficial for them to go to schools with a majority of students from middle/high-class families; and also whether there are specificities related with the different countries of origin of these students.

REVIEW OF LITERATURE

Scientific interest in the impact the school compositional effect has on students' results has intensified throughout the current century, as the subject has been widely explored by researchers in various national contexts. More recently, the study of these effects has been extended to students' social integration (Van Houtte and Stevens, 2009) and their school behavior (Geven et al., 2016).

As is well documented, the school social and ethnic composition is only one of the conditions that may influence educational achievement of immigrant descendants. Also relevant are family socioeconomic conditions (Vallet, 1996), educational capital of parents (Kasinitz et al., 2008; Portes e Rumbaut, 2001; Suárez-Orozco e Suárez-

¹ Refers to the African countries in which Portuguese is an official language, countries that are former Portuguese colonies: Angola, Cape Verde, Guinea Bissau, Mozambique, Sao Tome and Principe.

Orozco, 2001), the migratory path performed (Zeroulou, 1988) and the conditions of development and social reception experienced in the host society (Portes e Zhou, 1993).

As Opdenakker & Van Damme (2001) showed, the explanation for the importance of school composition effects on students' results goes beyond simple peer influence – i.e. the influence of interactions between students – inasmuch as that influence itself affects a range of school processes which directly interfere with academic success: the type of relationship teachers establish with students (transmitting higher or lower expectations), the learning environment they provide (or don't provide), and the relationship teachers and students establish with each other (more or less cooperation). This is the sense in which these authors say that a school's social composition has a dual effect: in addition to the effect in its own right, composition affects a set of organizational and relational variables that act in a given school context.

Specifically, there is a consensus about the existence of the effect of schools' ethnic composition on students' results (usually measured by standardized tests involving different school subjects and levels of education), but divergent conclusions as to the intensity and direction of the relationship between these variables. In most research, high immigrant concentrations at schools have been shown to have negative effects on the outcomes of all students, regardless of their status as immigrants or their social class (Agirdag, Van Houtte & Van Avermaet, 2012; Jensen & Rasmussen, 2011; Van der Slik, Driessen & De Bot, 2006). Studies in the United States highlighted the importance of analyzing the specificity of each group of immigrants. Lleras (2008) concluded that these effects are particularly negative for students with immigrant origins, and within this group, for those who are black. Goldsmith (2003) also had previously pointed to the lack of benefits to be gained by concentrating black students in certain schools, while curiously noting that the results of Hispanic and Latino students were better at schools where they formed the majority. In Spain, Cebolla-Boado and Medina (2010) analyzed the effect of immigrant concentration on the results of national Mathematics, Spanish and Social Sciences tests taken by 6th grade students, concluding that this effect is only noticeable when more than 20% of a school's population has immigrant origins.

Although the disadvantage experienced by students descended from immigrants as a whole does not disappear when we control the effects of their families' social conditions, within the specific group of students from families with low levels of

schooling and/or from socially disadvantaged classes, the academic results of children of immigrants (particularly if they are second-generation immigrants) tend to come close to (and sometimes exceed) those of their autochthonous peers (Portes and MacLeod, 1999; Seabra, 2010; Moudon, 1984; Kao and Tienda, 1995; Vallet & Caille, 2000; Boulot & Boyzon-Fradet, 1988). This reduction in the gap between the two groups is linked to the fact that while immigrant populations encounter major adversities, such as a relative lack of knowledge of the host society and its language and culture, and the economic difficulties they often face, they simultaneously harbor a particular desire for social mobility which drives them to make an overinvestment in their descendants' education. We also know that there are important differentiations within the group of students with immigrant origins, who can present very different levels of performance at school, depending on their countries of origin.

Another important conclusion to be drawn from past research concerns cross-country variation. Schnepf (2007) demonstrates how the effect of a school's ethnic composition varies according to the national context in which the study was undertaken. Using PISA results to compare the impact of immigrant concentration at schools on student outcomes in ten countries, Schnepf found that both the direction and the effect size differ across national contexts. In some countries (Australia and Canada), immigrant concentration had a positive effect on student outcomes; in others (Switzerland, Germany, New Zealand and France) the effect was negative; while in yet others (Netherlands, Sweden, UK and USA) the effect was not statistically significant.

