



Research article

Socio-spatial analysis of migrant school students according to Bourdieu's capitals in Santiago de Chile (2017–2020)

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ABSTRACT

Chile has experienced a substantial immigration boom in the last 10 years. The urban areas of this nation present high levels of residential segregation, represented in its main city, Santiago. This article presents results of an exploratory analysis of the relationship between residential segregation, immigration rate by educational institutions and changes in school performance. Based on the generation of clusters characterized by cultural, social, economic and symbolic capital, an analysis of the changes in school performance in those schools that received the greatest number of migrants is generated.

1. Introduction

Latin America and the Caribbean have been regions that, over the last decades, have stood out for their constant migratory mobility between countries of the same continent [1]. In the specific case of Chile, in recent years, the country has received thousands of foreigners annually, mainly from countries such as Peru, Colombia, Venezuela and Haiti [2]. This context gives rise to a series of challenges in relation to the inclusion of the migrant population in various sectors of society, with education being one of the fundamental elements for their adaptation. According to data provided by the National Institute of Statistics [2], the foreign population in Chile has experienced a significant increase between 2014 and 2021, reaching a total of 1,462,103 immigrant individuals by 2021, which represents 7.5 % of the country's total population.

These significant waves of migrant population arriving in the country coexist with a constant situation of adaptation in terms of residential areas, work environments and institutions in which to seek accommodation according to their skills and social connections. First, in relation to the territorial scope, it is observed that 61.9 % of the immigrants residing in Chile live in communes of the Metropolitan Region, highlighting its importance as a complex urban center. This space concentrates areas with a high labor supply, connectivity, public and private services, making Santiago one of the most important arrival points for immigrants in Chile.

According to Segura and Abde [3], the choice of territories of residence by the immigrant population is based on the presence of "centers of attraction for immigrants (...), sources of employment, areas with high connectivity to central areas (...), the existence of a

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housing market available for rent or purchase, given that they are among the worst positioned in the residential hierarchy (...), and possibly one of the most significant aspects when analyzing the location of the city's residential areas.), the existence of a housing market available for rent or purchase, given that they are among the worst positioned in the city's residential hierarchy (...), and possibly one of the most significant aspects when analyzing the location of immigrant groups in a territory is the existence of a network of compatriots who represent their primary social network" (p.23). This aligns with Sennett's perspective, who argues that immigrants are the individuals most apt to identify optimal urban spaces in the cities they arrive in, taking advantage of the opportunities they find to create maps of efficiency within the city [4].

In this context of a continuous influx of immigrants to the country and the region, there is a significant impact on institutions due to the demographic, cultural and demand changes generated by this situation. One of the main systems affected is the public school system. In recent years, the reality of Chilean schools and colleges allows us to understand the challenges associated with these changes. Thus, the school becomes a space of migratory access where foreign students seek opportunities, equality and respect [5,6].

According to official enrollment statistics provided by the Ministry of Education, in 2021, 5.3 % of school enrollments correspond to immigrant children, which represents a percentage increase of 157 % compared to enrollments between 2017 and 2021 [7]. This indicates that the increase in immigrant enrollment has reached about 200 thousand children in the educational system, who do not enter uniformly to all types of educational establishments, but rather form educational niches. According to the Casen 2020 survey [8], 57 % of immigrant enrollment is concentrated in the country's municipal schools, 38 % in private subsidized schools and only 5 % in private paid schools.

2. Educational segregation and concentration of immigrant enrollment in Chile: A spatial and socio-educational perspective

Broadening the understanding of the educational panorama in Chile, we observe the formation of a specific niche of migrant enrollment in the country's municipal and subsidized private schools, given that 95 % of migrant children enter the educational system through these types of establishments. Córdoba [9] emphasizes that the concentrations of migrants in Chilean schools not only respond to factors related to geographic location, but are also explained by an approach that considers various types of segregation and marginalization that migrants experience upon arrival in the country. The author argues that schools currently represent a new form of migrant segregation, where the manifestations of this segregation are mainly manifested in socioeconomic factors, followed by academic aspects. Valenzuela et al. [10] indicate that the expression of this educational segregation based on socioeconomic criteria significantly complicates the implementation of an inclusive educational model for migrant students.

Carrasco, referring to the context of the segregating logic of the Chilean educational system, states that this system "systematically excludes the most dispossessed classes of the country" (Hernández and Raczynski, 2015, cited by Carrasco & Maldonado, 2022), since the education they receive is limited by the educational center they attend (Bellei, 2013, cited in Carrasco, 2022). In the same line is the migrant population, which faces constant discrimination due to their condition, facing fewer study opportunities (p.59) [11]. Consequently, it can be stated that the Chilean educational system follows exclusionary guidelines based on a logic of reproduction of the country's structures and the prevailing market logic, where the right to education is ensured, but a model focused on educational integration or inclusion in the classroom is not prioritized [12].

Considering the case of the Metropolitan Region, where 57.8 % of the country's immigrant enrollment is concentrated, the territorial distributions of immigrant student enrollment are revealed through statistical studies of the Ministry of Education [13]. The data indicate that, although immigrant enrollment constitutes 8 % of the total school enrollment in the Metropolitan Region, there are communes where these immigrant groups are significantly concentrated. For example, Independencia is positioned as the commune with the highest foreign enrollment, reaching 17 % of the total enrollment in the region and representing 30 % of the total enrollment in that municipality. According to Fernández (2018) [14], Santiago is the second commune with the second highest number of immigrant students, comprising 13 % of the total number of students. These data reflect how the foreign population residing in the country generates specific institutional areas or spaces where they accumulate in regions, communes and, finally, in private schools.

After analyzing the concentration of immigrant enrollment in schools in the Metropolitan Region of the country, we can observe in Fig. 1 a marked distribution in certain territories. In this visual representation, the establishments are differentiated by color: yellow indicates those with a very low presence of immigrants, ranging between 0 % and 1 %. The orange establishments have enrollments ranging from 1.1 % to 5 % of immigrant children. On the other hand, institutions marked in terracotta represent a range of immigrant enrollment from 5.1 % to 10 %. Those marked in purple have between 10.1 % and 15 % of foreign enrollment, while those in blue highlight educational institutions with immigrant enrollments exceeding 15.1 %.

This concentration of immigrant enrollment in certain territories and educational establishments in the country has led to research that explores the effects of residential environments on the academic performance of students. Carranza et al. (2016) [15] position this discussion around communes, identifying them as geographical spaces where inequalities persist within them, specifically the creation of homogeneous socioeconomic groups within the same establishment, with detrimental effects on student performance. The authors conclude that "less favored areas are linked to lower academic results, even considering individual characteristics" (p.19) [15], which constitutes a key factor in the socioeconomic aspects affecting Chilean society, and are fundamental elements of the differentiated mechanisms of collective socialization in each municipality. Nevertheless, they suggest exploring further the elements of social cohesion not contemplated in the study, which could improve the understanding of performance and its effects on the neighborhood environment.

