Author's postprint:

SCHOOL SEGREGATION OF MIGRANTS AND THEIR DESCENDANTS IN A DUAL SCHOOL SYSTEM: THE CASE OF BARCELONA

Abstract

This study analyses levels of school segregation of students of immigrant origin in a city of the south of Europe, namely Barcelona, which is characterised by a rapidly increasing growth of international immigration in recent decades, and moderate or even low levels of residential segregation of immigrants. Besides its analysis of nationality and origin, its main contribution is that it explores a generational typology classifying students according to their place of birth, year of arrival, and origin of progenitors, thus revealing different degrees of school segregation in keeping with each student's migratory history. Moreover, in the context of a dual school system (public and private) segregation is analysed by breaking it down in accordance with state or private ownership of the school. The results indicate a marked degree of segregation among students of the first generation and also among descendants of immigrants, showing how the dual school system is responsible for a significant part of the segregation, and that comparison of residential and school segregation always shows that the latter is greater.

Key Words: School segregation, Immigration, Residential segregation, School system, Descendants of immigrants

SCHOOL SEGREGATION OF MIGRANTS AND THEIR DESCENDANTS IN A DUAL SCHOOL SYSTEM: THE CASE OF BARCELONA

Introduction

The intensity of international immigration to Spain in the early years of the twenty-first century with what has been called the *international migratory boom* (Arango 2009; Domingo and Cabré 2015), brought about structural changes in Spanish society, with the incorporation within a few years of five million immigrants, who came to represent 14.2% of the population. This affected all sectors of the state, including schools where the impact was particularly noticeable. The arrival of immigrant minors with their parents in the early stages of the process, as well as subsequent family reunification meant a multiplying presence of immigrant students in schools and the progressive incorporation, some years later, of their descendants, the so-called second generations (García-Castaño and Carrasco, 2011; Portes et al. 2016; González-Ferrer and Cebolla-Boado, 2018), some of whom retained the nationality of their parents. In cities like Barcelona or Madrid, which act as a gateway of entry for international immigration and also as points of its subsequent dispersal around the country, the numbers have always been higher, to such an extent that, in Barcelona today, one in four of the city's residents was born abroad.

In the case of Barcelona, the locus of this study, the territorial distribution of foreign immigrants in the neighbourhoods of the city is characterised, as in other Spanish cities, by initial settlement in the old centre, followed by their later swift distribution through all the city's neighbourhoods, especially those in the periphery, which were constructed in the 1960s and 1970s in response to Spain's earlier internal migratory processes. Only the

more prosperous neighbourhoods, together with some of the most recent private housing estates, continue to show moderate percentages of immigrants. In this setting, notable for its considerable dispersion, the values for residential segregation are generally moderate or even low for most groups of immigrants (Martori et al., 2006; Bayona and López 2011; Galeano and Bayona 2018), despite a wide range of situations depending on national origins.

However, what happens in the residential domain does not always match with the actual distance between immigrants and autochthonous inhabitants. In cities of the south of Europe, segregation values tend to be moderate or low, even though they coincide with high levels of vulnerability among immigrants (Martínez del Olmo and Leal, 2008; Arbaci, 2019; Arbaci and Malheiros, 2010). A clear example of these discrepancies appears with analysis of what happens in schools. In the case of Barcelona, there is a significant degree of overrepresentation of immigrant students in public schools, but also marked differences between schools in the public education system, a situation that has been condemned by the Síndic de Greuges[1] in several of its reports (Síndic de Greuges, 2008, 2016). Hence, school segregation is greater than residential segregation (López-Falcón and Bayona 2012; Alegre 2017; Bonal et al., 2019), and this is particularly noticeable among the more residentially dispersed groups like those from Latin America (López-Falcón and Bayona 2012). Recently, in 2019, the Barcelona City Council announced its first programme to combat this segregation by distributing 2,000 vulnerable students to schools with more resources, providing financial help, and establishing new criteria for the management of "live enrolment" of immigrant students joining their classes in the middle of the school year, which has previously been highly concentrated.

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[1] The *Síndic de Greuges* is the Ombudsman of Catalonia.

Studying school segregation of foreign-born students, usually carried out on the basis of nationality, produces biased results. It renders invisible students who acquire Spanish nationality, many of them from Latin America, while descendants of groups for which access to nationality is more difficult (for example, Africans and Asians) keep appearing as foreigners. For example, 47% of students of foreign nationality in the city of Barcelona were born in Spain while, among those students born abroad, 35.4% have Spanish nationality. In order to remedy this bias, which involves unequal persistence or disappearance in student statistics depending on the criterion of observation, the present study adopts a generational perspective in its calculations of segregation, this being based on the student's place of birth, year of arrival, and birthplaces of the parents. This typology offers a fresh way of analysing school segregation, contributing a new, all-inclusive view of segregation of students of immigrant origin. In Spain, very few studies include the student's birthplace. Most statistical series include the criterion of nationality (Spanish or foreign, noting the applicable nationality in the latter case), although the availability of statistical data in open access is very limited. The only exception is work drawing on the PISA (Programme for International Student Assessment) report in which segregation is calculated using the category of immigrant students on the Autonomous Community scale (Murillo et al., 2018), starting out from student samples. Use of ethnic categories, as happens in other countries (Johnston et al., 2004), identifies a greater number of students but does not supply data on the year of arrival.

Besides explaining the process of integration of minors of immigrant origin, analysis of school segregation offers a complementary viewpoint that helps to achieve a more accurate interpretation of the process of integration of the immigrant population in domains other than residence. We work with the hypothesis that there is a hierarchy in the values of school segregation determined by the distance existing between the various

generational categories and the autochthonous population. In doing so, we first give an account of the immigrant population in Barcelona, focusing on presence in schools and employing as variables in the analysis nationality and place of birth. Second, we use a generational typology and present the results for different school years. Third, we apply segregation indicators with three different aims: 1) offering a comparison between school segregation and residential segregation; 2) calculating segregation for the different generational categories; and 3) breaking down segregation in keeping with type of school (public and private), which allows us to evaluate the influence of the dual school system on segregation. Finally, the implications of this analytical perspective on segregation and its results will be discussed in the conclusions.

Theoretical framework and state of the art

Although most studies of segregation use the residential sphere, there are other areas of individuals' lives where segregation can be even more important than in the place of residence and, accordingly, have a greater impact on the process of adaptation to the host society. These include schools in the case of children, the workplace for employed people, the place where shopping is done, the means of transport used, and leisure spaces, all of which complement the residential perspective as places where interaction between immigrants and autochthonous residents takes place (Boterman and Musterd, 2016). These areas make up a very important part in the lives of individuals, and we could even attribute greater significance to them than place of residence—because they play a key role in the possibility for interaction with the host society—when referring to the development of the process of integration. Studies that explore distance from autochthonous residents in these areas identify a range of relationships between different types of segregation. Hence, school segregation is usually greater than residential

segregation (Gramberg, 1998; Schindler, 2007), although the two types tend to be related (Boterman, 2019; Johnston et al., 2004). However, labour segregation is much less (Marcińczak et al., 2015). In the particular case of school segregation, our concern here, the interest of our analysis stems from the fact that this is one of the key mechanisms for understanding the reproduction of inequalities and possibilities for social mobility among immigrant students (Boterman et al., 2019), since segregation has a negative impact on the most disadvantaged students (Bonal and Bellei, 2018). In a context of growing urban segregation in Europe (Tammaru et al., 2016; Musterd et al., 2017), Bonal and Bellei (2018) show how school segregation is once again attracting considerable attention, as is evident in the appearance of recent research initiatives in several European cities.