The conclusions about the effect of a school's ethnic composition on student outcomes may also change according to the indicator used to measure it: the degree of concentration of a particular ethnic group, or the degree of ethnic diversity of the school. Fekjaer and Birkelund (2007), in research conducted in Norway, employed the latter indicator and concluded that the impact on student outcomes of a school's ethnic composition is not consistently negative. They analyzed higher education results of students who attended secondary education at schools with different degrees of ethnic diversity, and found that the effect of diversity is small but positive when parents' educational background is controlled.

Another important finding is the weakening of the effect of a school's ethnic composition on results, whenever we take the school's social composition into account (Driessen, 2002; van der Silk et al. 2006; Fekjaer and Birkelund, 2007; Ryabov & Van

Hook, 2007; Dumay & Dupriez, 2008; Cebolla-Boado and Medina, 2010; Agirdag, van Houtte and van Avermaet, 2012). Indeed, the effect of school ethnic composition tends to be smaller than that of school social composition. Agirdag, van Houtte and van Avermaet (2012) studied the mathematics results of Belgian students and concluded that after considering family socioeconomic status and prior academic achievement, school's ethnic composition was no longer significantly associated with student results, but the school's social composition remains significant.

Research in different countries also reveals that the compositional effect of the school varies according to student profile (in addition to an immigrant background, the student's academic performance, social status and gender), the level of schooling attended by the student, and also the academic discipline taken into account in the results (Driessen, 2002; Opdenakker and Van Damme, 2001; Jensen and Rasmussen, 2011).

In the present research we aimed to understand the effect that ethnic concentration at Portuguese schools has on student outcomes, while also taking the socioeconomic composition of schools into account. How this effect varies between native students and students with an immigrant background, and also between different groups of immigrant students, is an important issue that we address below.

Our analysis was restricted to students who were concluding the 1st Basic Cycle (4th grade),² and looks at their Mathematics results, the discipline that has presented the largest difference between the results of students with immigrant origins and their autochthonous counterparts (Seabra et al., 2014).

IMMIGRANT STUDENTS IN THE PORTUGUESE CONTEXT

Portugal has become a country of immigration over the last four decades,³ with an important immigrant contingent from the former African colonies (Angola, Mozambique, Cape Verde, Guinea Bissau, Sao Tome and Principe) and Brazil, countries with whom it has historical ties, and joined at the end of the last century by immigrants from Eastern Europe and, more recently, immigrants coming from China

² The Portuguese school system comprises 9 school years of Basic schooling divided into 3 cycles: 4 years (1st CEB), 2 years (2nd CEB), and 3 years (3rd CEB) – followed by 3 years of Upper Secondary School.

³ In 2016, foreigners represented 3.8% of the total resident population in Portugal (Oliveira & Gomes, 2017).

and Pakistan (Baganha, Marques & Góis, 2009). Currently the Brazilian community is the largest (Oliveira & Gomes, 2017).

In 2016, an estimated 3.9% of the resident population in Portugal were legal immigrants; of these, 20.4% were from Brazil, 16.4% from Ukraine or Romania (8.7%; 7.7%), 13.5% from Cape Verde or Angola (9.2%; 4.3%), and 5.7% from China.⁴

Although immigrants originating from PALOP countries are the ones that live longest in Portugal, many of them reside in neighborhoods on the suburbs of Lisbon (Hortas e Fonseca, 2013), working mainly in construction (men) and cleaning services (women), while the other immigrant groups have developed various integration strategies in Portuguese society that has been settled for a less exclusionary integration (Baganha, Marques & Góis, 2009). Recently, the government of Portugal has adopted various measures for the integration of immigrants, but their effects are not immediate.⁵

Recent available school-system data for the 2014-2015 school year indicate that 3.7 % of pupils attending basic and secondary school had a foreign nationality,⁶ originating mainly from Brazil (23.4 %), Cape Verde (11.4 %), Angola (6.9 %), Ukraine (7.2 %), Romania (6.3 %), and Guinea Bissau (6.3 %).⁷

If we just look at the 1st Cycle, in the 2014-2015 school year, 54.9% of all foreign students were in the Lisbon Metropolitan Area (LMA). In this region, foreign students represented 5.7 % of students and among them 43.8% were from the former Portuguese African colonies (PALOPs), and 22.8% were from Brazil. The distribution of foreign 1st Cycle students in schools was quite uneven in that 62.6% of such students were concentrated at 25% of schools.

