Revista ELectrónica de Investigación y EValuación Educativa

RELIEVE

e-Journal of Educational Research, Assessment and Evaluation

ISSN: 1134-4032

Profiles of school segregation by socioeconomic status in Spain and its Autonomous Communities

Perfiles de segregación escolar por nivel socioeconómico en España y sus Comunidades Autónomas

Murillo, F. Javier & Martínez Garrido, Cynthia
Universidad Autónoma de Madrid

Abstract

The research that estimate the magnitude of school segregation by socioeconomic status that has been done until now shown an overly simplistic image of the phenomenon that is not capable of reflecting his highly complex reality. This paper presents an alternative approach of analysis and interpretation of school segregation. Specifically, the aim of this research is to determine the profile of school segregation by socioeconomic status of Spain and its Autonomous Communities, and to establish models of segregation of the Communities. A special exploitation of the PISA 2015 data is conducted. We use the socioeconomic and cultural status of the families (NSEC) as a main variable. The analysis of the data is carried out in two phases: on the one hand, it is estimated the Gorard index using 19 minority groups; on the other hand, it is identified the segregation models and their characteristics using the analysis by clusters and k-means. The results show the existence of 17 different profiles of school segregation by socioeconomic status, one for each of the Autonomous Communities studied, and identify five behavior models of school segregation in Spain. This research shows how little is the knowledge about school segregation in Spain, and presents a more accurate alternative to estimate the magnitude of school segregation by socioeconomic status considering it, not as a point, but as a profile

Keywords: Segregation; School; Socio-economic status; Model; Spain

Reception Date
2018 July 28

Approval Date
2019 February 03

Publication Date:
2019 February 05

Resumen

Las investigaciones que estiman la magnitud de la segregación escolar por nivel socioeconómico realizadas hasta el momento ofrecen una imagen excesivamente simplista que no es capaz de reflejar la realidad altamente compleja del fenómeno. Este trabajo presenta un enfoque alternativo de análisis e interpretación de la segregación escolar. Concretamente, busca determinar el perfil de segregación escolar por nivel socioeconómico de España y sus Comunidades Autónomas, y establecer modelos de segregación de las Comunidades. Para ello, se realiza una explotación especial de los datos de PISA 2015. Como variable criterio se utiliza el nivel socioeconómico y cultural de las familias (NSEC). El análisis de los datos se realiza en dos fases: de un lado, se estima el índice de Gorard utilizando 19 grupos minoritarios, de otro, se identifican modelos de segregación y sus características utilizando el análisis por conglomerados y de k-medias. Los resultados encontrados muestran la existencia de 17 perfiles diferentes de segregación escolar por nivel socioeconómico, uno para cada una de las Comunidades Autónomas estudiadas, e identifican cinco modelos de comportamiento de la segregación escolar por nivel socioeconómico en España. Esta investigación demuestra lo poco que se sabe sobre la segregación escolar en España y presenta una alternativa más precisa para estimar la magnitud de la segregación escolar por nivel socioeconómico considerándola, no como un punto, sino como un perfil

Palabras clave: Segregación; Escuela; Nivel socio-económico; Modelo; España

Fecha de recepción
2018 Julio 28

Fecha de aprobación
2019 Febrero 03

Fecha de publicación
2019 Febrero 05

Only if we have up-to-date, reliable and accurate data on the state of public education and the challenges it currently faces will we be able to make policy decisions that help to improve the educational system itself. And, the need for data and a more acute analysis of the latter is doubly urgent if talking about decisions that affect existing inequalities in

Corresponding author / Autor de contacto

Martínez-Garrido, Cynthia. Autonomous University of Madrid. Email: cynthia.martinez@uam.es

education and have a direct impact on the construction of a fairer and more inclusive society.

School segregation, a phenomenon by which students are distributed to one or another school based on their personal/social traits or condition, represents one of the major obstacles to providing equal educational opportunities to all and, consequently, keeps us from creating a society without exclusion. However, we still lack sufficient data on this segregation globally, in general, and in Spain, in particular.

In effect, research studies calculating the magnitude of this school segregation by socio-economic status in Spain provide an incomplete and overly simplistic view of this phenomenon. They all summaries the data regarding the scope of this segregation using one or two figures, when reality is much more complex.

Studies dedicated to calculating the extent of this segregation in Spain using statistically representative data have only appeared within the last decade. The studies by Ferrer, Ferrer and Castel (2006), Benito and González (2007) and Sánchez Hugalde (2007) are pioneers in this respect. The reason for this scant attention is perhaps due to the need for statistically representative samples, though there also seems to be lack of interest in this topic (Murillo, 2016). The creation and availability of large databases such as the one created by the Government of Catalonia (Benito & González, 2007; Sánchez Hugalde, 2007) and, especially, the different editions of the international PISA performance assessment program have helped to foment these recent studies.

As a result, the vast majority of studies on the degree of school segregation in Spain focus primarily on the secondary education level. There are studies on the situation in primary schools, in these cases, school segregation by students' national origin and not socio-economic status (for example, Sánchez Hugalde, 2007; Síndic, 2008).

Using the PISA database, the majority of studies estimate segregation for the country as a whole (Bonal, 2018; Ferrer, Ferrer & Castel, 2006, 2008; Ferrer et al., 2011; Mancebón-Torrubia & Pérez-Ximénez, 2009, 2010; Martínez y Ferrer, 2018; Murillo & Martínez-Garrido, 2018a, 2018b; Sicilia & Simancas, 2018). In some cases, they also analyze some or all of Spain's Autonomous Communities (Bonal, 2018; Ferrer et al., 2011; Mancebón-Torrubia & Pérez-Ximénez, 2014; Martínez & Ferrer, 2018; Murillo & Martínez-Garrido, 2018a). Benito and González (2007), however, use the Government of Catalonia's database to study segregation in different municipalities within the region. For their part, Mancebón-Torrubia and Pérez-Ximénez (2014) gather *ad hoc* data for the Autonomous Community of Aragon and, consequently, their results are limited to this region.

Table 1 provides details on the key studies that examine the scope of school segregation by socio-economic status in Spain. Amongst these studies' differentiating traits, the following are worth noting:

1. *School segregation dimensions*. Two segregation dimensions can be applied to school segregation (St. John, 1966): evenness (Jahn, Schmid & Schrag, 1947), by which school segregation is seen as the unequal distribution of students in schools, and exposure (Bell, 1954), which sees school segregation in terms of the probability that students will be in schools with others from their same groups. The ten studies analyzed examine school segregation using the evenness dimension, though two also address the exposure dimension (Murillo & Martínez-Garrido, 2018a, 2018b).
2. *Criterion variables*. The various studies use different criterion variables in order to assess the socio-economic status of families of the students. Studies using PISA data, the vast majority, apply the Economic, Social and Cultural Status (ESCS) index generated by PISA, a continuous variable (Bonal, 2018; Ferrer, Ferrer & Castel, 2006; Ferrer et al., 2011;

Mancebón-Torrubia & Pérez-Ximénez, 2010; Martínez & Ferrer, 2018; Murillo & Martínez-Garrido, 2018a, 2018b; Sicilia & Simancas, 2018). In addition, Mancebón-Torrubia and Pérez-Ximénez (2010) use the categorical variables, "type of parents' jobs" and "parents' educational levels". In a study by these same authors focused on segregation in the Autonomous Community of Aragon (Mancebón-Torrubia & Pérez-Ximénez, 2014), they also work with the categorical variable, "family income". Lastly, Benito and González (2007) use the categorical value, "parents' instructive capital" based on Government of Catalonia data.