The school system is one of the key explanatory variables with regard to segregation. In Spain, as in other countries, there exists a dual, public and private, educational system, although the latter, with a substantial presence, especially in the city of Barcelona, mostly takes the form of publicly subsidised private schools.[2] Given this situation, the possibility for parents of choosing a school is a determining factor in the growth of segregation (Wilson and Bridge, 2019; Alegre, 2017). In Catalonia, the initial choice of school is, according to the Catalan Ombudsman's report (Síndic de Greuges, 2016), one of the main causes of school segregation. Moreover, progressive diversification of the educational projects of primary and secondary schools makes it easier for autochthonous families, which are more informed of the characteristics of and differences between centres, to make the selection. This is especially true of middle-class families, as Benito and González (2007) note when speaking of the case of Catalonia. In this sense, and in relation with the immigrant population, segregation is supported by two kinds of practices of the

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[2] With regard to the two kinds of private schools, the available database does not let us distinguish, between those that are state subsidised and those that are not.

local population. One has been called "ethnic avoidance" (Rathelot and Safi, 2014), whereby parents decide against schools with larger proportions of immigrant students, and the other is "white flight" where their children are taken out of schools with larger proportions of immigrant students (Sánchez-Hugalde, 2009) and sent to a private school or another public school with a smaller proportion of foreign students. The impact of the economic crisis, in which countries like Spain are among the hardest hit, only aggravates these differences.

Other factors also influence school segregation. The most important of these is socioeconomic stratification in the host society, where students are segregated in accordance with the social characteristics of their families of origin (Murillo et al. 2018; Jenkins et al. 2008). Hence, foreign students are segregated as members of the most underprivileged social classes, since immigrant families with school-going children tend to be in situations of disadvantage. This process is favoured in the context of the dual educational system with public and private schools. On the one hand, both systems are unequally distributed throughout the territory (Bonal and Zancajo, 2020; Bonal et al. 2020) and, notably, with a smaller presence of private schools in vulnerable areas, as happens in Barcelona (Domingo and Bayona, 2021). On the other hand, it encourages segregation because of the possibility of choosing among schools and the higher economic costs associated with private schools, even though they might be partially state-funded. In these cases, school zoning policy and choice of school are among the factors that have an effect (Alegre, 2017; Oberti and Savina, 2019), either by facilitating or preventing segregation. In the case of Catalonia, the non-existence, for many years, of clear policies in this regard has ended up encouraging segregation between the systems (Bonal, 2012). This is what has happened in Barcelona where school zoning reforms

favouring greater eligibility have brought about increased segregation (Bonal and Zancajo, 2020).

At the same time, segregation of immigrant students is also explained by isolation of immigrant groups in the city (Johnston et al. 2004; Schindler, 2007; Bonal et al. 2019), and its evolution over time might be related with changes in the composition of the immigrant population (Johnston et al. 2008), in which case the school is a reflection of what is happening in society. Thanks to expanding globalisation and the economic crisis, Europe has recently seen a growth of more vulnerable zones, as a reflection of increasing social inequalities (Tammaru et al. 2016, Musterd et al. 2017). In the case of Barcelona, the economic crisis has had a major impact and the more vulnerable zones are now to be found in the peripheral areas (Sarasa et al. 2018), which have a growing immigrant presence at the same time as segregation is increasing (Sorando and Leal, 2019; Rubiales, 2020). In these vulnerable neighbourhoods, the concentration of the immigrant population in schools is normally greater (Robinson, 1984; Johnston et al. 2007), owing to a higher birth rate, an ageing demographic structure in the autochthonous population, and other factors of choice, both positive (concentration of students of similar origins) and negative (fruit of discrimination).

In the case of Spain, the high levels of school segregation have, according to Murillo and Martínez-Garrido (2018) who draw on data of the PISA report, come to be among the uppermost on the European scale. This would have intensified recently as a diffuse effect of the economic crisis (Murillo and Martínez-Garrido, 2018). School segregation is receiving increasing attention in Catalonia (Benito and González, 2007; Carrasco et al. 2007; Alegre et al. 2008; Sánchez-Hugalde, 2009; Ferrer et al. 2011; Bonal, 2012; Tarabini et al. 2018; Bonal et al. 2019), with particular interest from the institutions (Síndic de Greuges, 2016). This school segregation in Catalonia is greater than residential

segregation (Alegre, 2017; Bonal et al. 2019), especially in the case of students with Latin American nationalities, where the low levels of segregation from the residential point of view are not the case when it comes to schools (López-Falcón and Bayona, 2012).

Analysis of school segregation and its prevention is important because of the effects involved. In particular, high levels of segregation mean less contact with local students which, in turn, affects the process of integration (Johnston et al. 2007) and school results. Indeed, evidence from Spain demonstrates that high levels of concentration affect school results. Data from the PISA report show that, as the number of immigrant students increases, the threshold at which the effect is observed also rises. Cebolla-Boado and Garrido (2011), using data from the 2006 PISA report, found negative effects when the threshold exceeded 20%, while Calero and Escardíbul (2016) conclude from the 2012 PISA report that the threshold increases to 30% for autochthonous students and 40% for foreigners. Even when it is of low intensity, concentration has negative effects for students of both immigrant and local origins (Bayona and Domingo, 2019). Nordin (2013) believes that the negative effects of concentration on school results are selective, especially affecting boys and second-generation students.

Analysis of segregation from the generational perspective, which is one of the focuses of the present study, is essential for discovering the impact of migratory trajectories on the distribution of immigrant students, as well as for observing changes in segregation over time (Fiel and Zhang, 2018). For immigrants as a whole, the theory of spatial assimilation indicates that descendants of immigrants show greater dispersion than the earlier generations (White et al., 1993; Allan and Turner, 1996) and, accordingly, lower residential segregation. The children of immigrants, the second generation, should have fewer difficulties because of their better knowledge of the language and the educational system by comparison with the first generation. In Spain, Aparicio and Portes (2014),

working with the second generation, identify the existence of good school results despite a high risk of failure for students of certain origins. This differentiation by origins has also been found by Bayona and Domingo (2018) when studying the school results of the second generation, in which Sub-Saharan and other African groups are at the lower end of the scale, a situation which De Miguel and Solana (2017) also find for students coming from North African countries. This lesser degree of school segregation is not always fulfilled since, in some cases, a greater prevalence of segregation has been found among the second generations (Schindler, 2007).