Most Portuguese schools belong to the public education system. In 2014/2015, just 14.9% of all students attended private schools (basic and secondary levels). In the public system a school's population tends to reflect the local neighborhoods.

The system is selective, given that a pupil's transition to the next school year is not guaranteed; in 2014-2015, 6.4% of Basic Education students failed to advance to the

⁴ *Relatório de Imigração, Fronteiras e Asilo 2016* (Report on Immigration, Borders and Asylum 2016) (<http://sefstat.sef.pt/Docs/Rifa2016.pdf>)

⁵ In 2006 the schools started offering the possibility of attending Portuguese as a second (non-maternal) language, in 2007 the National Plan for the Integration of Immigrants was created and in 2015 a Strategic Plan for Migration was launched.

⁶ The national statistics provided by the Ministry of Education are based on the student's nationality. If we consider all students whose parents were born in a foreign country (students with an immigrant background) the proportion is much higher.

⁷ The group of students who were nationals of PALOP countries represents 30.1 % of all foreign students.

next level (3.6% in the 1st Cycle, 6.7% in the 2nd, and 9.8% in the 3rd). As in other countries, when taken as a whole the school results of students with immigrant origins in Portugal are not as good as those of their autochthones counterparts (lower transition rate, poorer average performance in national tests, and greater likelihood of taking vocational rather than academic pathways) (Seabra, 2010; Seabra et al., 2011; Seabra and Mateus, 2011; Seabra et al., 2014). Data provided by the Ministry of Education separate students by nationality and show that the difference in academic performance between foreigners and Portuguese nationals increases as the level of schooling rises (e.g. in the 2015-2016 school year, the difference in the pass rate between the two groups was 4.7% in the 1st Basic Cycle and 10.9% at the upper secondary level), and that there are differences depending on country of origin. The best average performances were achieved by French, Moldavian, Spanish and Chinese nationals, which sometimes surpassed those of the Portuguese students, whereas the group of countries with the worst results included several PALOPs (Cape Verde, Guinea Bissau, Angola) (Seabra et al., 2018). This latter fact may be explained by two factors: on the one hand, these students live in families with unfavorable socioeconomic conditions and, on the other hand, the autochthonous population tends to consider these groups of immigrants in an unequal way, as a result of its previous position of settlers.

RESEARCH QUESTIONS

Our research paid special attention to the effect of ethnicity, considered at both the student (national origin) and the school (the school's ethnic composition) levels. In a more in-depth analysis of the effects of school composition, we also looked at socioeconomic composition (SES). The analysis focused on the *main effect* of a school's ethnic and socioeconomic composition on the academic achievement of its students. Additionally, the *moderating effect* of both compositional effects was tested. The analysis was directed at the following research questions:

- Does the school's ethnic composition have an effect on students' results?
- Does the school's ethnic composition effect remains when students individual characteristics (ethnic origin, gender, family socio-economic status (SES), grade retention, and school size) are taken into account? And what happens when the school's socioeconomic composition is also considered?

- Does the school's composition (ethnic and socioeconomic) moderate the relationship between having and not having an immigrant background and students' results, when individual-level (gender, family SES, and grade retention) and school-level variables (socioeconomic composition, and school size) are controlled?

METHOD

Data

The data used in this study included those for fourth-grade students at public schools who took the National Attainment Test in Mathematics in the 2014-2015 school year. This register-data was collected by the Directorate-General of Education and Science Statistics (DGEEC). The research area was the Lisbon Metropolitan Area (LMA).

After excluding schools with fewer than 15 students (12.4%) who took the exam in the fourth grade, the final database included 23,143 students and 522 public schools in the LMA. The main reason for this exclusion was the need to test moderator effects using cross-level interactions, for which the recommended minimum is 10 units per group (Hox, 2010). The distribution of students across schools ranged from 15 to 157 (Table 1).

