

# Unequal educational opportunities in a fragmented urban space

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## Abstract

This research examines how educational and socioeconomic inequalities are articulated and manifested in the urban space of the population of Bahía Blanca, Argentina. It also analyzes the unequal spatial distribution of families’ educational, economic and cultural capital and its influence on young people’s educational trajectories in terms of access, persistence and progression. A methodological strategy combining different quantitative techniques and using a primary, up-to-date, representative source of information for the whole city was used. The results obtained suggest that the fragmentation of urban space both reflects and contributes to the production and persistence of unequal educational and social opportunities for young people.

**Keywords:** unequal opportunities; educational trajectories; secondary education; segregation; urban space.

## 1. INTRODUCTION

The unequal distribution of educational, economic and cultural capital in Argentine families is reflected in unequal educational trajectories of children and adolescents in terms of access, performance and completion. Likewise, given the growth of residential segregation in the main urban centers, the spatial or territorial dimension of these inequalities is becoming increasingly relevant.

Completing compulsory basic education in due time and form is a fundamental prerequisite for development in the workplace and access to satisfactory living conditions. Evidence indicates that this depends to a large extent on the conditions of origin, such as the socioeconomic level of the family, and education is a key factor in the proliferation of social inequalities. In this respect, the fragmentation of urban space based on socioeconomic criteria reflects and contributes to the production and persistence of inequality.

This research analyzes how the educational and socioeconomic inequalities of the population are articulated and manifested in an urban space in the context of Bahía Blanca, the main city of the district of the same name, located in the southwest of the Province of Buenos Aires, Argentina. According to the 2010 National Population, Household and Housing Census, with 291,741 inhabitants, it is considered an intermediate city (Prieto, 2017).<sup>1</sup> At the same time, it represents an important economic center in the region, based on commercial, industrial, and agricultural and livestock activities, and has a developed educational market.

As Sassera (2022) points out, studies at the local level allow us to investigate the specific configurations of education systems and their links with their socioeconomic environment, shedding light on the heterogeneous realities within provinces or countries, which are often beyond the reach of global analyses. Intermediate cities represent case studies of great interest due to their recent demographic dynamism, the unique characteristics associated with their location and integration with other centers, and a lower sociocultural diversity than large urban centers (García-Araque, 2022; Prieto, 2017). Likewise, research limited to intermediate cities can offer more specific diagnoses of reality and favor a better design of policy guidelines.

More specifically, the study aims to analyze how educational opportunities for young people vary among the city's neighborhoods, focusing on how access and progression in secondary education are linked to the students' conditions of origin. Thus, The analysis addresses one of the facets of socio-spatial differentiation in the city, considering the characteristics of the population and neighborhoods related to educational achievements.

For this purpose, a primary, current and representative source of information for the entire city was used: the household survey conducted by the Southern Institute for Economic and Social Research (Instituto de Investigaciones Económicas y Sociales del Sur, IIESS) (UNS-CONICET) in December 2021. Different multivariate statistical analysis techniques were combined to address various aspects of the problem in the following three stages: *i*) estimation of synthetic indices of residential segregation; *ii*) estimation of logistic regression models to identify the socioeconomic determinants of academic success; and *iii*) analysis of neighborhood clusters to study how these conditions differ between different areas of the city. Evidence was obtained in favor of the working hypothesis, according to which, since household economic and cultural capital is a fundamental explanatory factor of educational outcomes at the secondary level, the unequal spatial distribution of the population undermines the equality of socio-educational opportunities.

The following section describes the background of the subject. The third section explains the methodological framework in greater detail. The fourth section presents the results and their discussion, ending with conclusions.

## 2. RELEVANT BACKGROUND

### Inequality of educational opportunities: socioeconomic determinants of access, permanence and progression

Since the middle of the last century, various theoretical currents have made it clear that educational achievement is influenced by circumstances that exceed individual capacity, preferences or effort. As Boniolo and Najnias (2018) or Katzman (2011) point out, the role of the social class of families, which allocates resources to collaborate in the construction of the human capital of the new generations, is pivotal, thus contributing to the reproduction of social inequalities.

Literature on the Economics of Education is abundant in terms of analyzing the determinants of access, permanence and progression in schooling. The influences of the different aspects of educational trajectories are often recurrent and the problems interact. Repeating a school year results from the effect of certain socioeconomic

characteristics on academic performance and generates discouragement and frustration, contributing to school dropout (Choi *et al.*, 2018). Multiple determinants represent personal, family, social, economic and educational characteristics, revealing the analysis's complexity (Suberviola-Ovejas, 2021).