The segregation faced by immigrant students within the Chilean educational system is based on the unequal and homogeneous distribution of certain social groups within this system. González [16] identifies that the main factors generating these homogeneous

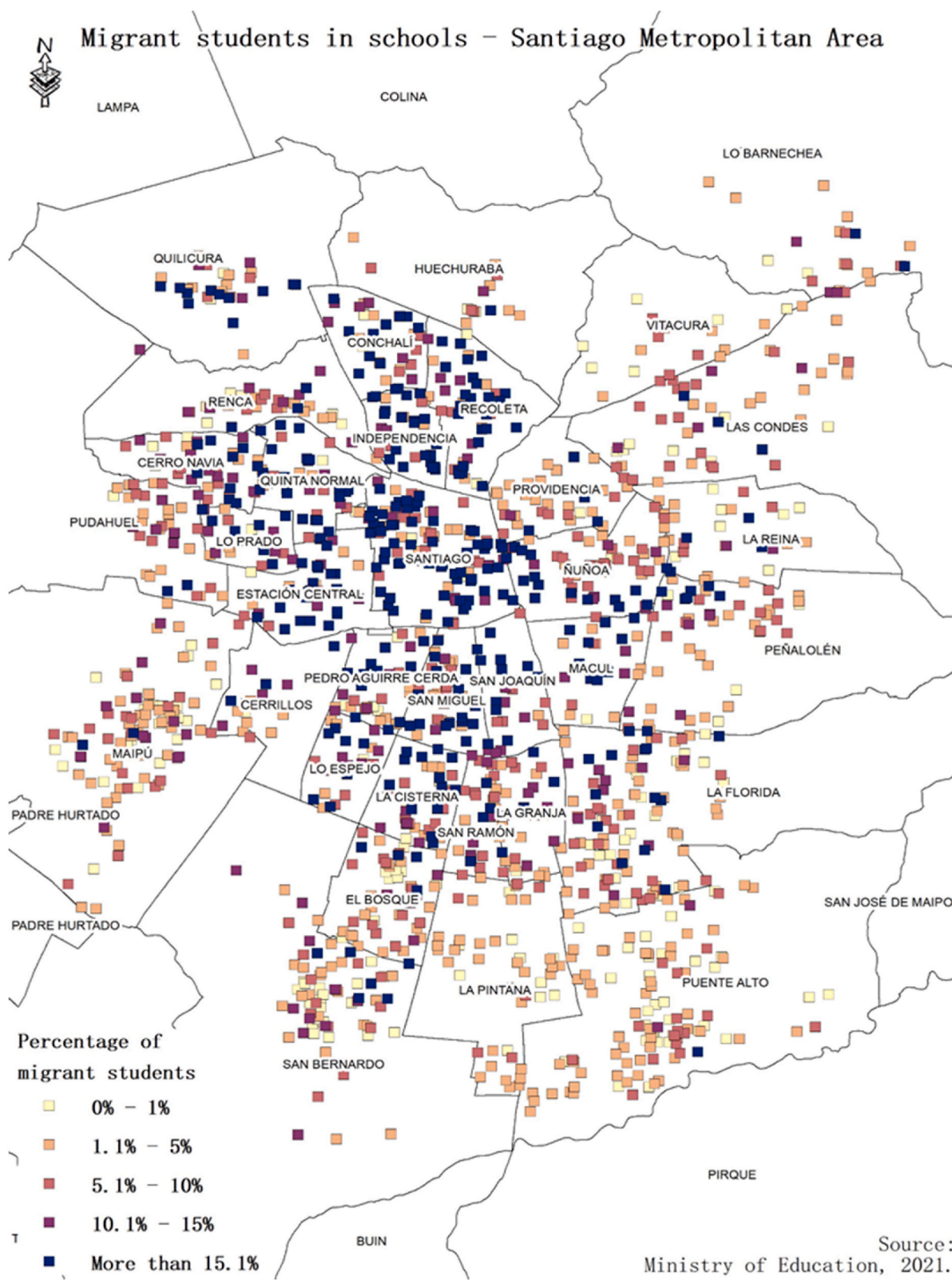


Fig. 1. Map of immigrant enrollment concentration in Chilean institutions 2021. Source: Authors.

groups within the educational system are gender, ethnicity and, above all, elements linked to socioeconomic factors, given that the system operates under market regulations. This author suggests that Chilean schools become homogeneous spaces where individuals with similar socioeconomic and cultural characteristics coexist, thus reproducing class structures and the particularities of Chilean society.

The discussion on educational segregation leads us to the spatial and territorial dimension as a fundamental component of analysis and understanding. In the context of the Chilean educational system, an unequal distribution of social groups in the territory is observed, especially within the Metropolitan Region, where certain communes face high levels of poverty, marginalization, stigmatization and general inequality [17]. Consequently, researchers urge us to reflect on the emerging educational dynamics of a broader social structure or system, which, through autopoietic processes, is replicated at all scales of the system.

The context raised together with the aforementioned literature review raises questions about how the configuration of the social space and neighborhood resources of the areas where the immigrant population resided in Santiago de Chile in 2017 affect academic performance in 2020. Our general objective is to analyze, from Bourdieu's capital framework, the academic performance of the educational establishments attended by the immigrant population in Santiago de Chile in 2017, and to characterize the neighborhood resources of the different establishments and their final impact on academic performance in 2020. This study presents the results of the following specific objectives:

To identify and characterize different clusters or social groups based on the economic, cultural, social and symbolic capitals present in the neighborhoods of the Metropolitan Region, focusing on their influence on educational establishments.

- To examine the variation and performance of the academic performance of educational establishments belonging to each cluster, compared to data from different years (2017 and 2020).
- To question and reflect on existing policies of inclusion and education of migrant students in relation to the results found.

Territorial inequality and educational segregation in Chile: A socio-educational and spatial approach.

The article reflects on concepts inherent to the critique of the existing segregating territorial model in Chile, relating it to one of the inequalities or segregations that emerge from this model, specifically educational segregation. The first relevant theoretical consideration in establishing the conceptual limits for discussing the number of immigrants in educational establishments and their performance is territorial segregation. This segregation is understood as a social process by which cities evolve towards the formation of urban spaces where individuals of the same class are grouped together. In this sense, the experiences of immigrant families in a country with high levels of socioeconomic segregation become problematic, contributing to systemic fragmentation and multidimensional inequalities for those who reside in certain territories.

According to Sabatini and Salcedo [18], this inequity is especially concentrated in the social peripheries, where certain social groups are segregated mainly by socioeconomic factors, increasing their vulnerability. Thus, we understand the formation of territorial segregation in the class paradigm, configuring urban spaces where immigrant groups are concentrated in the country.

These territorial differentiations based on socioeconomic grounds in urban areas have repercussions on residents' access to goods and services. Specifically, for the purposes of this research, they impact access to an educational system that follows the same logic of exclusion and socioeconomic segregation in the selection of institutions. Carranza et al. [15] reflect on this type of inequalities in terms of power of choice, known as neighborhood effects. According to the authors, it is hypothesized that living in marginal or disadvantaged territories affects children's educational attainment, also influencing the educational centers themselves since the composition of schools is directly influenced by neighborhoods. Thus, there is a significant relationship between neighborhood effects on residents and their impact on academic achievement, school dropout rates and social mobility, among other aspects, all influenced by the neighborhoods in which schools are located. The author points out that there are neighborhood inequalities that go beyond individual conditions themselves, as there are collective elements that affect the inhabitants of certain disadvantaged areas.