Measures

The design of the research was multilevel, so both level-1 (student level) and level-2 (school level) variables were used.

Outcome variable

In the school year 2014-15 Portuguese fourth-grade students took national exams in Mathematics and Portuguese. Both exams are standardized tests measured in a scale ranging from 1 to 5. In Portugal, student results in Mathematics are on average lower than those obtained in Portuguese and have a higher standard deviation (JNE, 2015), and the difference between the results of students with immigrant origins and their autochthones counterparts is higher in Mathematics than in Portuguese (Seabra et al., 2014). For this reason, and despite the importance of both disciplines, in this research the dependent variable was the fourth-grade students' academic achievement measured by

their results in the Mathematics National Attainment Test. The average Mathematics results was 2.89 ($SD = 0.93$; see Table 1) ranging from 1 to 5.

Individual level variables

National origin distinguished between non-immigrant and immigrant students. We considered an immigrant student to be one whose parents (one or both) were born in a foreign country. The non-immigrants were established as the baseline category, and two dummy variables were created to categorize immigrant students: one for PALOPs (14.0%, Table 1), which included students from Portuguese-speaking African countries (Angola, Cape Verde, Guinea Bissau, Mozambique, Sao Tome and Principe) and another for other immigrants (11.6%) for students from European, Asian and American countries (e.g. Brazil, France, Moldavia, Romania, Ukraine, Spain, China).

Table 1. Descriptive statistics

	Mean or Pct	SD
<i>School level</i>		
Ethnic composition	0.250	0.15
SES composition ⁽¹⁾	-0.046	0.55
School size ⁽²⁾	214.53	98.41
<i>Individual level</i>		
National origin ⁽³⁾		
PALOP	14.0	
Other immigrants	11.6	
Female ⁽⁴⁾	47.4	
Family SES ⁽¹⁾	0.03	1.13
Grade retention ⁽⁵⁾	24.4	
Mathematics results	2.89	0.93

Note: Individual level, $N = 23,143$; School level, $N = 522$ public schools in the LMA. Mean and standard deviation (SD) for quantitative variables and proportion (Pct) for categorical variables.

Legend: SES = Socioeconomic status; PALOP = students with PALOP origin – Portuguese-speaking African countries (Angola, Cape Verde, Guinea Bissau, Mozambique, Sao Tome and Principe); Other immigrants = (e.g. Brazil, France, Moldavia, Romania, Ukraine).

⁽¹⁾ SES was a standardized variable

⁽²⁾ Number of students in the school

⁽³⁾ Baseline – non-immigrants

⁽⁴⁾ Baseline – male

⁽⁵⁾ Baseline – no grade retention

At the individual level, family socioeconomic status (SES), grade retention, and gender were used as control variables. In order to assess the family SES, a multidimensional index was defined. The input variables were parents' educational level, social class (parents' occupation and employment status), and students' situation regarding economic support (ES).⁸ Since the variables were categorical Multiple Correspondence Analysis (MCA) was performed (Heiser and Meulman, 1994; Gifi, 1996). Through the MCA optimal scaling procedure, the three categorical variables were quantified. From the new category quantifications, a standardized score was obtained for each student

⁸ The state subsidises economically deprived students by paying part of their school expenses. The students who received this assistance are identified in the database provided to us.

that quantifies the family SES. The internal consistency of the new composite variable was assessed using a Cronbach reliability coefficient with a value of 0.75, demonstrating adequate reliability. Grade retention (i.e. age-grade retardation) was considered when a student was above the modal age for a grade (Hauser, Pager and Solon, 2004). A dummy variable was created: 0 = no grade retention, and 1 = at least 1 retention (24.4%). A dummy variable was also created for gender: 0 = male, and 1 = female (47.4%).

School level variables

Two compositional characteristics were considered as aggregate variables at the school level. Ethnic composition was measured by the proportion of immigrants at each school. On average, the proportion of immigrants was 0.250 ($SD = 0.15$; see Table 1), ranging from 0.00 (13 of 522 schools) to 0.87 (1 school). Socioeconomic composition was obtained by aggregating the family SES of the students. The standardized scores for school SES averaged -0.046 ($SD = 0.15$), ranging from 1.69 to 1.31. Finally, school size was used as a control variable ($M = 214.53$, $SD = 98.41$).