There is extensive debate with regard to the second generations and their composition. Ramakrishnan (2004) recommends making a distinction between children of immigrant origin born in the host country, among the second generations (with two immigrant parents) and the 2.5 generation (with one autochthonous parent) because the two groups differ considerably in their sociodemographic characteristics. Rumbaut (2004) goes still further in adding still more complexity to the classification, breaking down the immigrants into several categories in keeping with the premise that generational cohorts, defined by the parents' year of arrival and place of origin, are important factors in the process of adaptation to the host society.

Data and Methodology

Student microdata from official non-university studies carried out in the city of Barcelona, ceded by the Department of Education of the Generalitat (Government) of Catalonia have been used. The data are from the 2015-2016 school year and cover the totality of non-university enrolled school children in Catalonia, which is to say 1,224,755 students. This article considers all the 176,160 school students in the city of Barcelona

(Table 1), 158,056 of whom reside in the city and 14,105 in another municipality, while the place of residence of 3.999 is unknown.[3]

These have been linked with the Continuous Population Register of 1 January 2016,[4] in an operation carried out by the Statistical Institute of Catalonia (Idescat), which makes it possible to recover information about the students' year of arrival in Catalonia as well as their parents' place of origin and nationality. Until now, inadequate availability of statistical data on student distribution has not permitted this kind of analysis in Spain. The link between data from administrative records (collected by the Department of Education) and that of the population register (from Idescat), on the basis of which a new statistical archive has been formed, has always been made bearing in mind the need to safeguard their private nature before access is given in order to respect confidentiality in their use. Moreover, rapid acquisition of Spanish nationality by some groups of students selectively conceals the children of immigrants of some origins, which means that information by nationality is biased and only representative for some groups. The perspective of generational cohort applied in this study is only possible when school records are related with population records or, in the case of Spain, the Official Population Figures. Hence, along the lines of Rumbaut's work (2004) a generational typology is constructed, combining the student's place of birth, age of arriving in Catalonia, and birthplace of parents. The classification used is as follows:

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[3] The data cover is good. The differences with data published by the Barcelona City Council for the same school year are of the order of 0.1%.

[4] This operation, based on the Official Population Figures, showing all residents of a municipality independently of the legal situation, represents data crossing from administrative records carried out by the *Institut d'Estadística de Catalunya* (Idescat – Statistical Institute of Catalonia).

1) *First Generation:* schoolchildren born abroad and who arrived in Catalonia aged seven and older and who have therefore not been in the educational system from the start of their schooling;

2) *Generation 1.75:* schoolchildren born abroad but who arrived in Catalonia before the age of seven and who therefore entered the obligatory educational system at the beginning;

3) *Second Generation:* schoolchildren born in Spain of two parents (or one, where information about only one parent is available) who were born abroad;

4) *Generation 2.5:* schoolchildren born in Spain, one of whose parents was born abroad and the other in Spain;

5) Autochthonous: schoolchildren born in Spain of parents also born in Spain. When there is information about only one of the parents and that parent was born in Spain, the student comes under this heading.

In the case of Barcelona, complete information for all students is not available as this is lacking for a small percentage (3.4%). Among them, the category of *Other immigrants* has been recovered for those born abroad (1% of students) and whose year of arrival in Catalonia is not known. Hence, a small percentage of the total number of students is lost (2.4%, among whom 0.4% are of foreign nationality and would be added to the second generation). It is possible that these are more complex cases, which could include a more recent arrival or a more vulnerable situation.

In Spain, school attendance is obligatory from six to sixteen years of age. It is divided into two stages: primary education (six years) and secondary education (ESO, four years). Before this, there are cycles of preschool education, in which the second cycle (children of 3-5 years) is practically universal. After completing ESO, students can move on to the baccalaureate (as a preliminary step to university), or to vocational training courses,

which are always non-compulsory. In the present study, data pertaining to obligatory schooling are analysed, although in some of the first descriptive graphs, children from the second cycle of pre-school education are included. This differentiated analysis is based on the existence of different numbers of schools at different stages, with a greater number in the preschool phase when proximity to the residence is a very important factor in choice of schools. At the same time, there is an unequal presence of public and private systems, with larger numbers of private schools in secondary education.

In the analysis of segregation, the dimension of evenness (Massey and Denton, 1988) has been used. This is done on the basis of three indicators. The first is the segregation index (S),[5] which compares the distribution of a population group with the total and is indicated in cases like the present study in which there is a high diversity of origins. Its formulation is:

$$S = \frac{1}{2} \sum_{i=1}^{n} \left| \frac{x_i}{X} - \frac{t_i - x_i}{T - X} \right|$$

In a second instance, the dissimilarity index (D) is used to compare population subgroups, and the distribution in space of the two groups considered (Duncan and Duncan, 1955). Its formulation is:[6]

$$D = \frac{1}{2} \sum_{i=1}^{n} \left| \frac{x_i}{X} - \frac{y_i}{Y} \right|$$

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[5] Where x_i is the population of group X in the spatial unit i; X, the population of group X in the municipality; t_i, the total population in spatial unit i; T, the total population of the municipality, where n is the number of spatial units.

[6] Where x_i is the population of group X in the spatial unit i; X, the population of group X in the municipality; y_i, the population of the group Y in the spatial unit i; Y, the population of group Y in the municipality; and n, the number of spatial units.

Third, the existence of a dual education system (public and private) requires consideration of a new indicator that allows quantification of the contribution of these sub-systems to total segregation. In an approach similar to that of Jenkins et al. (2008), Vázquez (2012), Murillo (2016), Murillo and Martínez-Garrido (2018) and Ferrando et al. (2020), we calculate the square root index or Hutchens indicator (Hutchens, 2004), which has the property of additive decomposition and allows breakdown into subsystems or, in this case, the influence of public and private schools on segregation. The indicator is defined as:

$$H = \sum_{i=1}^{k} \left(\left(\frac{x_{1i}}{X_1} \right) - \sqrt{\frac{x_{2i}}{X_2} \frac{x_{1i}}{X_1}} \right)$$

Here, x_{1i} and x_{2i} represent the numbers of students in the minority and majority groups in the school i, and X_1 and X_2 are the totals for these subgroups in the municipality. This is decomposed into:

$$H = H_{within} + H_{between}$$

where

$$H_{within} = \sum_{g=1}^{G} W_g H_g$$

and

$$W_g = \sqrt{\left(\frac{P_g}{P} \right) \left(\frac{R_g}{R} \right)}$$

Here, g refers to the subgroups, W_g to the influence of the subgroup g, P_g and Pr_g to the number of cases (students) in the subgroup g with regard to the majority groups P and R (public schools and private schools respectively). Although it is one of the few indices that allows breakdown, it has the problem of showing generally low values and also of

being little known among researchers (Allen and Vignoles, 2007), which makes comparison and interpretation difficult.