We will understand the composition of these spaces through the paradigm of social space [19], which invites us to reflect on space in a context that accumulates a series of dispositions, classes, choices and practices. For Bourdieu, space is translated as a space of positioning through the space of dispositions (or habitus) (p.31) [19]. In other words, we understand social space as the construction of the social field based on how agents or individuals distribute themselves in relation to their position (i.e., the valuation of individual capitals by third parties). Under this understanding of social space, the school is configured as a reflection of society [20], where coexistence is governed by the tendency to homogenize students [21].

In this sense, for the conceptualization of the social environment of the neighborhoods, we propose an understanding through capitals. We will refer to economic, cultural, social and symbolic capital. These capitals form two clear dimensions for understanding the social life of individuals.

First, we will consider the social dimensions of the material or objective aspects, which are characterized by an unequal distribution of capitals in societies through economic, social and cultural capital. Secondly, there is a completely subjective and symbolic construction of capitals, based on dispositions, appreciations, expectations and representations of individuals or groups, represented in the symbolic capital. Bourdieu [22] defines the four capitals in terms of the following elements:

1. Economic capital refers to the material resources and assets that individuals possess.
2. Cultural capital consists of three essential elements: the educational level of individuals (institutionalized cultural capital), the practical and cultural knowledge inherited through social dynamics (embodied cultural capital) and material cultural capitals, such as books and works of art.

3. Social capital refers to the network of relationships and social dynamics that individuals have and their position in the hierarchy of relationships within their contextual circumstances.
4. Symbolic capital refers to the recognition or valuation of economic and cultural capital by third parties, establishing relationships between individuals.

These theoretical elements are fundamental to understanding the social environment of immigrants arriving in the country. Negative elements will emerge for these marginalized groups who, according to the author, are at a disadvantage in the distribution of material capitals and do not favor social mobility based on practical experience. This social and territorial stigma that arises around certain social groups becomes a true class frontier, making cohesion and interaction between already materially unequally distributed groups even more difficult, which represents a demonstration of how certain territories become foci of negative symbolic capital.

Faced with situations of segregation and marginalization affecting certain social groups in urban environments, educational segregation arises, which can be defined as notorious inequalities in access to educational centers. In this context, we understand educational segregation as “an unequal and homogeneous distribution of certain social groups within the educational system, which can lead to unequal development among students” (p.53) [16]. This is the educational reality faced by immigrant students, who are already territorially segregated when they enter the Chilean educational system.

The precariousness and multidimensional inequality experienced by these marginalized groups reflect the problem of educational integration in terms of academic performance. This raises questions about the systemic structures of the Chilean educational system, which hinder the establishment of equitable dynamics for access to educational centers and the formation of homogeneous groups within this system. This difficulty is particularly noticeable in the creation of clusters in neighborhoods and educational establishments with significant concentrations of foreign enrollment, which is evidence of the lack of interculturality in the inclusion of the immigrant population in the Chilean educational system.

All of these elements will be considered for the characterization of the population selected for the study, with a focus on the formation of cultural patterns and common behaviors in the environments where the immigrant population in the country is studied. ons in the environments where the immigrant population studies in the country. Subsequently, we will proceed to the comparative analysis of performance between 2017 and 2020. Performance is measured as a standardized index from 1 to 7 (range of grades in the Chilean educational system, where 4 is the minimum passing grade). This metric will allow comparing the averages of the establishments between the aforementioned years in terms of variations in the selected variables representing the concepts. The choice of using school averages instead of individual cases is justified by the objective of examining the performance of groups formed by the relationship between similar students.

3. Methods

This study is quantitative, inductive and exploratory in approach, employing various spatial statistical techniques to estimate the spatial distribution of social, cultural, economic and symbolic capitals among schools in relation to their environments. The study area covers 34 communes of the Metropolitan Area of Santiago (AMS), the capital of Chile, where 6,071,531 inhabitants reside [23], and a total of 1517 primary level educational establishments are included, serving 597,108 students, who constitute the target population of this research (Fig. 1).

The units of analysis are elementary school, including public, subsidized and private schools. Census tracts (polygons defined by the National Institute of Statistics) are also considered, which are interpreted as the neighborhoods adjacent to educational establishments. These zones were used to estimate existing capital levels based on information from the 2017 census.

The methodology adopted focused on the analysis of four fundamental components. First, the migrant component was based on determining the total number of students of migrant origin and those with a temporary identifier for migrant students (IPE, for those without a national identity document), as well as their percentage representation in the total enrollment of the establishment.

The second component, derived from the first, evaluated the level of segregation of the immigrant population within the educational center. The location quotient [24] was used to estimate the representation (high or low) of a specific population group (in this case, students of immigrant origin) compared to the regional average of that same population.

The formula for determining this coefficient is as follows [24]:

$$QL = (x_i / t_i) / (X / T)$$

- t_i : total population of unit i
- T : total population of the region
- x_i : population of the group of interest in unit i
- X : total population of the group of interest

The third component focused on academic performance, evaluated through the average of grades of educational institutions for the years 2017 and 2020. The Ministry of Education [25] defines national grading standards, establishing that “the curriculum subjects that will be considered for the calculation of the annual average must have at least one grade in the year. This grade must be expressed on a numerical scale from 1.0 to 7.0, with one decimal (...) with a minimum passing grade of 4.0” (Article 8 and 10, Decree 67, p.4).

The fourth and last component addressed the social environment of the neighborhood and how different capitals are configured and accumulated in educational institutions according to Bourdieu [22]. Variables from the INE 2017 census were operationalized to

estimate economic, cultural, social and symbolic capital.

1. Economic capital was expressed through housing conditions, evaluated by the materiality index that considers housing quality as a function of the predominant materials in roofs, walls and floors (Table 1). This is because housing condition can be considered as a way of understanding or operationalizing Bourdieu’s economic capital due to its intrinsic connection with the socioeconomic position of individuals and families within a social structure. Bourdieu proposed that economic capital is not limited only to monetary wealth, but also encompasses other resources and assets that possess value in society. Housing and its condition are direct reflections of the economic position of an individual or social group [22]. In the context of an investigation, the condition of housing, especially in terms of habitability, living conditions, infrastructure, and level of maintenance, can provide key indicators about the economic position of the residents. Thus, the lower the percentage of housing in a state of salvageable condition, the higher the socioeconomic status.
2. Cultural capital was estimated based on the years of education of the population over 24 years of age.
3. Social capital was interpreted through the levels of residential segregation of the immigrant population using the location quotient. The use of residential segregation can reflect the quantity and quality of social connections between migrant groups in a given area.
4. Symbolic capital was deduced through the levels of socioeconomic segregation using Theil and Finniza’s Entropy index [26]. This index compares the diversity (heterogeneity) of a local area with respect to regional diversity, in this case comparing the diversity of the census tracts with respect to the study area, based on the total and proportion of households in the lower, lower middle, middle, upper middle and upper strata. From this, a value ranging between 0 and 1 is obtained, where a value of 1 indicates that there is no diversity in the local areas analyzed, while a value of 0 indicates that the local areas are as diverse as the region as a whole, therefore the closer the index is to 1, the greater the residential segregation in the local area analyzed. In addition, to facilitate its analysis and interpretation, in all those areas where low and lower middle strata households predominate, the Entropy index is multiplied by -1 , in order to better differentiate those areas segregated by low strata from those segregated by high strata. By manifesting the concentration of different economic strata in specific geographic areas, we will be able to reflect certain social and symbolic valuations associated with these strata [27].