3. *Segregation index*. There is a multitude of indexes to calculate segregation, so much so, in fact, that Gorard and Taylor (2002) talk about an "index war". This variability is clearly reflected in Spanish research. For example, Ferrer, Ferrer and Castel (2006), Ferrer et al. (2011), Murillo and Martínez-Garrido (2018b) and Mancebón-Torrubia and Pérez-Ximénez (2009, 2010, 2014) use the Dissimilitude Index (Duncan & Duncan, 1954). Contrarily, Murillo and Martínez-Garrido (2018a, 201b) and Benito and González (2007) apply the Gorard Index (2006), while Murillo and Martínez-Garrido (2018b) use the Square Root Index (Hutchens, 2004). Similarly, Mancebón-Torrubia and Pérez-Ximénez (2010, 2014) use the Coleman Segregation Index (Coleman, Hoffer & Kilgore, 1982), while Bonal (2018) and Sicilia and Simancas (2018) apply the Social Inclusion Index (OECD, 2010).

4. *Choice of minority group*. The Dissimilitude index, Gorard index, Square Root index, and Coleman index, all those used by Spanish research excepting the Social Inclusion Index, require defining majority and minority groups (Murillo, 2016). Research using categorical criterion variables has taken different paths. Benito and González (2007) study segregation for three minority groups: students whose parents don't have any education, parents with upper secondary education and those with university studies. For their part, Mancebón-Torrubia and Pérez-Ximénez (2009) use students whose mothers don't have any education or only have a primary school education and hold blue-collar jobs (workers carrying out manual tasks and those in industries such as construction, manufacturing, agriculture, maintenance, metal-mechanics, facilities and technical maintenance). In their 2014 study, these same authors use family income below 1,200 euros per month as a variable (Mancebón-Torrubia & Pérez-Ximénez, 2014). However, when the criterion variable is continuous, it has to be dichotomized, thus its difficulty.

The majority of Spanish studies estimating the scope of school segregation by socio-economic status use the socio-economic and cultural variable as the criterion variable. Since the latter is continuous, they have to determine different cut-off points to dichotomized the data and thus define the majority and minority groups. Most studies have opted for 25% of students from families with the lowest socio-economic and cultural status (quartile 1, Q1). This is the case with Ferrer, Ferrer and Castel (2006), Ferrer et al. (2011) and Martínez and Ferrer (2018). Murillo and Martínez-Garrido (2018b) add the 25% of students whose families have the highest socio-economic and cultural status (quartile 4, Q4). In another study published that same year (Murillo & Martínez-Garrido, 2018a), those same authors also consider the 10% of students whose families have the lowest socio-economic status (percentile 10, P10) and the 10% with the highest status (percentile 90, P90).

The decision regarding which minority group to choose does not seem to be based on any objective criteria. In addition, reviewing international research, we can observe other options. For example, Gasparini et al. (2011) and Jaume (2013) use percentile 20 as the cut-off point, while Benavides, León and Etesse (2014) and Massey, Rothwell and Domina (2009) use the first quartile. Contrarily,

Valenzuela, Bellei and De los Ríos (2008) use percentile 30, Arenas and Hindriks (2017) and Vázquez (2012) use the mean, Valenzuela, Bellei and De los Ríos (2008) use percentile 70 and Krüguer (2014) and Murillo and Martínez-Garrido (2017) use the fourth quartile.

The decision to use one minority group or another has significant implications. First, the cut-off point used will evidently produce different results regarding the magnitude of school segregation. As observed in the findings obtained by Murillo and Martínez-Garrido (2008a), the segregation value can vary from 0.20 to 0.45 based on the cut-off point used (value estimated through the Isolation Index for individuals in percentile 10 and the fourth quartile, respectively). Similarly, they only have information on some of the groups and ignore what happens with others.

For all of the above, we can argue that research analyzing school segregation by socio-economic status in Spain and, by extension, in the rest of the world, provides an overly simplistic and partial view of the phenomenon. This is because results produce a given number which, on its own, cannot reflect a highly complex reality. In truth, segregation is not a number; it is a profile.

Our study thus presents a precise method to estimate school segregation by socio-economic status, allowing us to overcome the deficiencies, partiality and simplicity of previous studies. Concretely, our research aims to determine school segregation by socio-economic status profile in compulsory secondary education in Spain and in its different Autonomous Communities. Based on the latter, we also aim to identify the different school segregation models that currently exist in the country.

(Continues on the following page)

Table 1. Characteristics of the 10 more important Spanish research that estimate the school segregation by socioeconomic and cultural status

STUDY	DIMENSION	CRITERION VARIABLE	EDUCATIVE LEVEL (DATABASE)	POPULATION	INDEX	MINORITY GROUP	RESULTS *
Ferrer, Ferrer & Castel (2006)	Evenness	Socioeconomic and cultural status	Secondary (PISA 2003)	Spain and Catalonia	D	Q1	D: 0.40
Benito & González (2007)	Evenness	Instructional capital of parents	Secondary (Data from the Government of Catalonia 2004)	Municipalities of Catalonia	G	Without degree	G: 0.45
						Postsecondary education	G: 0.34
						University education	G: 0.37
Mancebón-Torrubia & Pérez-Ximénez (2009, 2010)	Evenness	Educational level of parents Occupational status of parents Socioeconomic and cultural status	Secondary (PISA 2006)	Spain	D, C	Without degree or Primary education	D: 0.29 C: 0.06
						Blue collar **	D: 0.31 C: 0.11
						Q1	D: 0.39
Ferrer et al. (2011)	Evenness	Socioeconomic and cultural status	Secondary (PISA 2009)	Spain and Autonomous Communities	D	Q1	D: 0.38
Mancebón-Torrubia & Pérez-Ximénez (2014)	Evenness	Family income	Secondary (Own data 2005)	Aragon	D, C	Income lower than 1200 eur/month	D: 0.18 C: 0.05
Bonal (2018)	Evenness	Socioeconomic and cultural status	Secondary (PISA 2012)	Spain and Catalonia	IIS	Does not apply	IIS: 0.75
Martínez & Ferrer (2018)	Evenness	Socioeconomic and cultural status	Secondary (PISA 2006-2015)	Spain, C. Madrid, Catalonia, Basque Country and Andalusia	G	Q1	G: 0.27-0.31
Murillo & Martínez-Garrido (2018a)	Evenness	Socioeconomic and cultural status	Secondary (PISA 2015)	Spain and Autonomous Communities	G	P10, Q1, Q4, P90	P10-G: 0.41 Q1-G: 0.31 Q4-G: 0.30 P90-G: 0.46
	Exposure				A	P10, Q1, Q4, P90	P10-A: 0.20 Q1-A: 0.39 Q4-A: 0.45 P90-A: 0.24
Murillo & Martínez-Garrido (2018b) ***	Evenness	Socioeconomic and cultural status	Secondary (PISA 2000-2015)	Spain and Autonomous Communities	G, D, H	Q1	G: 0.31 D: 0.42 H: 0.17
						Q4	G: 0.35 D: 0.47 H: 0.20
	Exposure				A	Q1	A: 0.39
						Q4	A: 0.45
Sicilia & Simancas (2018)	Evenness	Socioeconomic and cultural status	Secondary (PISA 2015)	Spain and Autonomous Communities	IIS	Does not apply	IIS: 0.72

Note: G: Gorard index. D: Dissimilarity index. IIS: Social Inclusion index. H: Square Root index. C: Coleman index. A: Isolation index. (*) Estimation of school segregation by socioeconomic status of Spain, except in Benito and González (2007) which is the average value of the municipalities studied and Mancebón-Torrubia and Pérez-Ximénez (2014) which is Aragón. (**) Blue-collar worker is a working-class person who performs manual labor, it involves skilled or unskilled in the sectors of construction, industry, agriculture, maintenance of premises, the metal-mechanical area, facilities and technical maintenance. (***) Results only for 2015.

Methodology

To achieve these objectives, we analyze data on Spain included in the PISA 2015 database.