The socioeconomic factors highlighted by specialized literature include the household income level (Mancha and Ayala, 2020). This influences both the possibility of meeting the direct costs of schooling and the ability to devote time to study to the detriment of work, thus incurring an indirect or opportunity cost. Several research studies of the Argentine context demonstrate the relevance of this factor, as well as the economic activity status of young people on the probability of attending school and maintaining adequate performance (Adrogué and Orlicki, 2018; Bertranou, 2001; Gasparini, 2001; Ibañez Martín *et al.*, 2020; Sosa and Marchionni, 1999). In this respect, in cases of scarce economic resources, young people often contribute to unpaid caregiving tasks, which also compete with studying (Ibañez Martín *et al.*, 2020; Rojas *et al.*, 2011 in Hernández-Prados and Alcaraz- Rodríguez, 2018).

In terms of both paid and unpaid work, the opportunity cost of studying increases with age, and the need to assume adult responsibilities at an early age can lead to exclusion from education. Therefore, age is a conditioning factor in relation to school attendance and the possibility of following a successful trajectory (Groisman, 2011; Ibañez Martín *et al.*, 2020; Paz and Cid, 2012).

Meanwhile, in close connection with household income, different papers highlight the influence of the working conditions of adult household members on educational variables (Groisman, 2011; Hernández-Prados and Alcaraz-Rodríguez, 2018; Ibañez Martín *et al.*, 2020; Paz and Cid, 2012).

The role of household economic capital can be visualized through another element highlighted by literature as detrimental: overcrowding in the home (Boniolo and Najnias, 2018; Katzman, 2011). Katzman (2011) attributes it to reasons such as the fact that the reduced space prevents having an appropriate place to study. It also influences family coexistence and can affect the emotional health of each of its members, which generates an unfavorable environment for concentration and support for school work.

Undoubtedly, the impact of the educational climate and the cultural capital of the household on the academic trajectory of its members is central (Valbuena *et al.*, 2020; Hernández-Prados and Alcaraz-Rodríguez, 2018; Paz and Cid, 2012). Authors such as Katzman (2011) and Gubbels *et al.* (2019) explain how the household's educational climate and cultural capital determine adults' abilities to transmit skills and attitudes to children and influence their schooling. Montes (2016 in Hernández-Prados and Alcaraz-Rodríguez, 2018) points out that household cultural capital creates expectations regarding education and conditions the ability to understand school codes and accompany academic trajectories. In this respect, several research studies highlight, in particular, the role of the education of mothers (Bertranou, 2001; Katzman, 2011; Sosa and Marchionni, 1999). Alderete *et al.* (2020) find that families' participation in cultural, sports, or reading-related activities correlates with school attendance.

Multiple empirical findings show that the different elements that make up a family's socioeconomic level or social class influence educational outcomes, such as attendance, grade repetition and dropout.

### The spatial dimension of social and educational inequalities

In line with the thinking of Bourdieu (2003), Di Virgilio and Perelman (2014) argue that inequality can be conceptualized "as a socio-territorial phenomenon. In other words, it is a socially produced phenomenon with clear spatial manifestations and articulations that, in turn, is sustained by them. Based on this approach, social inequality has its territorial correlation" (p. 9). They also point out that the urban structure influences people's opportunities in the face of unequal access to goods, services and social networks, defined within the neighborhood context. Opportunities associated with localization represent a stratification factor. This is due to residential segregation since, in Latin American cities, there is a concentration pattern of ascending upper and upper-middle classes in central areas, with recent expansion towards a specific direction in the outskirts. The rest of the outskirts and certain pockets close to the center are occupied by the poorest groups of society (Sabatini, 2006).

Among other aspects, urban social segregation has adverse effects on education. On the one hand, it means that many sectors have less access to public goods such as the environment, services, spaces for social interaction or public safety, potentially impacting educational achievements (García-Araque, 2022; Sassera, 2022). On the other hand, Katzman (2011) points out that in recent decades, literature has expanded the notion of primary areas of socialization, incorporating the characteristics of neighborhoods into the explanatory models of academic achievement.

The social composition of neighborhoods is considered to be part of the set of educational opportunities since it can provide behavioral models that influence the aspirations and motivations of children and adolescents and affect the construction of social capital and the quality of the resources of the schools in the area - as concluded by several studies reviewed in Sassera (2022). Furthermore, different studies find that moving to neighborhoods with lower levels of poverty at an early age can positively impact children's educational achievement, regardless of their conditions at home (Giménez *et al.*, 2018). Finally, residential social segregation is related to school social segregation, which represents a disadvantage for those who are from the most disadvantaged backgrounds (Krüger, 2020; Tammaru *et al.*, 2021).