Data Analysis

The data in this study had a hierarchical structure with students nested within schools. A multilevel modelling (Goldstein, 1999; Hox, 2010; Snijders, & Bosker, 2012) and the Linear Mixed Models (MIXED) procedure was used to test the multilevel models. First, a null model was fitted to compare within-school variation with between-school variation and decide if the results provided empirical support for the use of multilevel modelling. The following models were tested: Model 1 included ethnic school composition; Model 2 added national origin as level-1 predictor and all control variables (gender, SES, grade retention and school size); Model 3 contained the additional effect of the socioeconomic composition; Models 4 and 5 included the cross-level interaction of national origin with the ethnic and socioeconomic composition of schools respectively; and the two interaction terms were simultaneously tested in Model 6.

In addition, the χ^2 difference test (-2 LL change) was used to compare models. The individual variables were group-mean centered (i.e. within-schools centered), and the level-2 variables were grand-mean centered.

RESULTS

A null model with a random intercept was used to test whether there was variance at the school level. The significant random school-level intercept in the baseline model confirmed that academic achievement varied significantly among schools ($p < .001$). The intraclass correlation (ICC) is 15.8%, and schools thus account for approximately 16% of the variability of the Mathematics results.

Table 2 displays the hierarchical linear regression results for the prediction of academic achievement. Model 1 shows that the ethnic composition of schools had a negative and significant effect on academic achievement ($\gamma = -0.61$, $t = -5.058$, $p < 0.001$).

After controlling for individual-variables (gender, SES, and grade retention) and the school-variable (school size) in Model 2, the effect of the ethnic composition of schools remained both negative and significant ($\gamma = -0.53$, $t = -4.546$, $p < 0.001$). Students from schools with higher proportions of immigrants thus performed worst. Results also showed that students with PALOP origins presented significantly lower results compared with non-immigrant students ($\gamma = -0.13$, $t = -7.239$, $p < 0.001$). The contrast with non-immigrants was not significant for other immigrant students ($p > 0.05$).

Model 3 introduced school-level SES, which had a positive and significant effect on student achievement ($\gamma = 0.45$, $t = 16.973$, $p < 0.001$). Students from schools with a higher SES presented better results in Mathematics, irrespective of ethnic composition. As Table 2 shows, this factor had no significant effect on academic achievement ($p > 0.05$), when school-level SES was controlled. It should also be noted that the effect of the other variables remained the same.

The interaction term for national origin and the ethnic composition of schools was introduced in Model 4. Although PALOP students tended to achieve worse results in Mathematics compared to non-immigrants at schools with a higher proportion of immigrant students, the moderating effect of ethnic composition was not significant ($\gamma = -0.21$, $p > 0.05$). In Model 5. The moderator effect of school SES composition was tested. As Table 2 shows, PALOP students performed better at schools with a higher SES composition ($\gamma = 0.12$, $t = 3.884$, $p < 0.001$). There was no significant effect for other immigrant students ($p > 0.05$). Model 6 reinforces the effect of socioeconomic composition, also as a moderator. When the moderator effects of both school composition variables were simultaneously incorporated in the analysis, only the SES

composition had a significant effect on the relationship between national origin and academic achievement. As in the previous model, PALOP students performed better when they attended schools with a higher SES ($\gamma = 0.13$, $t = 3.550$, $p < 0.001$).