We use the families' economic, social and cultural status (ESCS) as the criterion variable. PISA generates the latter based on the information students and families provide through questionnaires. The ESCS index is obtained using the following variables:

a) The International Socio-Economic Index of Occupational Status (ISEI) and

b) The indexes created by PISA regarding the highest level of education achieved by students' parents converted into years of schooling, the family wealth index, the index on the level of educational resources available to students in the home and, lastly, the index on the level of cultural possessions in the family home.

The value of the ESCS variable is expressed as a continuous variable typified for each country, with a mean of 0 and a standard deviation of 1. The ESCS is calculated for each country with the mean of the indexes for the country's students, assuming that each student's weight is equivalent to the number of individuals within the population that they represent.

The total sample consists of 39,066 students in 1,177 schools. In the PISA 2015 database, in addition to the nation-wide sample for Spain (6,736 students in 201 schools), all the Autonomous Communities extended their regional samples to be able to gather data to compare them internationally. This resulted in a mean of 1,800 students in 54 schools in each Autonomous Community. The exception to this was the Basque Country which doubled this figure. Table 2 details the distribution of students and schools in the sample by each Autonomous Community.

Table 2. Sample of the study. Number of students and schools

	Students	Schools
Andalusia	1,813	54
Aragon	1,798	53
Asturias	1,790	54
Balearic Islands	1,797	54
Canary Islands	1,842	54
Cantabria	1,924	56
Castile and Leon	1,858	57
Cast.-La Mancha	1,889	55
Catalonia	1,769	52
Extremadura	1,809	53
Galicia	1,865	59
La Rioja	1,461	47
C. of Madrid	1,808	51
Reg. of Murcia	1,796	53
Navarre	1,874	52
Basque Country	3,612	119
Valencian C.	1,625	53
Total Spain	6,736	201

Source: Elaborated by the authors from PISA 2015

We applied a two-step process to analyze the data. First, we calculated the school segregation profile by socio-economic status in the Autonomous Communities. We used the Gorard Index to this end. The use of this index is recommended given its ability to remain invariable to changes in minority group composition compared to other indexes such as the Dissimilitude Index (Gorard, 2006).

In keeping with Gorard Index posits, the level of school segregation is defined as the proportion of minority group subjects that should change organizational units for there to be a homogenous distribution of the latter at the different levels. We obtain the estimates in our research using the final weights provided by the PISA study for each student. The use of weighted data compensates for possible bias resulting from the sampling or non-response by schools and students. In addition, its use leads to appropriate estimates of population values. Weighting implies recognizing that the importance of the units in our sample varies and that the most relevant have to contribute more than the others to calculate any population estimate. Thus, a unit with a low probability of selection is considered more important than a unit with a high probability of selection. The weights are inversely proportional to that probability of selection (OECD, 2016).

The formula to calculate the Gorard Index is as follows:

$$G = \frac{1}{2}\sum_{i=1}^{k}\left|\frac{x_{1i}}{X_1} - \frac{T_i}{T}\right|$$

In said formula, where x1i represents the number of students in the minority group in school i in each Autonomous Community, X1 is the total number of students in the minority group in all the schools in said Autonomous Community. T_i is the total number of students in school *i*, and T is the total number of students in each Autonomous Community.

This index determines cut-off points at 5% intervals. Consequently, we have 19 minority groups representing the socio-economic and cultural status of students' families (continuous variable). These groups range from the 5% of students from families with the lowest socio-economic and cultural status to the 5% of students from families with the highest status.

To achieve our second objective, namely, identify the different school segregation models applied in Spanish Autonomous Communities, we carry out two cluster analyses: a hierarchical cluster analysis to explore the existence of clusters or models based on the squared Euclidean distance as the measurement of association and K-means clustering to verify the traits identified.

Results

a) School segregation profile

Figure 1 depicts the school segregation profile by socio-economic status in Spain. The figure is the result of the estimated segregation for 19 minority groups: from 5% of students from families with the lowest socio-economic status to 50% of the students and, once again, to the 5% of students from families with the highest socio-economic status. The result is a line or "profile" which we present in a radial graph and which provides much more complex and useful information than an estimation of a single point, whether this be P10, P20 or Q1.

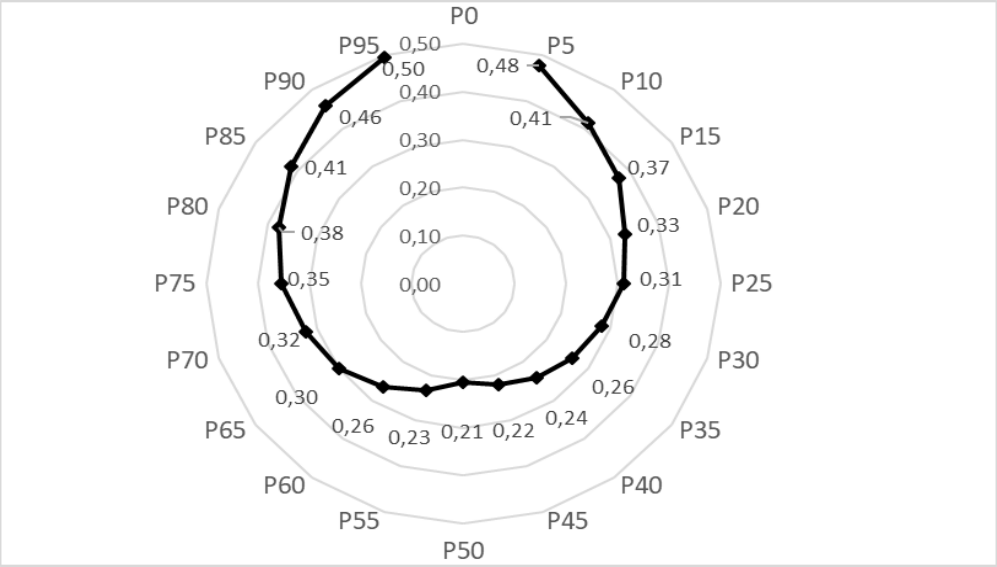

Figure 1. Profile of school segregation by socioeconomic and cultural status in Spain. G index for 19 minority groups
Source: Elaborated by the authors from PISA 2015

The analysis of Figure 1 allows us to extract several ideas. On the one hand, the profile's open egg shape, with a flattened point at P50 and elongated points at P5 and P95, is worth noting. This representation results from the different minority groups' sizes, that is, 5% of the subjects at the extreme ends and 50% in the lower part. On the other, also worth noting is that segregation on the left-hand side of the profile is greater than on the right. This means that, for the country as a whole, the segregation of students from families with a higher socio-economic status is more pronounced than the degree of segregation of students from lower socio-economic status. This view of segregation has gone unnoticed in practically all the studies carried out thus far. See Table A1 in the Annex for full data.

In effect, in addition to verifying that the point with the least segregation is P50 (a 0.21 score using the Gorard Index), we can also see that school segregation amongst students with the lowest socio-economic status is lower than amongst those with the highest socio-economic status. Thus, for 10%, 15% and 20% of the students from families with the lowest and highest socio-economic status, the differences are at their greatest, with up to 0.5 points between the cut-off points. However, for 5% of students, the differences diminish due to the spectacular increase in segregation at P5.

Another extremely interesting conclusion due to its comparative nature is the socio-economic segregation profile calculated for each of Spain's 17 Autonomous Communities (Figure 2, Table A1). However, the large number of Autonomous Communities and the similarity of their profiles make their representation less clear. Regardless, some noteworthy conclusions are as follow:

1. The Community of Madrid is the most striking case due to it having the highest segregation status of all the regions throughout the profile (until P80 where it is overtaken by the Canary Islands up to P95 where seven Autonomous Communities exceed it). Madrid's mean segregation according

to the Gorard Index is 0.37. Navarre has a similar profile though somewhat more moderate: high for all the groups but low for students from families with the highest socio-economic status.