To connect the neighborhood capitals with the schools attended by the students, an area of influence of 1800 m was defined for each school, based on the average distance students travel to their respective schools.

After linking each educational establishment spatially with nearby census tracts within 1800 m, the sum total or average of the different capitals analyzed for each establishment was obtained. This included variables such as the total number of dwellings in poor condition, the percentage of adults with higher education and the level of segregation in the surrounding neighborhood.

For the development of this research, an exploratory analysis of the four components mentioned above was carried out with a specific focus on the formation of groups using a cluster analysis methodology. This quantitative approach was used to group establishments with similar capital profiles. A statistical technique was developed to classify related observations within the data set of educational establishments in the Metropolitan Region, ensuring the homogeneity and quality of the data.

Subsequently, a clustering algorithm was applied to these data with the objective of identifying groups of establishments sharing similar characteristics. This process involved the exploration of several algorithms and the evaluation of the coherence of the resulting clusters. Each cluster represented a set of schools with comparable socioeconomic and educational profiles, considering variables such as the number of recoverable housing units, the percentage of migrant population, average years of schooling and the territorial segregation index.

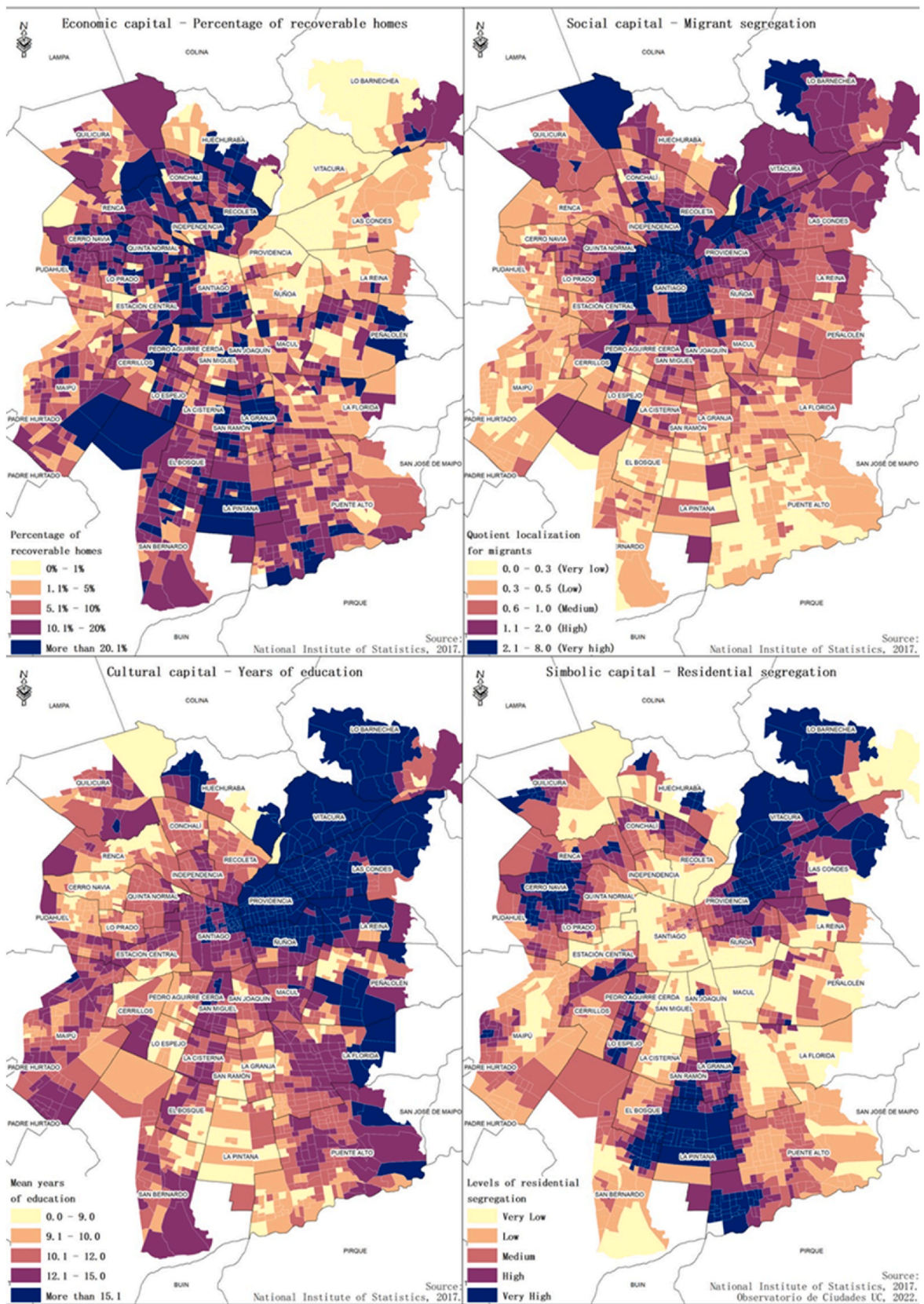
Detailed interpretation of the clusters allowed us to understand the unique characteristics of each group of establishments. A comparative analysis between the clusters was performed to understand the differences and similarities in terms of academic performance, spatial distribution and presence of migrant students. In addition, the validity of the results obtained was checked to ensure the consistency and relevance of the clustering performed [28].

The objective of the research is to examine how the neighborhood effect, discussed in the theoretical framework, manifests itself in schools with a higher concentration of migrant students, considering the administrative type and the dominant socioeconomic level. A possible finding could be that, at the same level of school vulnerability (SEP, NSE), schools with a higher concentration of migrants face greater performance difficulties compared to schools with a lower concentration, and that the accumulated capital in the neighborhood plays a significant role.

Table 1
Classification of predominant materiality in Housing components.

House component	Dominant material classification		
	Acceptable	Recoverable	Irrecoverable
Roof	Tiles or shakes, fiber cement.	Phonolite; straw, coiron, cattail or reed.	Precarious or waste materials; no roof cover.
Walls	Reinforced concrete: masonry, partition lined on both sides.	Partition without interior lining.	Precarious or waste materials.
Floor	Parquet, wood, floating floor or similar; ceramic, flexit; carpet or floor covering.	Cement tile, screed, cement facing.	Earth floor.

Source: Authors



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Fig. 2. Map of the Santiago Metropolitan Area according to the distribution of the 4 types of capital proposed by Bourdieu: Economic capital; Social capital; Cultural capital; Symbolic capital. Source: authors.

4. Results

The empirical work carried out during the research aims to introduce certain elements addressed in this article, which will shape the subsequent theoretical discussion of the results obtained. Below, we present the main conclusions of the statistical and demographic exploration carried out by the research team.