These indicators will be calculated, first, according to nationality and place of origin of the students, identified by continent. The unit of analysis employed is the primary or secondary school. In the city of Barcelona, these schools exist in different numbers, depending on the stage of education. There are 333 primary schools, equally divided between 166 public and 167 private.[7] At secondary school level, the presence of private schools increases, and greatly so, when by contrast with only 65 public schools, they account for 147 (69.3%) out of a total of 212 schools with a representation that is well above the average for Catalonia (47.9%).

Residential segregation is also calculated for the population aged between 6 and 15 residing in Barcelona. The same ages are therefore compared, an important factor in segregation analysis (Sabater and Catney, 2019). The calculation is made by nationality and country of birth with data from the Official Population Figures on 1 January 2016 and, therefore, on the same date as the school data. Two scales of analysis are used for this, the census section (1,068 census sections) and Basic Statistical Areas (BSA, with 238 areas), with averages of between 1,500 and 6,700 inhabitants respectively. The latter scale presents a figure for units that is closer to that for schools, and hence more comparable.

Segregation in the school

Evolution of the immigrant and foreign population in Barcelona

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[7] Most of the latter are government-subsidised centres, which is to say they are privately managed but partially funded by the Generalitat (Government) of Catalonia. In the Barcelona City Council data, only 8 private primary schools and 7 secondary schools are not state subsidised.

Since the end of the twentieth century Barcelona has experienced a continuous increase in immigration, in such a way that, from 3.9% in 1996 and 8.7% in 2001 and a volume of 58,385 and 110,129 immigrants respectively, the figures have risen to a maximum of 25.7% and 420,955 residents in 2019. The effects of the economic crisis are barely noticeable in this evolution, except for a one-off decrease in 2014, by contrast with other Spanish cities. At present, half the immigrant population is from the Americas (50.2%), a quarter from Europe (24.8%), while the remainder is divided between Asians (18.2%) and Africans (6.7%). This is a young population that has arrived relatively recently, coming from a wide range of places, amongst which 42 countries each account for more than a thousand residents in the city. In 2018, a third of the immigrant population has Spanish nationality, especially those from the Americas (48%), while Asians (15.7%) and Europeans (13.8%) have less access, in the latter case because, being from an EU country, they have the same rights as Spaniards and do not need to obtain citizenship. Since this is a city that acts as a port of first entry and subsequent metropolitan redistribution, the proportion of minors is lower than in other suburban municipalities.

As for internal distribution, half the population in the old city centre is comprised by immigrants (59.7% in El Raval and 61.0% in the Gothic Quarter), with significant percentages in some of the peripheral lower-income neighbourhoods, for example Ciutat Meridiana (41.6%). In most neighbourhoods, the values are around 20%, with a minimum of 9.1% in Canyelles, a neighbourhood constructed in 1974, where there is still only a small presence of international immigrants.

School-age population according to the generational perspective

In the school year of 2015-2016, there were 176,160 young people studying in Barcelona, 12.2% foreigners, and 10.0% immigrants, or 21,525 and 17,605 respectively. These

percentages are much lower than those presenting the total of foreigners and immigrants in the city as a whole on the same date (16.6% and 22.5% respectively), partly because of an age structure in which young adults predominate but also owing to laws on the acquisition of Spanish nationality and the recent evolution of migratory flows in Spain which, after a maximum number of arrivals in 2007, experienced a period when these figures fell, even to the point of reaching a negative migratory balance in the years of greatest intensity of the economic crisis.

[FIGURE 1 ABOUT HERE]

A significant part of the students of foreign nationality were born in Spain (47%), especially in the early years of schooling when they exceed 75% while, in secondary education, the situation is precisely the opposite, with more than 90% born abroad (Figure 1, left). From this standpoint, the composition of the students is dominated by Asians (36.5%), with 28.5% from the Americas, 25.5% from Europe, and 9.5% from Africa. Among the students of immigrant origin, however, access to nationality is significant (35.4%), with smaller variations between the different levels of education (from a minimum of 26.8% to a maximum of 43.5%), and with a profile in which students born in the Americas predominate (44.8%), followed by 28.4% born in Asia, 20.4% in Europe, and 6.3% in Africa.

When a distinction is made in accordance with the type of school (public or private), there is a clear overrepresentation of immigrant students in public schools (Table 1), and this is particularly the case with foreign students (20.1% of students in public schools and 6.7% of those in private schools). This is the result of the fact that two out of three foreign students attend public schools. The concentration is less depending on the place of birth (14.8% and 6.6%, respectively), except in secondary education where 28.1% of the students in public schools are immigrants by comparison with 10.2% in private schools.

The paradox hidden behind these figures can be interpreted through two processes, which will later be observed in more detail: the segregation of some origins, independently of place of birth, in the first case, and the concentration of newly arrived students in just a few secondary schools, in the second.

[TABLE 1 ABOUT HERE]

The number of students related with the migratory process rises to 53,612 or 30.4% of all students when the immigration status typology is used (Table 2). By educational stages, the numbers are 14,043 for pre-school (35.2%), 23,856 for primary (29.1%), and 15,713 (28.9%) for secondary. By type of school, the gap between systems continues to grow, with 42.8% of the students in public schools and 21.7% in private schools. These percentages are the result of a composition where not all the categories have the same weight. With the private school, for example, Generation 2.5 (for which one of the parents is autochthonous) represents one third of the students of immigrant origin, when in public schools the figure is less than 17%. In this regard, it is notable that 69.3% of the first generations attend public schools by comparison with 33% of autochthonous students. These differences are clearly observed in Figure 2 where, on an educational level by educational level basis and in accordance with ownership of the school, the changing composition according to the migrant status of students is represented.

[FIGURE 2 ABOUT HERE]

School and residential segregation in Barcelona

The levels of school and residential segregation are in the middle range. Using the census section, residential segregation is very stable with age and is estimated as being above 0.4. Depending on place of birth, segregation decreases with age, especially in the early ages. These values drop to below 0.3 if Basic Statistical Areas (BSA) are used. The

relationship between segregation by nationality or place of birth is maintained. At school, segregation by nationality is generally greater and practically stable through all educational levels. However, analysis by country of birth draws attention to the increase observed in the final years of secondary education when, unlike what is happening from the residential standpoint, segregation considerably increases. In the comparison between residence and school, segregation is greater at school, a situation that is particularly visible if the geographic unit of comparison is the BSA. Since BSA has a number of units that is more similar to that for schools, the values are more comparable and allow us to state that levels of segregation in schools are higher than those for residence.