2. Catalonia's profile is analogous. After Madrid, it is the Autonomous Community with the greatest segregation for nearly all the cut-off points. The difference is that this segregation moderates at both extremes, both for students from families with the highest socio-economic status and those from the lowest.

3. The opposite is true for the Balearic Islands. It is the Autonomous Community with the lowest degree of segregation at nearly every cut-off point. Its mean segregation level is 0.24, with little variance (0.07).

4. School segregation by socio-economic status in the Basque Country has a unique profile. It is very high for families with a low socio-economic status, but moderate for those with a high socio-economic status.

5. Asturias and the Canary Islands are also unique for their variability (var. = 0.10), their mean analogous segregation (0.31 and 0.30, respectively) and, especially, their behavior. Both have a mean segregation for students from families with the lowest socio-economic status, though this increases significantly for those with the highest socio-economic status.

6. Something similar occurs in Extremadura, Castile and Leon and Cantabria. All three of these Autonomous Communities are characterized by low level of segregation for students from families with the lowest socioeconomic status, though this increases greatly for families with the highest status. All three also have great variability.

7. The behavior detected in the Region of Murcia and the Valencian Community is completely inverse to the previous group: there is a high degree of segregation for the lowest percentiles, and this segregation decreases as the cut-off point for socio-economic status increases. Interestingly, both Autonomous Communities' behavior is unstable, though this is more pronounced in the Valencian Community.

8. La Rioja, Andalusia, Galicia and Castile-La Mancha, despite some differences, have analogous behaviors. All three are in an intermediate zone, without any major deviations for the different cut-off points. The degree of school segregation is lower in La Rioja, the mean in Andalusia and Galicia, and the highest in Castile-La Mancha

9. Last, La Rioja reflects the most unstable behavior of all the Autonomous Communities. Though its global position is intermediate, it goes from being the third most segregated Autonomous Community at P25 to the least segregated at P80 and P85.

Table 3 clearly reflects our initial research hypothesis: a single figure and a single minority group do not provide a very accurate image of school segregation, in this case, at the Autonomous Community level. Consequently, depending on the Autonomous Communities, results are completely different.

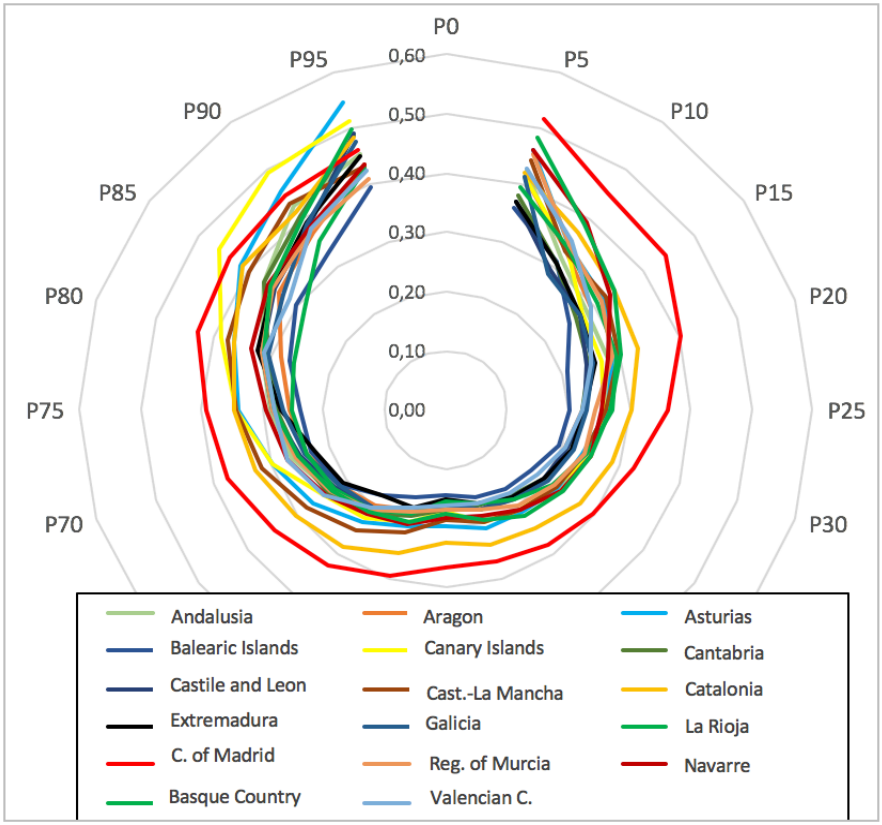

Figure 2. Profile of school segregation by socioeconomic and cultural status in the Autonomous Communities of Spain. G index for 19 minority groups

Source: Elaborated by the authors from PISA 2015

Table 3. Order of the Autonomous Communities of Spain according to their school segregation by socioeconomic status

	P5	P10	P15	P20	P25	P30	P35	P40	P45	P50	P55	P60	P65	P70	P75	P80	P85	P90	P95
Balearic Islands	BI	GA	BI	BI	BI	BI	BI	BI	BI	BI	BI	BI	EX	EX	BI	RI	RI	BI	BI
Extremadura	EX	CL	CA	CL	AR	AR	VC	VC	VC	EX	EX	EX	BI	BI	RI	BI	BI	RI	MU
Castile and Leon	CL	EX	CL	CA	CA	VC	CA	CA	RI	RI	VC	AR	GA	AR	AR	AR	VC	AR	VC
Cantabria	CA	CA	GA	VC	VC	CL	EX	CL	EX	GA	AR	CL	AR	RI	GA	CA	GA	MU	RI
La Rioja	RI	BI	EX	AR	EX	CA	CL	EX	CA	CL	CL	GA	CL	GA	EX	GA	AR	VC	CM
Aragon	AR	AN	CN	GA	CL	EX	AR	RI	CL	VC	MU	VC	RI	CL	CA	BC	CL	NA	NA
Galicia	GA	CM	AN	EX	GA	GA	GA	AR	AR	AR	GA	RI	BC	BC	VC	VC	MU	CL	AR
Canary Islands	CN	AR	AR	CN	MU	AS	RI	GA	MU	MU	RI	MU	MU	CA	BC	CL	EX	GA	EX
Catalonia	CT	CN	VC	AN	NA	CM	MU	MU	GA	CA	CA	AN	AN	MU	CL	AN	BC	EX	AN
Andalusia	AN	RI	RI	NA	CN	MU	CN	CN	NA	CN	CN	BC	CA	AN	MU	MU	NA	BC	MD
Valencian C.	VC	AS	MU	AS	AN	RI	CM	AN	AN	BC	BC	CA	NA	NA	AN	EX	AN	CA	GA
Cast.-La Mancha	CM	MU	AS	MU	CM	CN	AS	CM	BC	AN	AN	NA	VC	VC	NA	NA	CA	CT	CT
Reg. of Murcia	MU	VC	CM	RI	AS	NA	AN	NA	CM	NA	NA	CN	CN	CN	AS	AS	CM	AN	CA
Asturias	AS	CT	NA	CM	BC	BC	NA	AS	CN	CM	AS	AS	AS	AS	CM	CT	CT	CM	CL
Navarre	NA	BC	BC	BC	RI	AN	BC	BC	AS	AS	CM	CM	CM	CM	CN	CM	AS	MD	BC
Basque Country	BC	NA	CT	CT	CT	CT	CT	CT	CT	CT	CT	CT	CT	CT	CT	CN	MD	AS	CN
C. of Madrid	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	CN	CN	AS

Note: Each Autonomous Community has been identified through its initials and in one color.

Source: Elaborated by the authors from PISA 2015.

b) Segregation models

Though the value is in the details for decision-making, in our case, 17 different profiles, one per Autonomous Community, may lead to a lack of perspective. The cluster analyses we carry out allow us to identify profile models which simplify our interpretative efforts. To this end, we carried out a two-step analysis. First, we undertook an exploratory study by means of hierarchical clustering. This provided us with an overall view and helped us to determine the number of models to select. Second, we carried out a K-means clustering analysis to examine the traits of the different models identified. In both cases, our analyses began with the 19 minority groups found.