In particular, as in other localities in Argentina, the urban space of the city of Bahía Blanca is fragmented, reflecting and reproducing socioeconomic inequalities among its inhabitants (Prieto, 2017). Residential segregation is evident when analyzing aspects such as services, infrastructure and environmental conditions offered by the different sectors of the city, as well as the possession of economic and socio-cultural capital of its population (Santos, 2022; Reyes Pontet, 2022). The central areas and certain zones in the north, east and northwest of the city provide superior living conditions to those of the outskirts in the south, southeast, southwest and west (Prieto, 2017).

The socioeconomic and territorial inequalities of the city are also manifested in the education system, which is segmented or made up of circuits of differing quality. There is evidence of processes of student segregation by socioeconomic level, especially between the state and private sectors, as well as differentiation among educational institutions according to their location in the urban space (Krüger *et al.*, 2022; Krüger *et al.*, 2021). This differentiation in access to quality institutions according to place of residence - apart from being influenced by possibilities of mobility - constitutes a factor of inequality in the educational opportunities of children and adolescents.

## 3. METHODOLOGY

### Data



The information used in the study comes from a household survey representative of the entire city of Bahía Blanca, conducted in December 2021 together with the team of the Executing Unit Project (PUE) "Sustainable social inclusion: innovations and public policies from a regional perspective" of the IIESS (CONICET-UNS). The PUE 2021 Survey (EPUE-21) surveyed 1,421 households in the city, with a total of 4,199 people. A two-stage sampling involved a first sampling stratification by neighborhoods, followed by surveying a random selection of blocks. This data source has a number of advantages over alternative sources such as the Permanent Household Survey of the National Institute of Statistics and Censuses (INDEC): more significant sample size, increased coverage of vulnerable neighborhoods and inclusion of a large number of variables that make it possible to define the socioeconomic situation of the population from a multidimensional perspective.

Although the EPUE-21 questionnaire's education grid was applied to all persons over 3 years of age, only those of the "theoretical age" to attend secondary school were considered since it is at this level that the greatest problems of access, permanence and progression in education are found (Formichella and Krüger, 2022). Thus, a sample of 414 people was used (representing 25,904 individuals).

Methods

The methodological strategy used was quantitative and combines a series of statistical techniques that allow different aspects of the problem to be addressed and involves three sequential stages: *i*) estimation of synthetic segregation indexes, *ii*) estimation of logistic regression models, and *iii*) cluster analysis. Stata 14.0 software was used.

As a starting point, we sought to determine the relevance of urban spatial segregation in the city. For this study, it is defined as the unequal distribution of people between zones or neighborhoods according to their level of academic success. In other words, young people are divided into two groups: the majority, which includes those with a desirable school record; and the minority, which includes the rest. The dimension of similarity (Massey and Denton, 1988) of segregation refers to whether the distribution of the minority among the city's neighborhoods is uniform or whether there is a tendency to accumulate in certain areas.

These are measured using the Dissimilarity index (Duncan and Duncan, 1955) and the Square Root index (Hutchens, 2004). Both take values between 0 and 1, with a higher value indicating a higher level of segregation. The Dissimilarity index can be interpreted as the percentage of minority people who would have to move to other neighborhoods to achieve a social composition in each neighborhood that represents the overall composition. The Hutchens index does not have such a direct interpretation, but it is useful because it can be broken down into an intersectoral and an intrasectoral segregation term. In other words, the neighborhoods could be grouped into different clusters and we could analyze whether segregation between clusters or within each cluster is more relevant.

To identify groups of neighborhoods that resemble each other in terms of the educational opportunities available to their inhabitants, a logistic regression model<sup>2</sup> was previously estimated to select a reasonable set of socioeconomic determinants of the probability of having a desirable academic trajectory. These are low-complexity models, widely used in specialized literature, and suitable for a binary dependent variable (Gujarati and Porter, 2009). Although the interpretation of the coefficients of the explanatory variables is not straightforward, the odds ratios associated with each regressor are usually presented, which measure the probability of an event occurring, conditional on the occurrence of another event; in relation to the probability of it not occurring, in turn conditional on the same event. In other words, odds ratios greater than 1 indicate a positive expected effect of the variable and vice versa.

Using the logistic regression model results as an input, groups of neighborhoods with similar educational outcomes for young people were identified. For this purpose, a cluster analysis was performed, a multivariate statistical procedure that permits the classification of information, grouping those elements that present a high degree of association for certain attributes (Aldenderfer and Blashfield, 1984). An algorithm was used that maximizes the differences between groups and minimizes those differences within them. The two-stage method (combining hierarchical and non-hierarchical methods) was used among the possible clustering methods. Thus, the optimal number of clusters is automatically determined using Schwartz's Bayesian Criterion (Schwartz, 1978), and the distance measure is the maximum likelihood (Santos-Mangudo, 2015).