In relation to Fig. 2, first, the economic capital map shows the distribution of housing in recoverable condition in the Metropolitan Region. The range of colors on the map corresponds to the percentage of housing in this condition. The shades vary from yellow for areas with between 0 % and 1 % of recoverable housing, orange for territories with between 1.1 % and 5 %, terracotta for those with between 5.1 % and 10 %, purple for those with a range of 10.1 %–15 %, and finally, in blue, the sectors with between 15.1 % and 73 % of housing in recoverable condition, thus the areas with the lowest economic capital.

Continuing with the same figure, in second place, the map of institutionalized cultural capital is presented, composed of the average years of schooling in all census districts of the Metropolitan Region. This map identifies different levels of average schooling in the region. Yellow stands out for areas with an average schooling between 0 and 9 years, orange for territories with 9.1–10 years, terracotta for those ranging between 10.1 and 12 years, purple for places with schooling between 12.1 and 15 years, and blue for areas where the average schooling is between 15.1 and 17.3 years, these being those who accumulate greater cultural capital.

Based on the same, in third place, the map of social capital is presented, which is identified through the location coefficient of migrants in the Metropolitan Region. In this map, colors are used to represent different levels of migrant population in the region. Yellow is observed for areas with a location index between 0 and 0.25 of migrant population in relation to the regional average, orange for areas with 0.26–0.5 in relation to the regional average, terracotta for those between 0.51 and 1 in relation to the regional average, purple for places with 1.01–2 in relation to the regional average, and finally, blue for territories with a figure between 2.01 and 8 of migrant population in relation to the regional average, these being the areas with the greatest presence of students of migrant origin.

Finally, Fig. 2 shows the map of symbolic capital, which identifies the levels of residential segregation in the Metropolitan Region. Here, shades representative of different degrees of residential segregation are displayed. Yellow is used for areas with low segregation, orange for medium-low level situations, terracotta for medium levels, purple for medium-high levels and, finally, blue for territories with a high level of residential segregation.

In conjunction with the individual analysis of each variable, a consolidated analysis of the four aforementioned components was carried out, using a cluster methodology to form groups based on these factors. Table N°2 describes the comparative behavior of each of these clusters, including relevant elements such as percentages of foreign enrollment and grade point averages.

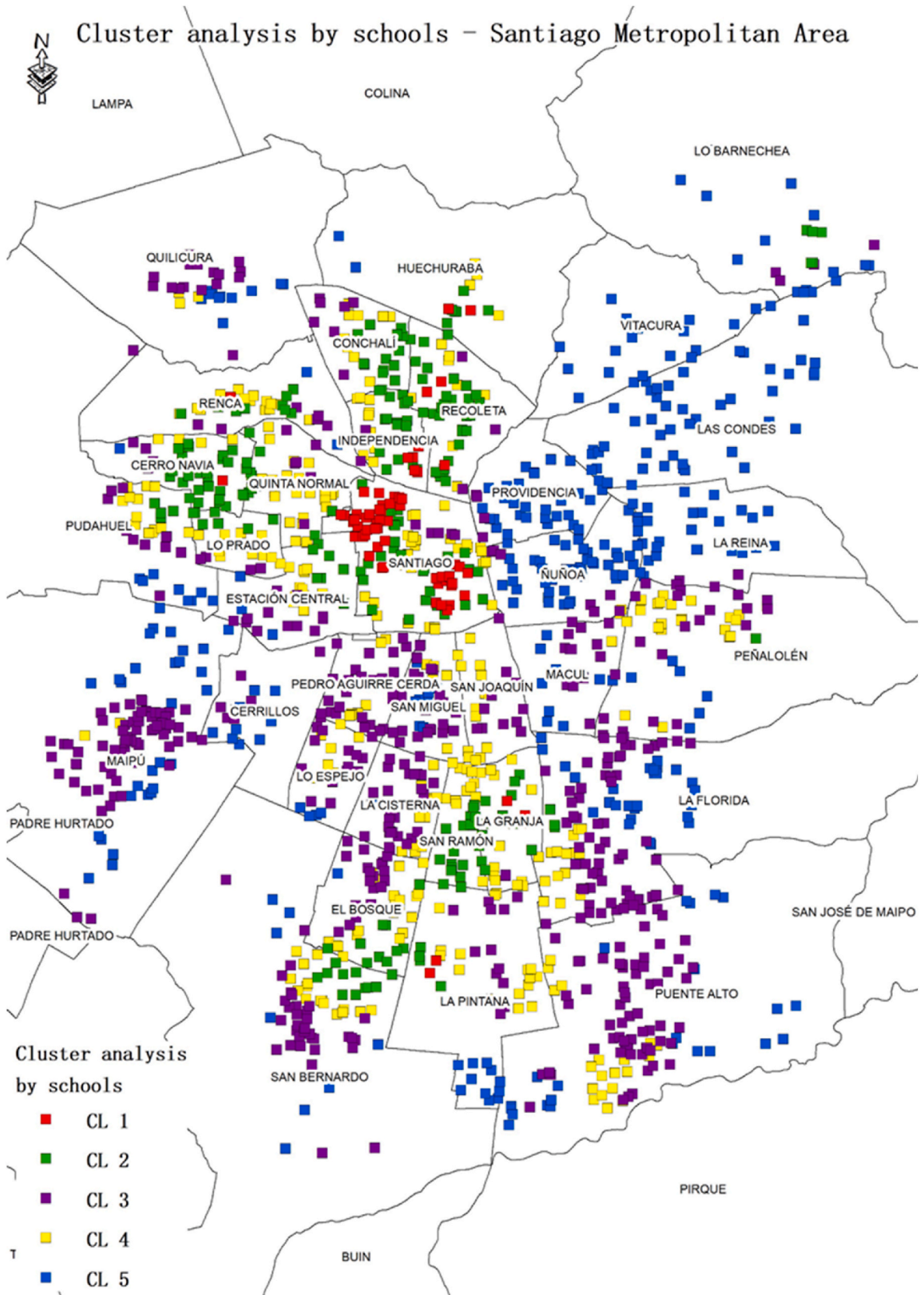
Group 1: Middle class with high immigrant schooling. This group stands out for having the largest number of recoverable housing units located in urban areas with low to positive spatial segregation. In addition, it has the highest concentration of migrant population in the region, represented by a migrant location coefficient of 3.29. Households in this cluster exhibit an average schooling of 12.5 years. Schools belonging to this cluster have the highest percentage of foreign enrollment and IPE enrollment. In 2017, this group recorded an average rating similar to clusters 2, 3, and 4; however, in 2020 it experienced the second highest average rating among all clusters, after cluster 5. This increase in ratings coincides with an increase in foreign enrollment, which rose from 13 % in 2017 to 21 % in 2020.

Group 2: Middle class with low schooling. Although this group has the second highest number of recoverable housing units, it differs from group 1 by having households located in urban areas with negative spatial segregation. It has the second highest migrant location coefficient, with 1.54 migrants more than the regional average in 2017. The distinguishing characteristic of this group is its lowest average years of schooling in households, registering an average of 10.8 years. It also shows the second highest percentage of foreign enrollment and IPE enrollment in 2017, after cluster 1. Between 2017 and 2020, this group experienced the lowest positive percentage change in qualifications, at 2.55 %. In both years, it was the second group with the second highest percentage of foreign enrollment, increasing from 7.92 % to 15.57 %, and IPE enrollment, increasing from 3.35 % to 6.5 %.