[FIGURE 3 ABOUT HERE]

The same comparison is carried out among continental groups, with some interesting results (Figure 4). First, comparing the form of the graphs and their evolution, one can say that there is a clear correlation between school and residential segregation, as the dynamics between ages and educational levels are similar. Comparing school and residence, and focusing the analysis on BSA data, one again sees greater school segregation. In line with the previous literature, the greatest differences are observed among immigrants from the Americas. If their values for residence are lower, their segregation in schools is greater than it is among Europeans.

[FIGURE 4 ABOUT HERE]

Beyond the classical problem of the number of units, it is observed that higher values for Africans, or the diminishing segregation of students from the Americas, are similar between residence and school. Hence, school segregation is partly explained by residential segregation. Nevertheless, some phenomena diverge, for example increased school segregation in the last year of secondary education, which is observed in some cases at school, although it is not reflected in territorial terms.

Segregation according to immigration status

Using immigration status offers a new reading of segregation that complements the partial views provided by data by origin and nationality. Hence, segregation shows very different intensities according to the generational typology. For first-generation students, segregation reaches its highest levels, even as much as twice those observed for the 2.5 Generation. These values are situated at around 0.5 (in the first school years there are few students) and they rise significantly in the last school year. There is a considerable distance from Generation 1.75, indicating both greater territorial concentration of students arriving in Barcelona and also bad management of year-round enrolment, which is to say allocation to schools of students who frequently arrive when the school year has already started. It is important to note, too, how the second generation experiences levels of segregation that are even higher than those for students of Generation 1.75. This is a matter of concern when 60% of these students have Spanish nationality and when socioeconomic differences as well as statistical invisibility can partly explain these values. Then again, there is hardly any segregation for generation 2.5, with values that are always less than 0.3. There is a big distance between them and the second generation, which does not vary between years of schooling, and hence the need to distinguish between the two subgroups of students.

[FIGURE 5 ABOUT HERE]

As for distribution between groups in schools, the dissimilarity index enables comparison (Table 2, rows). In primary schools, autochthonous groups and generation 2.5 are the closest groups, and there are also similar distributions among generation 1.75 and the second generation. By contrast, the greatest difference is between the first generation and autochthonous students and also generation 2.5. Also notable is the difference between the autochthonous group and the second generation, which is even greater than it is with

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generation 1.75. In secondary education (Table 2, columns) most relationships indicate a drop in segregation, except for the first generations where there is mostly an upward trend.

[TABLE 2 ABOUT HERE]

Segregation and public and private schools

From the generational standpoint, the segregation values differ between public and private schools. The segregation index, calculated by stage of education, for schools as a whole, and by ownership (public or private), indicates how, in the cases of the first and second generation, segregation is greatest in private schools, coinciding with the highest values of segregation (Figure 6). In the remainder of the cases, segregation is greater in public schools. This is due to an unequal distribution of students between public and private schools and because the presence of students of immigrant origin in private schools is much more polarised than it is in public schools. This happens, in particular, in some religious state-subsidised private schools where the majority of the students are of immigrant origin. In some cases, for example those of Moroccans and Pakistanis, about 90% of the students go to public schools while, in others, like Filipinos, the figure is at the same level as that for Spanish students with regard to private schools. Moreover, some of these groups are to be found in just a few schools, many of them religious state-subsidised private schools, which increases segregation within the same system (in this case, private). In addition, and owing to different strategies for choosing centres, it is notable how autochthonous students experience greater levels of segregation *vis-à-vis* the students as a whole than the 1.75 and 2.5 generations.

[FIGURE 6 ABOUT HERE]

Finally, the Hutchens' index allows evaluation of each one of the subsystems with regard to total segregation, which is the third aim of this study. The values within which this indicator moves are significantly smaller than those provided by the segregation indicator

21

and, although they are not directly comparable, on this occasion the interest is to find out how segregation is divided between the school systems, and the weight of each one in total segregation (Table 3).

The segregation values repeat some previously found consistencies, for example greater segregation of the first and second generations. Generation 2.5, especially in primary school, shows the lowest values. However, the differences between calculation by nationality and by country of birth are magnified, with much greater segregation in the former case.

Results concerning the contribution to segregation of the dual school system indicate how segregation of students in state-funded private schools is greater than in public schools for most of the groups analysed, and the greater the segregation, the more striking this is. As for contribution to total segregation, in general this is more present in private than in public schools, especially when it comes to higher levels of segregation. A third element influencing segregation is different distribution between two systems. This component represents about a quarter of segregation in primary schools while, in secondary education, it accounts for more than a third in most cases. In primary education, and for second generation students, the result of the different distribution of students between systems gives a figure of 25.9%. In secondary education, and for first-generation students, this value rises to 37%. It is only in the 2.5 generation that the differences between systems would contribute nothing to total segregation.

[TABLE 3 ABOUT HERE]

Conclusions

The usual analyses, based on nationality, of residential segregation of students of immigrant origin present biased views of segregation, as the presence of these students in the statistics is the result of casuistry regarding legislation on acquisition of nationality.

Hence, in the city of Barcelona, students who are descendants of immigrants of Latin American origin, or who are themselves immigrants from Latin America, are not counted in the observation, while those of other, for example Asian or African, origins remain in the statistics. Moreover, there is also a selection that makes visible those who have arrived more recently while others, who have been in the country for years, disappear from view. The present study's cohort perspective derived from links between statistical records multiplies the number of students under consideration and allows analysis in four different categories. This, then, offers a more complete account of the relationship between the migratory process and school segregation, and could be important for the implementation of public policy in this regard.

Analyses comparing school and residential segregation indicate, first of all, the relationship between the two, this being derived from observation of the temporal evolution by level of education and ages of school and residential segregation. As in other contexts (Johnston et al. 2004, Schindler, 2007), school segregation is generally of greater intensity. This is observed when comparing the patterns by nationality or place of birth with very similar dynamics between school and residence. On the one hand, considerable school segregation of Africans and Asians correlates with high levels of residential segregation for these origins and, on the other hand, the evolution of segregation in school years is similar to that observed with ages in the territory. With some particularities, school segregation depends on residential segregation, which means that part of it is explained by the distribution of the immigrant population around the city. One of the exceptions noted is what happens in the last year at school when there is an increase of segregation that is not visible in territorial terms. This is a consequence of bad management of "live enrolment" which results in a concentration of students in a few secondary schools, and especially of those who arrive in the city as part of the family

23

reunification programme with the intention of swift incorporation into the labour market. These students belong to the first generation and their characteristics are very different from those of other students of the same nationality. The results, here, underscore the need to consider aspects pertaining to the migratory process when analysing school segregation—as we have done in the present study—and the importance of giving attention to certain specific groups.

One of the limitations of this study is that we have not had access to socioeconomic data on students and their families, which would have enabled us to carry out analysis by social class. We are aware of the importance of social class in segregation levels (see Prieto-Latorre et al, 2020, for the Spanish region of Andalusia) but the aim of our study is to draw attention to the impact of cohort and origin in segregation levels. It is also an example of the importance for social research of being able to use increasingly detailed information like that which can be derived from ever more common practices of taking advantage of administrative records.