Figure 3 provides a representation of the hierarchical clustering analysis results. It illustrates the hierarchical structure of the Autonomous Communities in terms of their proximity, all based on their school segregation profile per socio-economic status. The first point we can observe is that the Community of Madrid behaves completely unlike the other Autonomous Communities. Clearly, this warrants additional reflection.

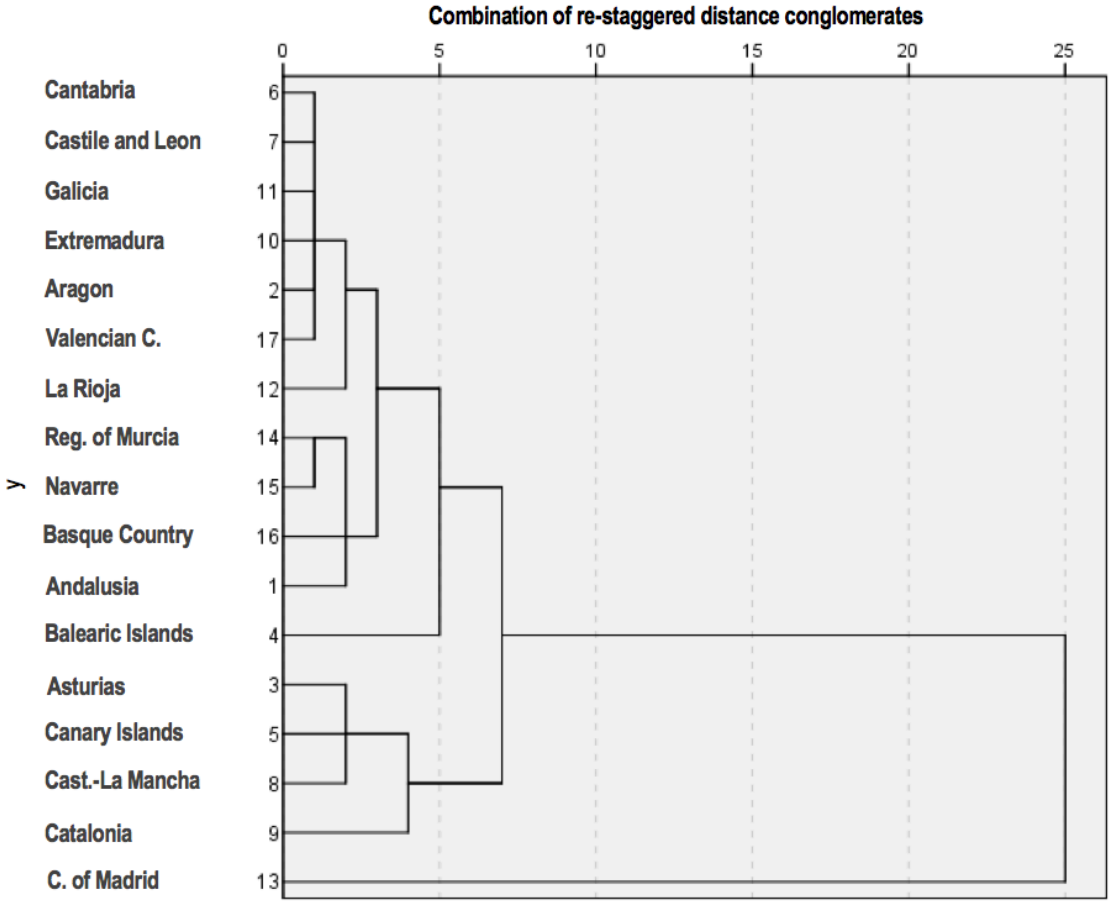

Figure 3. Dendrogram with the models of school segregation of socioeconomic and cultural status in the Autonomous Communities of Spain. Results of the hierarchical conglomerate analysis with the G index for 19 minority groups

Source: Elaborated by the authors from PISA 2015.

In addition, the dendogram illustrates the Balearic Island's differing behavior and the existence of three additional groups. The first comprises the Autonomous Communities of Cantabria, Castile and Leon, Galicia, Extremadura, Aragon, the Valencian Community and, a bit further away, La Rioja. The second includes the Region of Murcia, the Basque Country and Andalusia. The third cluster in the lower part of the chart encompasses Asturias, the Canary Islands, Castile-La Mancha and, somewhat further away, Catalonia.

The hierarchical and K-means clustering analyses provide information about these clusters and their traits (see Table A2) and allow us to represent the different profiles using a radial graph. This new image (Figure 4) simplifies our initial view of the Autonomous Communities and provides a more comprehensive perspective. This, in turn, makes interpreting the five models easier:

1. As seen, the Community of Madrid represents a single model on its own. It is characterized by having very high status of segregation at all the cut-off points examined. This high degree of school segregation varies slightly for the 5% of students from families with the highest socio-economic and cultural status.
2. The Balearic Islands represent the extreme opposite, defined by the low status of segregation for all of the minority groups.
3. The third and most numerous group comprises seven Autonomous Communities (Andalusia, Aragon, Cantabria, Castile and Leon, Extremadura, Galicia and the Valencian Community). This group is characterized by having low levels of school segregation, in general, but they are especially low for the groups of students with the lowest socio-economic status (P5 to P35). These levels then increase greatly from P90 to P95. In other words, these Autonomous Communities are characterized by relatively low levels of segregation for students from families with lower socio-economic status and high levels of segregation for those from families with greater socio-economic status.
4. The Region of Murcia, Navarre, the Basque Country and La Rioja represent a distinct group. The shape of their profile is more symmetrical than that of the other groups. It can thus be defined by having intermediate and analogous levels of segregation for students from both higher and lower socio-economic and cultural status.
5. Lastly, Asturias, Canary Islands, Castile-La Mancha and Catalonia. These Autonomous Communities have a high degree of separation on average, though school segregation is moderate for the lower socio-economic status and high for the higher socio-economic status.