Group 3: Mixed middle class. This group shows the second lowest number of recoverable housing units and, unlike other groups, does not present spatial segregation indexes. Its particularity lies in having the lowest concentration of immigrants according to its location index, with a QL of 0.62 in 2017, representing only 4.81 % of the immigrant population. Households in this group have an average schooling of 11.4 years, placing it as the group with the third highest years of schooling. It also exhibits the second lowest percentage of IPE students after group 5, and the lowest percentage of foreign enrollment in 2017, at 1.45 % of its total enrollment. Between 2017 and 2020, this group experienced the largest percentage change in enrollment and percentage of IPE students, with an increase of around 170 % in both cases.

Group 4: Low income. This group stands out for having a high number of recoverable housing units, with urban segregation indexes that range from moderately low to negative. In educational terms, it is the group with the second lowest average years of schooling, with an average of 10.9 years. It also shows the third highest percentage of foreign enrollment and IPE students after groups 1 and 2. Between 2017 and 2020, this group presented the lowest percentage change in grades.

Group 5: High and upper-middle income. This group is characterized by having the lowest number of recoverable housing units among the 5 groups. In educational terms, it is the group with the highest average years of schooling, with an average of 13.57 years. It also shows the lowest percentage of IPE students and the second lowest percentage of foreign enrollment. Between 2017



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← **Fig. 3.** Distribution map of the 5 clusters in the Metropolitan Region. Source: Authors.

and 2020, this group experienced the best improvement in grades, in addition to significant increases in the percentage change in its percentage of IPE students and foreign enrollment. However, it continues to be the group with the lowest number of immigrants compared to the other groups.

Based on the objectives established at the beginning of the article, our interest is not only limited to describing the social characteristics of each cluster, but also to identifying the geospatial location of each one of them. Specifically, we are interested in spatially locating the educational establishments associated with cluster 1, characterized by its belonging to the middle class with a high proportion of migrant schooling.

The location map in Fig. 3, shows the locations of the 5 different types of schools. In red are the establishments of Cluster No. 1, which are identified as Middle Groups with high migrant enrollment, which can be seen as being mostly located in the central zone of the region. In green is Cluster No. 2, where the establishments of Middle Groups with Low Education are located, which are grouped in the western part of the city. In purple are the establishments of Cluster No. 3, characterized by Mixed Middle Groups, which are located in the southern zone of the city, an area where the communes with the least economic capital in the city are located. In fourth place, the yellow establishments belong to Cluster No. 4, identified as Low Income Groups, located mainly in the south and west zone of Santiago. Lastly, in blue is Cluster No. 5, formed by establishments of Medium-High and High Income Groups, which are located in the areas with the highest economic capital in the city.

5. Debate

The results presented allow us to examine the behavior of the selected social field (the educational system) from Bourdieu's perspective. Based on this methodological approach, a description of the territory and the location of each of the clusters developed based on the four capitals: economic, cultural, social and symbolic. Additionally, a comparative analysis was performed between the same establishments in 2017 and 2020 to identify the behavior of academic performance through the interaction and dynamics of the capitals in the social fabric. The subsequent section will delve into the theoretical and reflective analysis of these results, with the objective of identifying how the selected variables influence the sample.

5.1. Territorial segregation and neighborhood effects: The importance of place

As shown in the results, there is an accumulation of similar subjects according to their capital and social characteristics in the educational establishments of the Metropolitan Region. Of particular interest in this article is the behavior of Cluster N° 1, characterized by a group of educational establishments with a high proportion of migrant students. As shown in Table 3, the schools in Cluster No. 1 tend to be grouped in the central area of the map. This migration pattern aligns with Contreras and Palma [29], who state that "Within the lower income group (...) an increasing number of Latin American migrants access central spaces to establish their links with work, families and social networks (Granados, 2010; Contreras, 2011, 2012), and also because labor opportunities tend to concentrate in the central areas of productive cities" (p.48). The author's statement is clearly reflected in Table 3, where almost all the establishments of Cluster No. 1 are located in the central area. This reaffirms what was pointed out by Fernández [14]: the preference of the migrant population to settle in large cities, mainly in the Metropolitan Region, and more specifically, in establishments dependent on the municipalities.

Table 3 shows that Cluster No. 1 has 26 % of immigrant population in its residential environment. This finding confirms previous observations about the inclination of the immigrant population towards the selection of settlement areas upon arrival in Chile. According to Contreras and Palma [29], although central urban areas offer multiple opportunities for their residents, these same areas tend to be inhabited by the migrant population, generating a centralization of both the national and migrant populations. This circumstance leads migrant communities to settle in old housing, often marked by overcrowding and extremely precarious conditions. Consistent with the results of the research, Cluster No. 1 presents the highest proportion of recoverable housing in the economic capital variable, indicating the condition of the housing. These residences are located in urban areas with low but positive spatial segregation, i.e., central and well-equipped territories.

Likewise, as reflected in Tables 3 and 2, there is a significant concentration of immigrant individuals in specific areas of the Region. In this sense, Contreras and Palma (2015) [29] argue that for the immigrant population, the search for spaces not only implies access to services and labor opportunities, but also to crucial elements for the creation of social networks. According to the authors, migrants seek areas that have historically been inhabited by previous waves of immigrants in the country, establishing a support network during their transition to central areas. This concept is reflected in the variable in Table 2, social capital. In our study, we define social capital by means of a location quotient that compares the immigrant population in each census tract with the regional average immigrant population. The results show that Cluster No. 1 has a social capital index of 3.29, indicating that neighborhoods in this cluster are home to 3.29 times more immigrants than the metropolitan area average. This situation suggests that immigrant clusters sacrifice their social capital, understood as their social relations with various individuals in their environment, to establish a support network among immigrants, thus facilitating their adaptation and development within these spaces.

On the other hand, in addition to the advantages associated with certain neighborhoods in terms of social dynamics that explain the formation of the aforementioned capitals, there are benefits linked to educational performance related to the valuation of individuals

Table 2

Summary table for each cluster.

CLUSTER	Economic capital (recoverable housing materiality)	Cultural capital (average schooling of heads of household)	Social capital (migrant location index)	Symbolic capital (theil index of residential segregation)	Average grade 2017	Average score 2020	% migrant in education with transitory documentation 2017	% migrant in education with transitory documentation 2020	% migrant in education 2017	% migrant in education 2020	% migrant in their neighborhoods
1	5586	12,59	3,29	,35	5,68	5,90	4,29	7,25	12,85	21,27	26,05
2	4215	10,85	1,54	-,32	5,62	5,76	3,36	6,50	7,92	15,57	12,15
3	1931	11,42	0,62	-,04	5,64	5,85	1,45	3,92	3,28	8,92	4,81
4	3043	10,93	1,01	-,31	5,60	5,70	2,63	5,97	5,61	13,38	7,95
5	658	13,57	0,96	,46	5,83	6,10	,98	2,21	3,49	6,92	7,26

Source: Authors.

Table 3
Summary table of migrant population percentage.