By and large, the generational perspective employed in the present study indicates how students of the first generation experience the highest levels of segregation. And these levels of segregation, which are higher than those found in relation with nationality, are in large part explained by the concentration that presently exists in the public-school system and, within that, in a few secondary schools. Management of student enrolment in secondary schools is not only deficient but it gives rise to high levels of segregation. Hence, adequate policies for receiving and distributing students who join classes during the school year could be very helpful in attenuating these high levels.

The second group experiencing high levels of segregation is that of the second generation, which suggests perpetuation of socioeconomic differentiation from parents to children. Their statistical visibilisation is just a first step towards policies concerning this group,

especially in the city's more vulnerable areas. This greater segregation is in keeping with the studies by Schindler (2007) and contradicts the view deriving from assimilationist ideas of greater dispersion among descendants. Only children of mixed couples (generation 2.5) experience lower levels of segregation. However, the segregation of generation 1.75 appears at lower levels than those observed for the second generation. This could be due to their greater statistical visibility (by comparison with the second generation, they can be identified by place of birth), which means that they receive government attention and some focus in policies. Otherwise, this higher visibility is the result of their residential concentration in neighbourhoods that have been given more attention because of their considerable percentages of foreign-born populations. The results could also be due to a composition effect in that the composition by origin of the different categories is influenced by immigration flows that change over time. As for our initial hypothesis on the existence of gradation between segregation and generations, this is partially confirmed, with the exception of generation 1.75, as we have noted. Detailed analysis of national origin and generation deserves attention in future research.

Finally, the analysis carried out with regard to the ownership status of schools sheds light on the effect on segregation of the dual school system. The results indicate heterogeneity in the origin of segregation. Hence, a third of presently existing segregation is explained by differences generated by the dual school system, and even more notably in secondary education which has a smaller number of schools. At the same time, the results suggest that internal differences within a same system are still important, and these should also be a primary focus of attention in both public and state-funded private schools.

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Table 1: Students according to nationality, country of birth, and immigration status in Barcelona, by educational stage and type of school, 2015-2016

	By nationality								
	Public school			Private school			All Students		
	Foreigners	Total	(%)	Foreigners	Total	(%)	Foreigners	Total	(%)
Preschool (second cycle)	4,314	18,011	24.0	2,032	21,895	9.3	6,346	39,906	15.9
Primary	6,109	34,915	17.5	2,796	46,952	6.0	8,905	81,867	10.9
Secondary	4,142	19,592	21.1	2,132	34,795	6.1	6,274	54,387	11.5
Total	**14,565**	**72,518**	**20.1**	**6,960**	**103,642**	**6.7**	**21,525**	**176,160**	**12.2**
	By country of birth								
	Public school			Private school			All Students		
	Immigrant	Total	(%)	Immigrant	Total	(%)	Immigrant	Total	(%)
Preschool (second cycle)	1,061	18,011	5.9	861	21,895	3.9	1,922	39,906	4.8
Primary	4,169	34,915	11.9	2,457	46,952	5.2	6,626	81,867	8.1
Secondary	5,508	19,592	28.1	3,549	34,795	10.2	9,057	54,387	16.7
Total	**10,738**	**72,518**	**14.8**	**6,867**	**103,642**	**6.6**	**17,605**	**176,160**	**10.0**
	By migratory status (with relation to migration)								
	Public school			Private school			All Students		
	Non-Autochthonous	Total	(%)	Non-Autochthonous	Total	(%)	Non-Autochthonous	Total	(%)
Preschool (second cycle)	8,448	18,011	46.9	5,595	21,895	25.6	14,043	39,906	35.2
Primary	14,113	34,915	40.4	9,743	46,952	20.8	23,856	81,867	29.1
Secondary	8,507	19,592	43.4	7,206	34,795	20.7	15,713	54,387	28.9
Total	**31,068**	**72,518**	**42.8**	**22,544**	**103,642**	**21.8**	**53,612**	**176,160**	**30.4**

Source: Department of Education and Idescat.

Table 2. Index of dissimilarity according to migratory status and educational stage, Barcelona year 2015-2016

		Secondary education				
		Autochthonous	First Generation	Generation 1.75	Second Generation	Generation 2.5
Primary education	Autochthonous	-	0.53	0.33	0.41	0.20
	First Generation	0.56	-	0.29	0.30	0.54
	Generation 1.75	0.42	0.26	-	0.20	0.34
	Second Generation	0.48	0.28	0.23	-	0.42
	Generation 2.5	0.19	0.52	0.38	0.44	-

Source: Education Department and Idescat.

Table 3. School segregation (Hutchens index) by students according to educational stage, Barcelona

	H total	H intra-subsystems						H inter-systems
		Public			**Private**			
		H gross	*Weight*	*Contribution*	*H gross*	*Weight*	*Contribution*	
PRIMARY SCHOOL								
Nationality	0.1576	0.0891	0.5204	0.0464	0.1550	0.4359	0.0676	0.0437
Country of birth	0.0985	0.0700	0.5071	0.0355	0.0819	0.4682	0.0384	0.0246
First Generation	0.1866	0.1103	0.5423	0.0598	0.2080	0.4179	0.0869	0.0398
Generation 1.75	0.0796	0.0654	0.5044	0.0330	0.0577	0.4765	0.0275	0.0191
Second Generation	0.1337	0.0745	0.5036	0.0375	0.1333	0.4618	0.0616	0.0346
Generation 2.5	0.0393	0.0654	0.4338	0.0284	0.0369	0.5661	0.0209	0.0002
SECONDARY SCHOOL								
Nationality	0.1714	0.0884	0.4604	0.0407	0.1487	0.4803	0.0714	0.0593
Country of birth	0.1165	0.0789	0.4348	0.0343	0.0704	0.5197	0.0366	0.0456
First Generation	0.1819	0.1016	0.4783	0.0486	0.1451	0.4544	0.0659	0.0673
Generation 1.75	0.0482	0.0233	0.4270	0.0100	0.0393	0.5567	0.0219	0.0164
Second Generation	0.0957	0.0297	0.4339	0.0129	0.1150	0.5462	0.0628	0.0199
Generation 2.5	0.0413	0.0465	0.3424	0.0159	0.0372	0.6567	0.0244	0.0009

Source: Department of Education and Idescat.