Table 2. Hierarchical linear modelling regression results for 4th grade students' achievement in Mathematics

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)
Intercept	2.85** (0.02)	3.01** (0.02)	3.01** (0.02)	3.01** (0.02)	3.01** (0.02)	3.01** (0.02)
<i>School level</i>						
Ethnic composition	-0.61** (0.12)	-0.53* (0.12)	0.06 (0.10)	0.10 (0.10)	0.09 (0.10)	0.10 (0.11)
SES composition			0.45** (0.03)	0.45** (0.03)	0.44** (0.03)	0.44** (0.03)
<i>School level control</i>						
School size		0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
<i>Individual level</i>						
National origin ⁽¹⁾						
PALOP		-0.13** (0.02)	-0.13** (0.02)	-0.11** (0.03)	-0.11** (0.02)	-0.12** (0.02)
Other immigrants		0.00 (0.02)	0.00 (0.02)	0.00 (0.03)	0.00 (0.02)	0.00 (0.02)
<i>Individual level control</i>						
Female ⁽²⁾		-0.14** (0.01)	-0.14** (0.01)	-0.14** (0.01)	-0.14** (0.01)	-0.14** (0.01)
Family SES		0.22** (0.01)	0.22** (0.01)	0.22** (0.01)	0.22** (0.01)	0.22** (0.01)
Grade retention ⁽³⁾		-0.19** (0.01)	-0.18** (0.01)	-0.18** (0.02)	-0.18** (0.01)	-0.18** (0.01)
<i>Cross-level interaction</i>						
PALOP x Ethnic composition				-0.21 (0.13)		0.02 (0.04)
Other immigrants x Ethnic composition				0.00 (0.15)		-0.08 (0.16)
PALOP x SES composition					0.12** (0.03)	0.13** (0.04)
Other immigrants x SES composition					-0.05 (0.04)	-0.06 (0.04)
<i>Variance components</i>						
Level-1 variance	0.74** (0.01)	0.67** (0.01)	0.67** (0.01)	0.67** (0.01)	0.67** (0.01)	0.67** (0.01)
Level-2 variance	0.13** (0.01)	0.12** (0.01)	0.07** (0.01)	0.07** (0.01)	0.07** (0.01)	0.07** (0.01)
-2LL	55297.892	53142.410	52917.173	52918.606	52907.912	52911.533
-2 LL difference	-	21555.56**	225.24**	1.433	10.694	3.621

Legend: SES = Socioeconomic status; PALOP = students with PALOP origin – Portuguese-speaking African countries (Angola, Cape Verde, Guinea Bissau, Mozambique, Sao Tome and Principe); Other immigrants = (e.g. Brazil, France, Moldavia, Romania, Ukraine).

⁽¹⁾ Baseline – non-immigrants

⁽²⁾ Baseline – male

⁽³⁾ Baseline – no grade retention

* $p < 0.05$ ** $p < 0.001$

The model-fit information (-2 LL difference; Table 2) emphasizes that only the changes in Models 2 and 3 were significant. Although the moderating effect of the SES school had been significant, the models with the main effects of the individual and school variables were the only models that introduce significant differences.

DISCUSSION

The results presented above reveal that when a student is not descendent from immigrants born in a PALOP, has parents with a high SES, has never been subject to retention and is a boy, he is more likely to achieve better results in Math exams. These conclusions were expectable, inasmuch as they match those of earlier research projects which analyzed the variation in results in accordance with the gender of students and the social and cultural conditions of their families, namely with regard to the poor academic performance of students with origins in the former Portuguese colonies (Seabra, 2010; Seabra et al., 2014). Having said this, the primary goal of the present research meant that the focus of our analysis was the school – i.e. we were seeking to understand the extent to which the tendencies we described earlier might change depending on each school's social composition.

Looking at our research questions, we initially concluded that school's ethnic composition affects students' results, even after controlling the effect of the variables regarding their national origin, socioeconomic status, gender, and grade retention. In other words, we found that the higher the concentration of students with immigrant origins at a school, the poorer students performed, regardless of their individual profile. However, when we also took school's SES into account, school's ethnic composition no longer had a significant effect on its students' Mathematics scores, although the effect of individual-level variables (immigrant origin, socioeconomic status, gender, and grade retention) remained significant. These results reinforce how the concentration of certain social conditions in the school context impacts on students' performance.

One important conclusion to be drawn from our research is thus that in Portugal the effect of school's socio-economic composition is more relevant to students' academic performance than the effect of school's ethnic composition. This corroborates other studies in different countries (Driessen, 2002; Van der Slik, Driessen & De Bot., 2006; Ryabov and Van Hook, 2007; Fekjaer and Birkelund, 2007; Cebolla-Boado and Medina, 2010; Agirdag, Van Houtte & Van Avermaet, 2012).