CLUSTERS	Migrant Population Percentage
1	26.05
2	12.15
3	4.81
4	7.95
5	7.26

Source: Authors.

and territories on the map. For example, the data presented in [Table 2](#) on symbolic capital indicate that territories with negative symbolic capital correspond to those with worse academic performance (Clusters 2 and 3). In contrast, territories with a positive valuation of symbolic capital belong to groups that exhibit higher academic performance (Clusters 1 and 5). Moreover, as [Table 4](#) shows, clusters with negative valuations are those that experience the lowest positive variation in average grades between 2017 and 2020 (Clusters 2 and 3), while clusters with positive symbolic capital show the opposite pattern.

The empirical results obtained regarding the effects of neighborhood environments on students' academic performance coincide with the reflections presented throughout this study on the impact of neighborhoods. According to Carranza et al. [15], "group effects related to neighborhood and school environments exert a substantial influence on academic performance. This is because the positive or negative behaviors of some children can spread to others, which modifies results, attitudes, aspirations, expectations and values in favor or against education" (p.7). In this sense, the authors refer to how neighborhood environments exert a direct influence on the socialization processes and academic development of children, based on social networks and how negative models can influence a lower valuation of education and low academic performance. Likewise, marginalized territories face greater difficulties in accessing quality educational resources, which hinders the provision of optimal education and student achievement.

Consequently, the institutionalized cultural capital of the neighborhoods where the educational establishments are located emerges as a crucial element of the analysis. Through the exploration carried out, it is possible to identify, in the first place, how Cluster No. 1, defined as the middle group with high schooling of migrants, is positioned as the second group with the second highest average years of schooling, following Cluster No. 5, identified as the Upper-Middle and High Income Group. According to Espejal et al. [30], "The educational level of parents is considered a central component of students' cultural capital, as it influences their skills, values and knowledge linked to formal education and educational practices" (p.5). Consistent with these findings, as highlighted throughout this section, it is precisely the establishments in these two groups that present a better performance compared to other clusters in 2017, and they are also the groups in which the scores evidenced a more positive variation towards 2020. This emphasizes the importance of neighborhood educational models and institutionalized cultural capital, represented by years of schooling, in the academic results of the establishments. According to Chaparro et al. [31], the intellectual environment is an essential factor in understanding children's learning. In environments with higher educational levels, activities and discussions focused on elements of cultural capital are promoted, thus stimulating children in their schoolwork and enhancing their academic skills.

The findings challenge the widespread perception about the effects of the integration of foreign students in Chilean schools. Contrary to the negative perception reported by Salas et al. [32], where 37 % of Chilean students indicate that the presence of migrant peers adversely impacts academic performance, the results presented in this study challenge such stigma.

6. Conclusion

In conclusion, from the data and analysis presented above, we can obtain an initial understanding of the logic of access to the educational system, which is characterized by segregation based on capital or neighborhood-specific characteristics. As highlighted in the theoretical framework, educational segregation refers to the homogeneous distribution of individuals in educational institutions without incorporating the social diversity in those environments. We highlight how the conformation of similar schools according to specific social characteristics can hinder the improvement of academic performance, especially in establishments with marked neighborhood traits, such as years of schooling and levels of residential segregation.

In line with this line of thought, it is evident how the formation of certain neighborhood habitus (shaped by capitals) affects the academic performance of students in the region's educational establishments. The habitus, in terms of Bourdieu [33], represents a system of dispositions that constitute the structure of behavior and thought of individuals based on their experiences and social

Table 4
Percentage change in academic qualifications from 2017 to 2020.

CLUSTERS	Percentage.Variation.in.Grades.2017–2020
1	3.98
2	2.55
3	3.77
4	1.94
5	4.67

Source: Authors.

context. The interaction and relationship between capitals are fundamental for understanding both educational segregation in access and the performance of educational institutions.

Furthermore, in coherence with the general approach sustained throughout the study, it is evident how the behavior of capital and the sacrifices made by the immigrant population in certain social contexts contribute to the good academic performance of Cluster No. 1. Despite opting for low-quality housing, recognized as vulnerable in the literature, immigrants sacrifice housing quality for social networks with other immigrants, job opportunities and access to services. Thus, spatial location in the city becomes of paramount importance for understanding educational aspects, such as the academic performance of schools in these neighborhoods.

The results and their analysis question the current policies of school integration and inclusion of immigrants. Educational institutions need to modernize in terms of instruments and mechanisms to include immigrant students and value cultural diversity. As Carrasco & Paz_Maldonado [11] point out, based on existing literature and new findings, it is essential to "facilitate admission processes [...] (Joiko, 2019), establish support programs (Webb & Alvarez, 2028), and make constant efforts to foster true educational inclusion (Pavez-Soto, 2017)" (p.71).

By way of conclusion, the present research has evidenced certain strengths and limitations inherent to its exploratory nature and to the analysis of the effects of neighborhood on academic performance. First, the main strength lies in the ability of this study to provide an overview of the interaction between residential proximity and school performance in a specific context. Despite not being able to reach definitive conclusions about the direct influence of neighborhood on academic performance, this analysis has allowed us to strengthen and reaffirm previous theories, consolidating the notion that neighborhood could play a determining role in certain observed findings.

However, it is essential to recognize the limitations inherent in the exploratory approach of this research. Given its nature, this study provides hints rather than definitive conclusions. The need for a deeper and more detailed analysis that can more precisely address the effects of neighborhood on academic performance is noted. This study highlights the existence of a gap in the local scientific literature, highlighting the scarcity of research in Chile that adopts a more specific scale of study than census blocks. This limitation prevents a more complete understanding of the interaction between neighborhood and academic performance, urging future research to consider a more detailed and comprehensive approach in this area.

Data availability statement

The authors do not have permission to share data.

Additional information

No additional information is available for this paper.

CRediT authorship contribution statement

Carlos Aguirre-Núñez: Writing – review & editing, Writing – original draft, Validation, Supervision, Project administration, Formal analysis. **Felipe Ulloa-Leon:** Writing – original draft, Validation, Resources, Project administration, Funding acquisition, Formal analysis, Data curation. **Juan Correa-Parra:** Visualization, Validation, Software, Resources, Methodology, Formal analysis. **Francisco Vergara-Perucich:** Writing – Original draft, Validation, Supervision, Project administration, Formal analysis.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