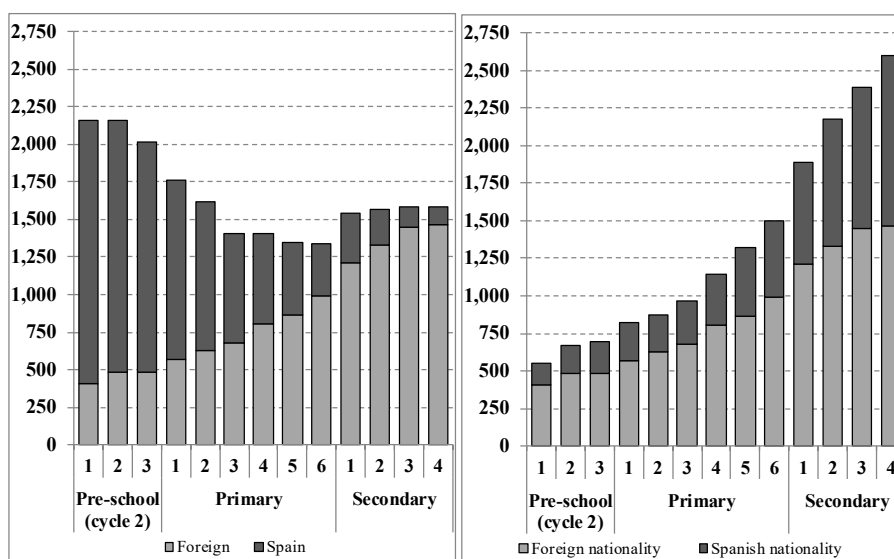*Students of foreign nationality by place of birth*   *Foreign-born students by nationality*

Figure 1: Students according to nationality, place of birth, and school year, 2015-2016. *Source: Department of Education and Idescat.*

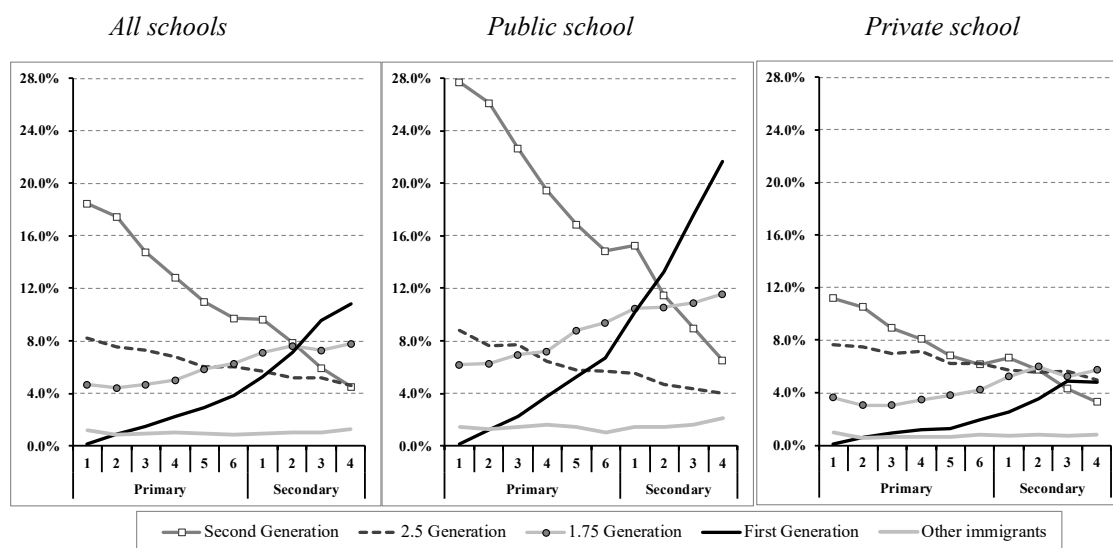*All schools*   *Public school*   *Private school*

Figure 2: Proportion of students according to immigration status in Barcelona by school year and type of school, 2015-2016. *Source:* Department of Education and Idescat.

By residence *School*
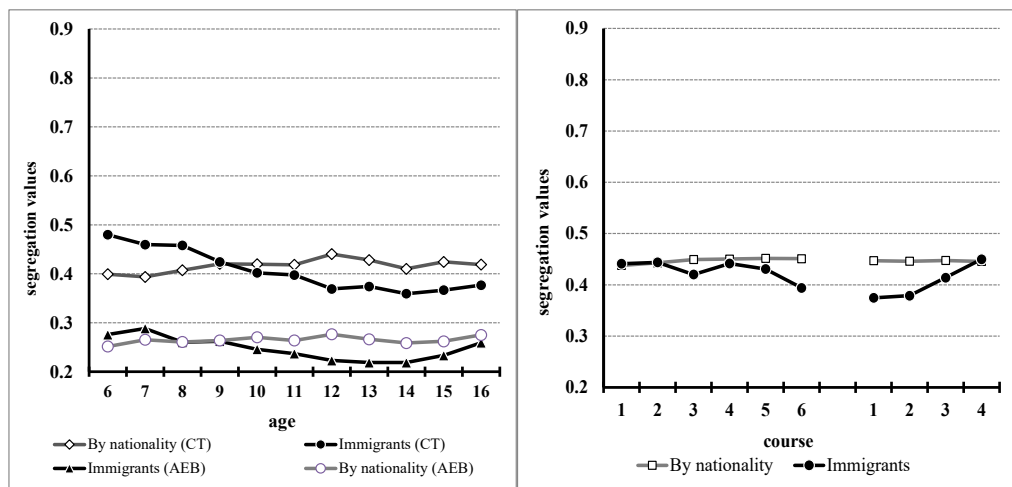
Figure 3: School segregation by nationality and origin, Barcelona, 2015-2016. Source: *Departament d'Ensenyament* and *Idescat*.