The weakness of the effect of school's ethnic composition on student's results was reinforced when we assessed the *moderating effect* of this variable on the relationship between students' national origins and their academic performance. This moderating effect did not prove to be significant, either for PALOP students, or for other immigrants. This contrasted with the significant moderating effect of the school's socioeconomic composition, which conditioned the relationship between being a student with PALOP origins and results in the Math test. In short, it is possible to conclude that these students were the ones whose mathematics results were most affected by the social composition of the school they went to. As such, we can say that students whose origins lie in the PALOPs are likely to benefit more than other students from going to schools with a more advantaged social composition, whereas they tend to be more heavily prejudiced when they attend schools with lower levels of SES.

This last finding corroborates the conclusions of several studies which show the particular sensitivity of students from the most disadvantaged social groups to context factors (Coleman, 1968; Duru-Bellat, 2002; Opdenakker et al., 2002), while Lleras (2008) reveals how the results of black students are specifically affected by the composition of the school they attend. In Portuguese society, along with the Roma, PALOP students represent the most stigmatized social group, often living in separate neighborhoods and sometimes attending schools or classes that concentrate students with their ethnic profile or with school failure (Seabra, 2010). Although the majority of these pupils from the former Portuguese colonies have already been born in Portugal, they may possess specificities related with the *condition of subordination* experienced by their forebears (Ogbu, 2003): i) display low levels of self-confidence; ii) are the object of low expectations on the part of teachers; and iii) are victims of school tracking, with an overrepresentation in vocational pathways (Seabra, 2010; Seabra et al., 2018). In addition, they experience the added difficulty of a similarity between their mother tongue (various Creoles) and the Portuguese language, which frequently generates confusion between the two. Portugal has implemented Portuguese as a second language at schools since the end of the twentieth century, but this program has lacked many of the conditions needed for it to be effective, and in any case, students with this particular linguistic profile have never been seen as qualifying for the program (Seabra et al., 2018).

The current results contribute to reinforce two ideas about the school performance of students with an immigrant background: i) it is important to distinguish the students according to their families conditions of life (present and past) and ii) school's social composition particularly affects student outcomes when they accumulate situations of social vulnerability.

Our research showed that the measure which would be most likely to improve the results of these students would be to ensure a balanced distribution of students among schools, taking into account their family's SES and regardless of their ethnic status. Achieving this goal has implications for public policies.

The social differentiation between schools that currently exists – above all as a reflection of the fact that students generally attend schools in the areas in which they live, which are themselves sometimes highly socially differentiated – makes it hard to implement education policy measures that would tend to promote the integration of students who are the descendants of immigrants from the PALOPs into schools where the students' average socioeconomic profile is not low. It could be more viable, although it would also face difficulties, to alter school organization practices like the formation of academically and socially differentiated classes which increase the social differentiation within the school itself. Avoiding this type of organizational practices could be one way to enhance the academic success of students of PALOP students, given that, as some researchers have concluded, the social composition of school classes may affect students' results even more than the overall social composition of the school (Van der Slik et al., 2006; Cervini, 2006).

Taken as a whole, the results we have presented here suggest the need to conduct further sociological research that will enable us to understand how the school context acts as a mechanism which conditions students' results. In this case, we have limited ourselves to diagnosing the compositional effect of the school on the math results of students of immigrant origin. For the conclusions to be consistent, it is necessary to take into account both the results obtained in other disciplines (in particular in the Portuguese language) and a set of other context variables (family and school), controlling their effect on school performance. It is also important to note that only complementary studies that use qualitative methodologies would clarify the processes and mechanisms that produce the described results.

While on the one hand our conclusions may be worrying, because they show the extent to which the “social disadvantage” of students descended from immigrants in general and those with origins in the PALOPs in particular is heightened whenever they are inserted into school contexts in which the average student profile is socially disadvantaged, on the other they do serve to clarify the centrality of school contexts, which can counteract (or worsen) students’ original social conditions. We thus have a clearer view of the importance of designing policies which recognize that school, as a social and organizational context, can either be an instrument for fighting social inequalities, or a factor that reinforces them.

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