- [1] J. Gómez, *La migración internacional: teorías y enfoques, una mirada actual*, *Semestre Económico* 13 (26) (2010) 81–99.
- [2] INE, *Estimación de población extranjera en Chile*, Instituto nacional de estadísticas (INE), 2021.
- [3] Segura Margarit, y Karina Bijit Abde Daisy, *Barrios y Población Inmigrantes: El Caso de La Comuna de Santiago*, *Rev. INVI* 29 (2014) 19–77, <https://doi.org/10.4067/S0718-83582014000200002>, n.o 81 (1 de agosto de).
- [4] Richard Sennett, *Construir y habitar: Ética para la ciudad*, isbn: 978-84-339-6433-5, Anagrama, colección Argumentos 2019 (2019) 430.
- [5] D. Castillo, E. Santa-Cruz, A. y Vega, *Estudiantes migrantes en escuelas públicas chilenas*, *Calidad en la Educación* (49) (2018) 18–49, <https://doi.org/10.31619/caedu.n49.575>.
- [6] F. Jiménez, M. Aguilera, R. Valdés, M. y Hernández, *Migración y escuela: análisis documental en torno a la incorporación de inmigrantes al sistema educativo chileno*, *Psicoperspectivas* 16 (1) (2017) 105–116, <https://doi.org/10.5027/psicoperspectivas-vol16-issue1-fulltext-940>.
- [7] *Ministerio de Educación, Gobierno de Chile: División de Educación General Unidad de Atención a la Diversidad*, in: *Escolaridad y flujos migratorios: una oportunidad para la educación inclusiva para personal y funcionarios/as del Ministerio de Educación*, Santiago de Chile, 2022.
- [8] *Ministerio de Desarrollo Social y Familia, Casen 2020 en pandemia*, in: *Encuesta de Caracterización Socioeconómica Nacional*, 2020. Recuperado de, <http://observatorio.ministeriodesarrollosocial.gob.cl/encuesta-casen>.
- [9] Claudia Córdoba, Carolina Altamirano, y Karina Rojas, *Elementos Para Comprender La Concentración de Estudiantes Extranjeros En Escuelas Chilenas*, *Rev. Latinoam. Educ. Inclusiva* 14 (1) (2020) 87–108, <https://doi.org/10.4067/S0718-73782020000100087>, junio de.
- [10] J. Valenzuela, C. y Bellei, D. de los Ríos, *Socioeconomic school segregation in a market-oriented educational system. The case of Chile*, *J. Educ. Pol.* 29 (2) (2013) 217–241, <https://doi.org/10.1080/02680939.2013.806995>.

- [11] S. Carrasco Mella, E. Paz-Maldonado, Estudiantes migrantes en escuelas chilenas, UCMAule (63) (2022) 56–80, <https://doi.org/10.29035/ucmaule.63.56>.
- [12] R. y Bustos, J. Gairín, Adaptación académica de estudiantes migrantes en contexto de frontera, *Calidad en la Educación* (46) (2017) 193–220.
- [13] 2022) Datos Abiertos del Centro de Estudios Ministerio de Educación (MINEDUC) (<https://datosabiertos.mineduc.cl/>) la base de datos “Matrícula Oficial 2022”.
- [14] M. Fernández, «Mapa del estudiantado extranjero en el sistema escolar chileno», Centro de Estudios MINEDUC, 2018.
- [15] R. Carranza, D. Contreras, y D. Otero, Los ‘efectos del barrio’ en el rendimiento educacional de los niños en Chile: los efectos de la organización local, polarización y desigualdad, *Centro de Estudios de Conflicto y Cohesión Social (COES)* (2016).
- [16] R. González, «Segregación educativa en el sistema chileno desde una perspectiva comparada», Centro de Estudios MINEDUC, 2017.
- [17] Francisco Sabatini, Gonzalo Cáceres, Jorge Cerda, Segregación residencial en las principales ciudades chilenas: Tendencias de las tres últimas décadas y posibles cursos de acción, *Eure* 27 (82) (2001) 21–42, <https://doi.org/10.4067/S0250-71612001008200002>.
- [18] Francisco Sabatini, y Rodrigo Salcedo, «Gated communities and the poor in Santiago: functional and symbolic integration in a contexto of aggressive capitalist colonization of lower-class áreas, *Housing policy debate* (2007).
- [19] Pierre Bourdieu, *Capital cultural, escuela. y espacio social por Picrre Bourdieu. Compilación y Traducción de Isabel Jiménez, Rev. y Corr. MEXICO: Siglo XXI* (2011).
- [20] R. y Cornejo, A. Rosales, Objective structures and symbolic violence in the immigrant family and school relationships: study of two cases in Chile, *Soc. Sci.* 4 (4) (2015) 1243–1268, <https://doi.org/10.3390/socsci4041243>.
- [21] L. Beniscelli, A. Riedemann, F. y Stang, Multicultural y, sin embargo, asimilacionista. Paradojas provocadas por el currículo oculto en una escuela con alto porcentaje de alumnos migrantes, *Calidad en la Educación* (50) (2019) 393–423, <https://doi.org/10.31619/caledu.n50.522>.
- [22] Pierre Bourdieu, *The forms of capital. En Handbook of Theory for the Sociology of Education*, Greenwood, 1986, pp. 15–29.
- [23] INE, Segunda Entrega de Resultados Definitivos CENSO 2017, 2017. http://www.censo2017.cl/wp-content/uploads/2018/05/presentacion_de_la_segunda_entrega_de_resultados_censo2017.pdf.
- [24] Isard, *Methods of Regional Analysis: an Introduction to Regional Science*, The MIT Press, Cambridge, 1960.
- [25] Unidad de Currículum y Evaluación Ministerio de Educación, *Criterios de evaluación, calificación y promoción de estudiantes de 1° básico a 4° año medio*, in: Ministerio de educación, 2020. Santiago.
- [26] H. Theil, A.J. Finizza, A note on the measurement of racial integration of schools by means of informational concepts, *J. Math. Sociol.* 1 (2) (1971) 187–193, <https://doi.org/10.1080/0022250x.1971.9989795>.
- [27] P. Sharkey, *Stuck in Place: Urban Neighborhoods and the End of Progress toward Racial Equality*, University of Chicago Press, Chicago, IL, 2013.
- [28] B.S. Everitt, S. Landau, M. Leese, D. Stahl, *An Introduction to Cluster Analysis*, John Wiley & Sons, Chichester, West Sussex, UK, 2011, <https://doi.org/10.1002/9780470977811>.
- [29] Contreras Gatica, y Pedro Palma Calorio Yasna, Migración latinoamericana en el área central de Iquique: Nuevos frentes de localización residencial y formas desiguales de acceso a la vivienda, *An. Geogr. Univ. Complut.* 35 (2015) 45–64, https://doi.org/10.5209/rev_AGUC.2015.v35.n2.50114, n.o 2 (16 de septiembre de).
- [30] Espejel García, María Vianey, Martha Jiménez García, Nivel educativo y ocupación de los padres: Su influencia en el rendimiento académico de estudiantes universitarios. *RIDE, Revista Iberoamericana para la Investigación y el Desarrollo Educativo* 10 (19) (2019) e026, <https://doi.org/10.23913/ride.v10i19.540>. Epub 15 de mayo de 2020.
- [31] A. Chaparro, C. y González, J. Caso, Familia y rendimiento académico: configuración de perfiles estudiantiles en secundaria, *Rev. Electrón. Invest. Educ.* 18 (1) (2016) 53–68. Recuperado de, <http://redie.uabc.mx/redie/article/view/774>.
- [32] N. Salas, D. Castillo, C. San Martín, F. Kong, L. Thayer, D. y Huepe, Inmigración en la escuela: caracterización del prejuicio hacia escolares migrantes en Chile, *Universitas Psychologica* 16 (5) (2017) 1–15, <https://doi.org/10.11144/Javeriana.upsy16-5.iecp>.
- [33] Pierre Bourdieu, y Loïc Wacquant, *Una invitación a la sociología reflexiva, Siglo XXI, Buenos Aires, 2008.*