School Segregation
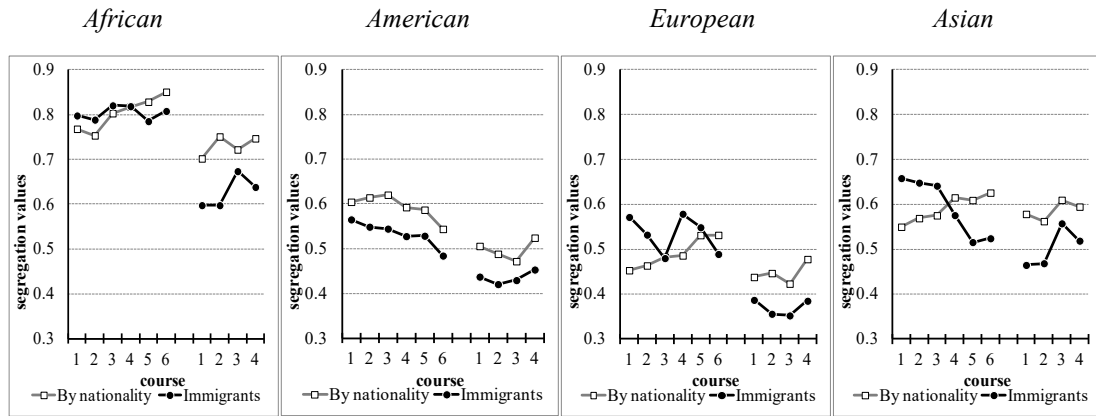
Residential Segregation (Basic Statistical Area)
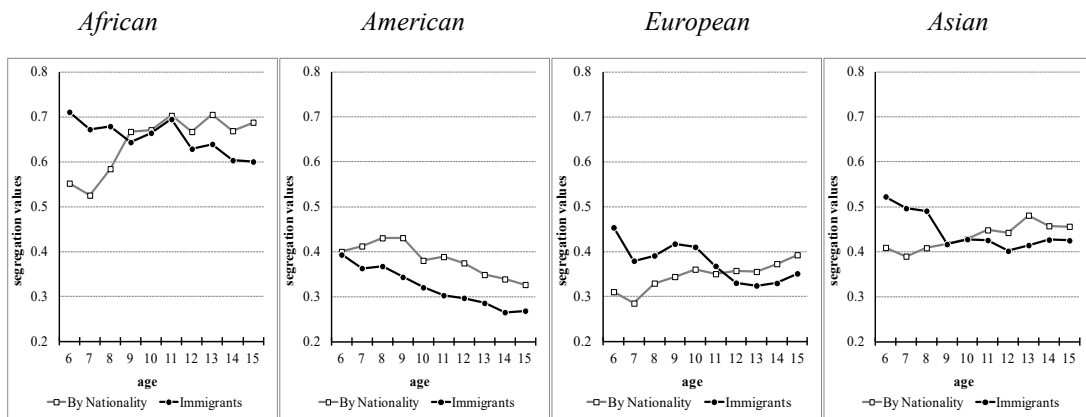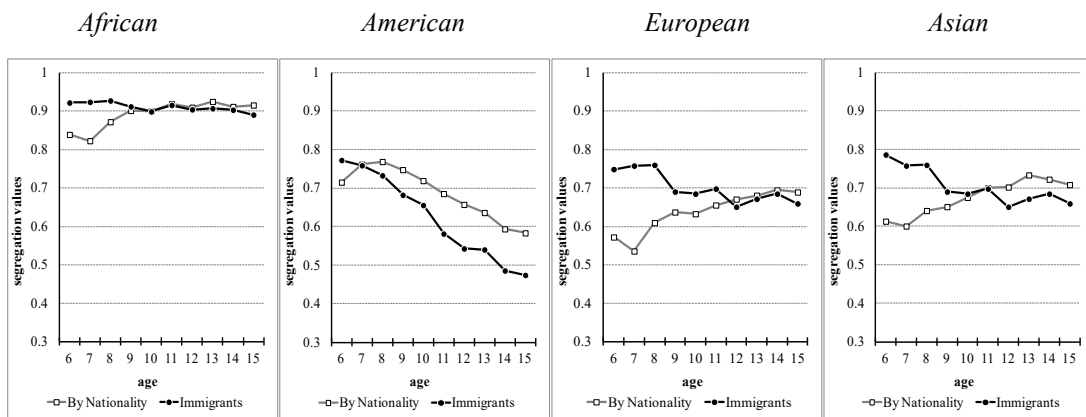

Residential Segregation (census tract)

Figure 4: School and residential segregation by continental origin and nationality. School year 2015-2016.

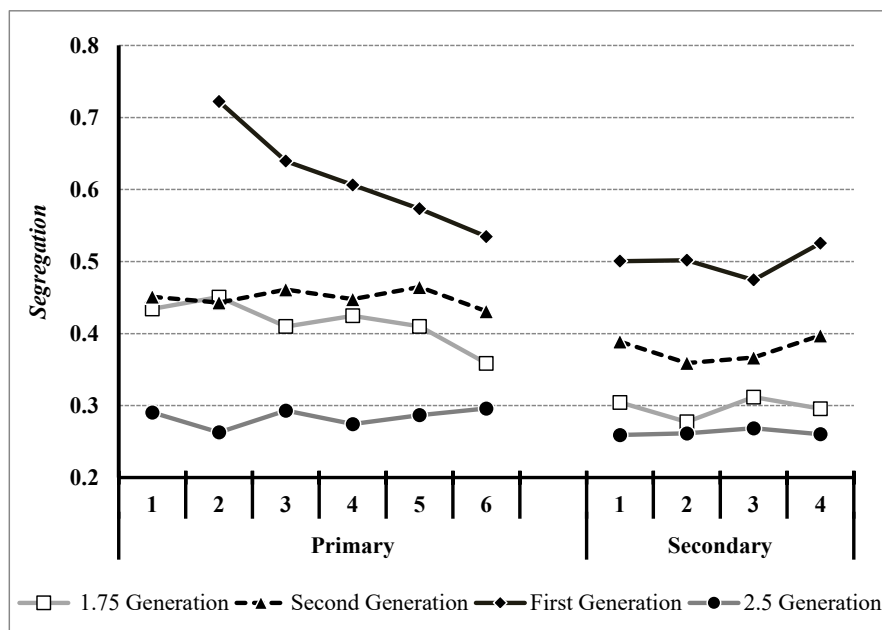*Source:* Department of Education and Idescat.

Figure 5. School segregation according to immigration status, school year 2015-2016. *Source:* Education Department and Idescat.
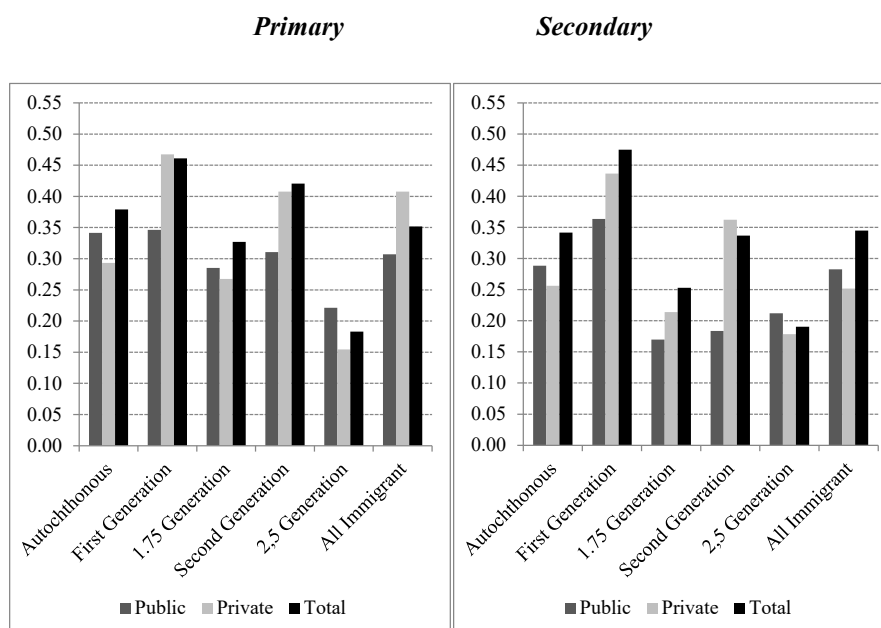

Figure 6. School segregation by migratory status, school stage and type of school, 2015-2016. *Source:* Education Department and Idescat.