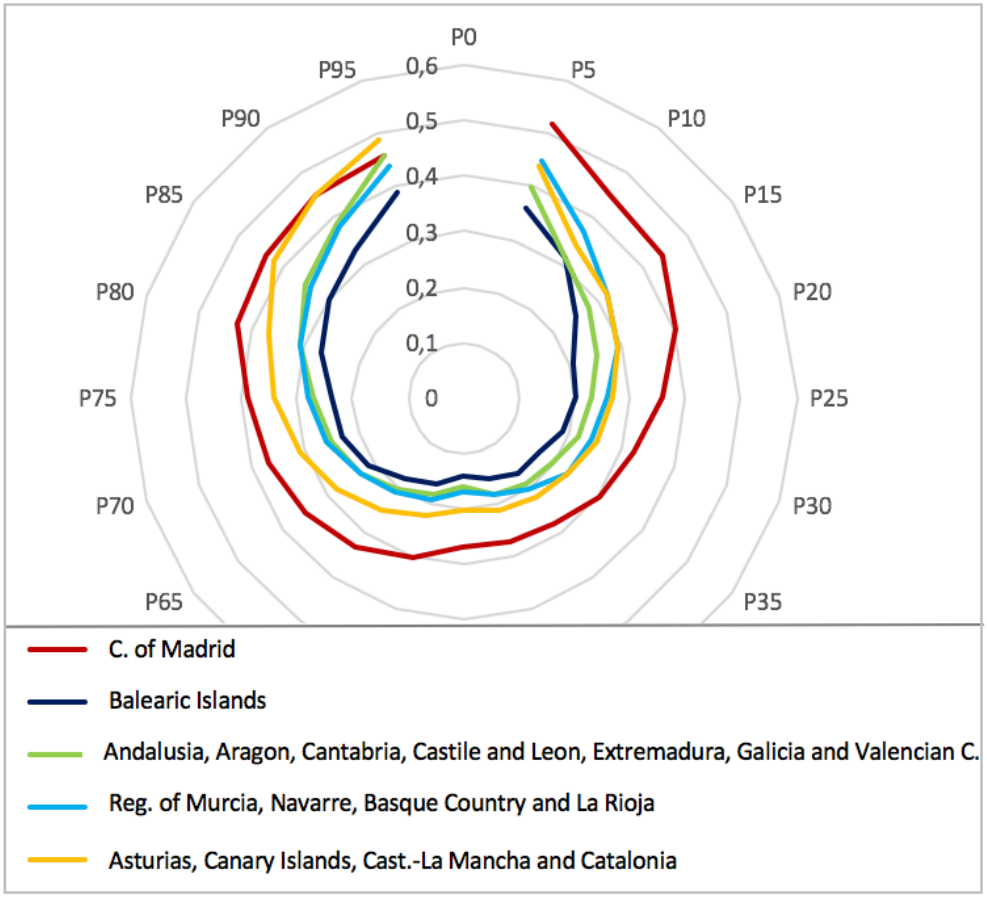

Figure 4. Models of school segregation of socioeconomic and cultural status in the Autonomous Communities of Spain

Source: Elaborated by the authors from PISA 2015.

Conclusions

The Spanish educational system suffers from severe social segregation in its schools. Other studies (for example, Murillo & Martínez-Garrido, 2018a) consider Spain one of the countries with the greatest school segregation by socio-economic status in Europe, with figures similar to those in Eastern Europe and quite distant from the situation in countries closer by, such as France, Portugal, Germany and Italy. In addition, the variability found amongst the 17 Autonomous Communities makes it difficult to see them as part of a whole.

Our study provides evidence that, first, calculating the scope of school segregation with just one measurement overly simplifies a highly complex reality. To provide just one example, Extremadura may be the Autonomous Community with the least school segregation by socio-economic status in Spain, while the Basque Country could be considered the second most segregated Autonomous Community or, also, the sixth least segregated. It all depends on the minority group examined. However, it is not a question of choosing the appropriate cut-off point. All of the minority groups provide equally relevant data for decision-making.

Second, in attempting to achieve the second objective of this study, we have successfully identified the school segregation profile by socio-economic status for secondary education in Spain

and in its Autonomous Communities. This broader image provides useful data for policy-making. For example, the segregation profiles in the Community of Madrid and Extremadura are completely opposite. The 5% of students from families with the lowest socio-economic status have the greatest and second lowest status of segregation, respectively, of all the Autonomous Communities. However, their levels of school segregation for the 5% of students from families with the highest socio-economic status are similar. This implies that a maximum priority for the Community of Madrid should be to reduce segregation levels for students from lower socio-economic status; for Extremadura, it should be on lessening the segregation for students from families with the highest socio-economic status.

The complexity of these 17 different profiles justifies the need to complete the second objective: identify profile models. Our study successfully does so, detecting five behavioral models in terms of school segregation. Its usefulness for decision-making is also clear. For example, those Autonomous Communities in which our results indicate that they segregate students from the lowest socio-economic status should enact policies to guarantee that there are no "ghetto schools". By contrast, for those Autonomous Communities that segregate students with greater resources, it is fundamental they guarantee full compliance with the Law and provide equal opportunities for all students.

Our results are completely in line with results found in other studies measuring the magnitude of school segregation in Spain. For example, our findings coincide with those reported by Murillo and Martínez-Garrido (2018a), given that the latter used the same index and the same database. The difference between the two studies, however, is that the latter's study only examines 4 minority groups compared to the 19 in our research. Other analogous studies are those undertaken by Ferrer, Ferrer and Castel (2006), Mancebón-Torrubia and Pérez-Ximénez (2010) and Ferrer et al. (2011). There are, however, two differences between these three studies mentioned and our research: first, they use the Dissimilitude Index which generates lower estimates (Murillo, 2016); and, second, they make use of data from previous PISA editions (2003, 2006 and 2009, respectively).

This article does not aim to find an explanation or determine the causes that lead to these disparate levels of school segregation. Looking at prior research, the literature explores, first, contextual factures such as residential segregation to explain school segregation (Denton, 2001; Frankenberg, 2013). Consequently, the concentration of families with certain socio-economic traits in specific neighborhoods would explain their concentration in schools. However, the significant differences found amongst the Autonomous Communities in our study underscores the importance of public policies in this area. Karsten (2010) mentions two key policy factors which lead to greater segregation: school choice policy and admissions criteria in private schools.

When analyzing the Community of Madrid, the Spanish region with the greatest school segregation, we find, on the one hand, that it has adopted school choice policies over the last few years aimed at creating a quasi-market for schools. These policies include a single school district, by which families can choose any school in the region, and the publication of school rankings to seemingly facilitate parents' choices. Similarly, the region's bilingual schools segregate those students with the most difficulties from others. On the other

hand, we have the Basque Country, the Autonomous Community with the highest percentage of students enrolled in public schools. The Basque Country is also one of the Autonomous Communities in which students from families from the lowest socio-economic status are segregated. Without doubt, more research is required to help us understand these phenomena.

As mentioned, we base our study on data from the PISA 2015 edition. This represents one of our study's strengths but also one of its weaknesses. The first strength worth noting is being able to count on a statistically representative sample of students from the 17 Autonomous Communities in Spain as well as a reliable measurement of families' socio-economic and cultural status. Up to now, the scientific community has never had such quality and reliable data to carry out studies of this type. That notwithstanding, there are some limitations, such as the reduced number of students per school. This fact limits the reliability for very small minority groups. However, these weaknesses are minor compared to the strengths and the solid empirical evidence they provide.

Our study also forges a new research path which needs to be extended and broadened. Given the different degrees of separation we detected amongst Autonomous Communities for each minority group, further research should explore the causes and consequences of this school segregation, especially for groups of students from families with higher socio-economic and cultural status, groups which have not been as studied as others. Another avenue for future research is analyzing the education policies that have led to this situation and those that can be reversed.

School segregation represents a serious obstacle to equal educational opportunities, decisively impeding the construction of a fairer and more inclusive society. Our research demonstrates how little is currently known about school segregation in Spain. The challenge now is to adopt the measures to drastically reduce this segregation. Society cannot afford to wait.

References

Arenas, A. & Hindriks, J. (2017). *Intergenerational mobility, school inequality and social segregation.* Louvain: Université Catholique de Louvain.

Bell, W. (1954). A probability model for the measurement of ecological segregation. *Social Forces, 32,* 357-364. https://doi.org/10.2307/2574118

Benavides, M., León, J., & Etesse, M. (2014). *Desigualdades educativas y segregación en el sistema educativo peruano. Una mirada comparativa de las pruebas PISA 2000 y 2009 [Educational inequalities and segregation in the Peruvian educational system. A comparative look at the PISA 2000 and 2009]*. Lima: GRADE.

Benito, R. & González, I. (2007). *Processos de segregació escolar a Catalunya [Processes of school segregation in Catalonia]*. Barcelona: Mediterrània.

Bonal, X. (2018). *La política educativa ante el reto de la segregación escolar en Cataluña [Educational policy in the face of the challenge of school segregation in Catalonia]*. Paris: UNESCO.

Coleman, J., Hoffer, T., & Kilgore, S. (1982). *High school achievement. Public, catholic and private schools compared*. New York, NY: Basic Books.

Denton, N. (2001). The persistence of segregation: Links between residential segregation and school segregation. En J. Powell, G. Kearney y V. Kay (Eds.), *In pursuit of a dream deferred: Linking housing and education policy* (pp. 89-119). New York, NY: Peter Lang.

Duncan, O. & Duncan, B. A. (1954). Methodological analysis of segregation indexes. *American Sociological Review*, *20*(2), 210-217. https://doi.org/10.2307/2088328

Ferrer, F., Castejón, A., Castel, J. L., & Zancajo, A. (2011). *PISA 2009: Evaluació de les desigualtats educatives a Catalunya [PISA 2009: Evaluation of educational inequalities in Catalonia]*. Barcelona: Fundació Jaume Bofill.

Ferrer, F., Ferrer, G., & Castel, J. L. (2006). *Les desigualtats educatives a Catalunya: PISA 2003 [Educational inequalities in Catalonia: PISA 2003]*. Barcelona: Fundació Jaume Bofill.

Ferrer, F., Ferrer, G., & Castel, J. L. (2008). *Les desigualtats educatives a Catalunya (I-II) [Educational inequalities in Catalonia (I-II)]*. Barcelona: Fundació Jaume Bofill.

Frankenberg, E. (2013). The role of residential segregation in contemporary school segregation. *Education and Urban Society*, *45*(5), 548-570. https://doi.org/10.1177/0013124513486288

Gasparini, L., Jaume, D., Serio, M., & Vázquez, E. (2011). La segregación entre escuelas públicas y privadas en Argentina. Reconstruyendo la evidencia [The segregation between public and private schools in Argentina. Rebuilding the evidence]. *Desarrollo Económico*, *51*(203), 189-219.

Gorard, S. (2006). *What does an index of school segregation measure? A commentary on Allen and Vignoles*. York: Department of Educational Studies.

Gorard, S. & Taylor, C. (2002). What is segregation? A comparison of measures in terms of 'strong' and 'weak' compositional invariance. *Sociology*, *36*(4), 875-895. https://doi.org/10.1177/0038038502036004005

Hutchens, R. (2004). One measure of segregation. *International Economic Review*, *45*(2), 555-578. https://doi.org/10.1111/j.1468-2354.2004.00136.x

Jahn, J., Schmid, C., & Schrag, C. (1947). The measurement of ecological segregation. *American Sociological Review*, *12*, 293-303. http://dx.doi.org/10.2307/2086519

Jaume, D. (2013). *Un estudio sobre el incremento de la segregación escolar en Argentina [A study on the increase of school segregation in Argentina]*. La Plata: CEDLAS.

Karsten, S. (2010). School segregation. In OECD. (Ed.), *Equal opportunities? The labor market integration of the children of immigrants* (pp. 193-210). Paris: OECD.

Krüguer, N. (2014). Más allá del acceso: Segregación social e inequidad en el sistema educativo [Beyond access: Social segregation and inequity in the education system]. *Cuadernos de Economía*, *33*(63), 513-542. https://doi.org/10.15446/cuad.econ.v33n63.45344

Mancebón-Torrubia, M. J. & Pérez-Ximénez, D. (2009). Segregación escolar en el sistema educativo español. Un análisis a partir de PISA 2006 [School segregation in the Spanish education system. An analysis

from PISA 2006]. In J. Cordero y R. Simancas (Eds.), *Investigaciones de economía de la educación* (pp. 63-75). Valencia: AEDE.

Mancebón-Torrubia, M. J. & Pérez-Ximénez, D. (2010). Una valoración del grado de segregación socioeconómica existente en el sistema educativo español. Un análisis por Comunidades Autónomas a partir de PISA 2006 [An assessment of the degree of socioeconomic segregation in the Spanish educational system. An analysis by Autonomous Communities based on PISA 2006]. *Regional and Sectoral Economic Studies, 10*(3), 129-148.

Mancebón-Torrubia, M. J. & Pérez-Ximénez, D. (2014). Equality of school choice: A study applied to the Spanish region of Aragón. *Education Economics, 22*(1), 90-111. https://doi.org/10.1080/09645292.2010.545197

Martínez, L. & Ferrer, A. (2018). *Mézclate conmigo. De la segregación socioeconómica a la educación inclusiva [Mix with me. From socioeconomic segregation to inclusive education]*. Madrid: Save the Children España.

Massey, D. S., Rothwell, J., & Domina, T. (2009). The changing bases of segregation in the United States. *The Annals of the American Academy of Political and Social Science, 626*(1), 74-90. https://doi.org/10.1177/0002716209343558

Murillo, F. J. (2016). Midiendo la segregación escolar en América Latina. Un análisis metodológico utilizando el TERCE [Measuring school segregation in Latin America. A methodological analysis using the TERCE]. *REICE. Revista Iberoamericana sobre Calidad, Eficacia y Cambio en Educación, 14*(4), 33-60. https://doi.org/10.15366/reice2016.14.4.002

Murillo, F. J. & Martínez-Garrido, C. (2017). Estimación de la magnitud de la segregación escolar en América Latina [Estimation of the magnitude of school segregation in Latin America]. *Magis, Revista Internacional de Investigación en Educación, 9*(19), 11-30. https://doi.org/10.11144/javeriana.m9-19.emse

Murillo, F. J. & Martínez-Garrido, C. (2018a). Magnitud de la segregación escolar por nivel socioeconómico en España y sus comunidades autónomas y comparación con los países de la Unión Europea [Magnitude of school segregation by socioeconomic status in Spain and its autonomous communities and comparison with the countries of the European Union]. *RASE: Revista de Sociología de la Educación, 11*(1), 37-58. https://doi.org/10.7203/RASE.11.1.10129

Murillo, F. J. & Martínez-Garrido, C. (2018b). Incidencia de la crisis económica en la segregación escolar en España [Impact of the economic crisis on school segregation in Spain]. *Revista de Educación, 381*, 67-93. https://doi.org/10.4438/1988-592X-RE-2017-381-381

OECD. (2010). *PISA 2009 results: Overcoming social background. Equity in learning opportunities and outcomes.* Paris: OECD.

OECD. (2016). *PISA 2015 Assessment and analytical framework.* Paris: OECD. https://doi.org/10.1787/9789264255425-en

Sánchez Hugalde, A. (2007). La segregació escolar dels immigrants a Catalunya [Immigrant school

segregation in Catalonia]. *Quaderns D'avaluació, 13*, 55-76.

Sicilia, G. & Simancas, R. (2018). *Equidad educativa en España: Comparación regional a partir de PISA 2015 [Educational equity in Spain: Regional comparison from PISA 2015]*. Madrid. Fundación Ramón Areces

Síndic. (2008). *La segregación escolar en Cataluña [The school segregation in Catalonia]*. Barcelona: Síndic.

St. John, N. H. (1966). The effect of segregation on the aspirations of negro youth. *Harvard Educational Review*, *36*(3), 284-294. https://doi.org/10.17763/haer.36.3.137368j68m5u9800

Valenzuela, J. P., Bellei, C., & De Los Ríos, D. (2008). *Evolución de la segregación socioeconómica de los estudiantes chilenos y su relación con el financiamiento compartido [Evolution of the socioeconomic segregation of Chilean students and their relation to shared financing]*. Santiago de Chile: FONIDE, Ministerio de Educación.

Vázquez, E. (2012). *Segregación escolar por nivel socioeconómico. Midiendo el fenómeno y explorando sus determinantes [School segregation by socio-economic status. Measuring the phenomenon and exploring its determinants]*. Buenos Aires: CEDLAS.

Acknowledgments

This paper has been developed within the framework of the R+D+i Excellence Project "Schools in socio-economically challenging contexts: An approach from education for social justice research" Ref: EDU2014-56118-P. Funded by the Ministry of Economy and Competitiveness-Government of Spain.

Annexes

Table A1. Magnitude of the school segregation by socioeconomic status in Spain according to different criteria of the minority group in percentiles of the socioeconomic and cultural status of the families of the students

	P5	P10	P15	P20	P25	P30	P35	P40	P45	P50	P55	P60	P65	P70	P75	P80	P85	P90	P95
Andalusia	0.4251	0.3192	0.2822	0.2767	0.2606	0.2493	0.2262	0.2074	0.1905	0.1785	0.2008	0.2132	0.2362	0.2634	0.2885	0.3174	0.3675	0.4240	0.4553
Aragon	0.4125	0.3341	0.2924	0.2498	0.2221	0.2052	0.2001	0.1864	0.1763	0.1639	0.1776	0.1981	0.2178	0.2396	0.2569	0.2852	0.3378	0.3702	0.4367
Asturias	0.4611	0.3417	0.3185	0.2844	0.2636	0.2358	0.2250	0.2134	0.2090	0.1949	0.2077	0.2341	0.2701	0.2964	0.3392	0.3650	0.4158	0.4574	0.5456
Balearic Islands	0.3596	0.3101	0.2490	0.2099	0.2019	0.1949	0.1731	0.1650	0.1547	0.1435	0.1567	0.1790	0.2138	0.2313	0.2397	0.2686	0.3012	0.3278	0.3944
Canary Islands	0.4153	0.3350	0.2767	0.2674	0.2570	0.2476	0.2208	0.2070	0.1984	0.1738	0.1983	0.2273	0.2478	0.2964	0.3447	0.3866	0.4593	0.4959	0.5112
Cantabria	0.3810	0.3074	0.2637	0.2455	0.2231	0.2155	0.1963	0.1802	0.1714	0.1690	0.1868	0.2159	0.2384	0.2544	0.2776	0.3045	0.3687	0.4063	0.4888
Castile and León	0.3709	0.2913	0.2701	0.2408	0.2274	0.2072	0.1976	0.1833	0.1761	0.1613	0.1811	0.2022	0.2239	0.2499	0.2831	0.3158	0.3466	0.3838	0.4893
Cast.-La Mancha	0.4442	0.3300	0.3246	0.2967	0.2624	0.2364	0.2233	0.2078	0.1983	0.1857	0.2160	0.2520	0.2816	0.3162	0.3443	0.3766	0.3964	0.4323	0.4323
Catalonia	0.4213	0.3693	0.3411	0.3314	0.3048	0.2870	0.2706	0.2493	0.2399	0.2263	0.2541	0.2882	0.3052	0.3259	0.3466	0.3658	0.4125	0.4144	0.4834
Extremadura	0.3700	0.3048	0.2726	0.2562	0.2254	0.2159	0.1971	0.1836	0.1672	0.1507	0.1725	0.1797	0.2086	0.2258	0.2689	0.3230	0.3517	0.3895	0.4489
Galicia	0.4150	0.2841	0.2703	0.2529	0.2294	0.2202	0.2047	0.1882	0.1777	0.1594	0.1816	0.2047	0.2163	0.2415	0.2647	0.3061	0.3283	0.3857	0.4776
La Rioja	0.3956	0.3394	0.3053	0.2942	0.2714	0.2423	0.2137	0.1860	0.1671	0.1534	0.1840	0.2088	0.2255	0.2409	0.2506	0.2609	0.2878	0.3506	0.4277
C. of Madrid	0.5180	0.4517	0.4427	0.4042	0.3632	0.3236	0.2967	0.2828	0.2691	0.2652	0.2953	0.3260	0.3470	0.3744	0.3925	0.4281	0.4353	0.4466	0.4615
Reg. of Murcia	0.4555	0.3443	0.3159	0.2866	0.2439	0.2372	0.2186	0.1995	0.1767	0.1689	0.1814	0.2095	0.2337	0.2593	0.2844	0.3178	0.3488	0.3727	0.4096
Navarre	0.4631	0.3919	0.3304	0.2799	0.2526	0.2478	0.2329	0.2091	0.1902	0.1829	0.2018	0.2193	0.2439	0.2720	0.2931	0.3339	0.3597	0.3801	0.4364
Basque Country	0.4847	0.3879	0.3402	0.2987	0.2678	0.2478	0.2348	0.2198	0.1969	0.1745	0.1986	0.2135	0.2310	0.2543	0.2794	0.3111	0.3556	0.3991	0.4979
Valencian C.	0.4278	0.3521	0.2927	0.2484	0.2234	0.2061	0.1858	0.1750	0.1670	0.1616	0.1755	0.2063	0.2461	0.2731	0.2793	0.3129	0.3175	0.3776	0.4235
Spain	*0.4781*	*0.4145*	*0.3730*	*0.3318*	*0.3114*	*0.2832*	*0.2622*	*0.2433*	*0.2202*	*0.2060*	*0.2347*	*0.2646*	*0.3005*	*0.3230*	*0.3543*	*0.3770*	*0.4140*	*0.4583*	*0.4962*

Fuente: Source: Elaborated by the authors from PISA 2015.

Table A2. Models of school segregation by socioeconomic and cultural status in the Autonomous Communities of Spain. Final conglomerate centers of K-media cluster analysis

	C. of Madrid	Balearic Islands	Andalusia, Aragon, Cantabria, Castile and Leon, Extremadura, Galicia y Valencian C.	Reg. of Murcia, Navarre, Basque Country and La Rioja	Asturias, Canary Islands, Cast.-La Mancha and Catalonia
P5	0.52	0.36	0.40	0.45	0.44
P10	0.45	0.31	0.31	0.37	0.34
P15	0.44	0.25	0.28	0.32	0.32
P20	0.40	0.21	0.25	0.29	0.29
P25	0.36	0.20	0.23	0.26	0.27
P30	0.32	0.19	0.22	0.24	0.25
P35	0.30	0.17	0.20	0.23	0.23
P40	0.28	0.17	0.19	0.20	0.22
P45	0.27	0.15	0.18	0.18	0.21
P50	0.27	0.14	0.16	0.17	0.20
P55	0.30	0.16	0.18	0.19	0.22
P60	0.33	0.18	0.20	0.21	0.25
P65	0.35	0.21	0.23	0.23	0.28
P70	0.37	0.23	0.25	0.26	0.31
P75	0.39	0.24	0.27	0.28	0.34
P80	0.43	0.27	0.31	0.31	0.37
P85	0.44	0.30	0.35	0.34	0.42
P90	0.45	0.33	0.39	0.38	0.45
P95	0.46	0.39	0.46	0.44	0.49

Source: Elaborated by the authors from PISA 2015.

Authors / Autores	To know more / Saber más
Martínez-Garrido, Cynthia (cynthia.martinez@uam.es). Assitant Professor of Educational Research Methods at the School of Education in Autonomous University of Madrid (UAM, in Spanish acronym). Editor of *REICE. Iberoamerican Journal of School Quality, Improvement and Effectiveness*. Her research lines are: School segregation, Teaching effectiveness, Educational leadership and Education for social justice. Teaching website: http://www.cmartinezgarrido.es. Postal address: School of Teacher Training and Education. Autonomous University of Madrid. Campus of Cantoblanco. Crta. of Colmenar Viejo Km. 15500. 28049-Madrid (Spain).	ORCID 0000-0001-7586-0628 Google académico ResearchGate Dialnet
Murillo, F. Javier (javier.murillo@uam.es). Associate Professor of Educational Research Methods at the School of Education in Autonomous University of Madrid (UAM). Chairholder of the UNESCO Chair on Education for Social Justice of the UAM and Coordinator of the Research Group *Educational Change for Social Justice* of the UAM. His research lines are: School segregation, Educational change and improvement, Educational assessment, Educational leadership and Education for social justice. Postal address: School of Teacher Training and Education. Autonomous University of Madrid. Campus of Cantoblanco. Crta. of Colmenar Viejo Km. 15500. 28049-Madrid (Spain).	ORCID 0000-0002-8003-4133 Google académico ResearchGate Dialnet

Revista **EL**ectrónica de **I**nvestigación y **EV**aluación **E**ducativa
E-Journal of Educational Research, Assessment and Evaluation
[ISSN: 1134-4032]