Variables

Table 1 synthetically defines the variables used in the different stages of the analysis, selected based on the empirical background and availability of EPUE-21 data.

Table 1. Selected variables linked to young people	
Variables	
Dependent	
Desirable trajectory	Is in the educational system and has never repeated a grade.
Explanatory	
Age	Chronological age
Male	Male gender
Receives UCA	Receives Universal Child Allowance
Disability	Presents any disability
Working	Employed
Active	Employed or unemployed (i.e., actively looking for work)
Moving home	Has moved home in the last five years
No health coverage	Does not have health coverage in addition to the state service
Source: EPUE-21. Compiled by the authors	

Table 2. Selected variables linked to households

Variable	Description
Years of study of adults	Average number of years of study of the main provider and their spouse.
Persons per room	Number of people in the household for each space used exclusively for sleeping.
Two-parent household	An adult couple inhabits the dwelling.
Low income	The household's income is in the first distribution quintile.
Deprivation in housing assets*	There are only two or fewer durable items in the home.
Precarious housing tenure*	The dwelling is borrowed, or its tenure document is a real estate tax bill, a utility bill, or no documentation.
Deprivation in employment*	At least one person between the ages of 18 and 64 is unemployed or a discouraged worker.
Deprivation in social security*	At least one person between the ages of 18 and 64 who is employed does not pay social security contributions, or at least one person aged 65 or older does not receive a pension.
Deprivation in housing materials*	The dwelling is poorly constructed or has problems with the quality of the materials used.
Deprivation in electricity*	The dwelling has no electricity or has an irregular connection.
Deprivation in food security*	People ate less than they should, ran out of food at home, felt hungry but did not eat, or went a whole day without eating, all due to a lack of money and other resources.
Deprivation in health*	At least one person does not have health coverage.
Intense to severe multidimensional poverty*	The household suffers from intense to severe poverty, i.e., it is deprived of 25% or more of the weighted indicators considered.
Access to Information and Communication Technologies (ICT)	A computer and fixed Internet connection are available in the home.
School absenteeism	In the last week, at least one child in the household was absent from school.
Late for school	In the last week, at least one child in the household was late for school.
Loneliness	The person in the household who answered the survey has felt lonely in the neighborhood.

Note: \* provided by Dr. Maria Emma Santos and defined in Santos (2022).

Source: EPUE-21. Compiled by the authors.

Figure 1. Socio-spatial segregation: distribution of theoretical secondary school-age students according to their academic trajectory



Source: EPUE-21. Prepared in collaboration with Dr. Marina Tortul (IIESS, UNS-CONICET).

Table 3. Selected variables linked to neighborhoods

Variable	Description
Vulnerable neighborhood	The Department of Statistics of the Municipality of Bahía Blanca (MBB) classified the neighborhood as vulnerable based on its access to public services (Santos, 2022).
Other indicators	The neighborhood complies with the characteristics indicated in each case: the existence of sports facilities, the presence of a pharmacy, the presence of a police station, the availability of a bus stop, daily garbage collection, the presence of a nearby garbage dump, the presence of a nearby burning site, and the presence of a flood zone.

Source: EPUE-21. Compiled by the authors.

4. RESULTS AND DISCUSSION

Urban spatial segregation

As a first step in investigating the city's combination of educational and territorial inequalities, neighborhood segregation indexes were estimated for adolescents with a desirable educational trajectory.

The Dissimilarity index yielded a value of 0.423, indicating a moderate level of segregation (Massey and Denton, 1988). Theoretically, this implies that 42.3% of this population should be located in other neighborhoods to achieve a uniform distribution among all the city's neighborhoods. In other words, in some neighborhoods, there is an overrepresentation of young people with an optimal educational outcome, while in others, there is an underrepresentation. In addition, the Hutchens index has a value of 0.239, which has no direct interpretation, but it is useful later in breaking down the overall level of segregation.

These first results supported the hypothesis that the city's population has an unequal territorial distribution in terms of educational opportunities and that the neighborhood of residence can act as a predictor of the probability of school success. Figure 1 shows how the distribution of the theoretical secondary school-age population, according to their school achievement, corresponds to previous evidence of socio-spatial segregation in the city.

It is therefore worth characterizing this distribution in the urban space and identifying the groups of neighborhoods in terms of conditions of educability of their population (defined by López (2006) as the characteristics that students bring with them and that enable them, or not, to navigate the educational system successfully).

Explaining the probabilities of having a desirable school trajectory

Different logistic regression models were estimated with the dual purpose of identifying the main determinants of permanence and progression at the secondary level and defining a synthetic set of variables to group the city's neighborhoods. The aim was to explain the probability of having a desirable academic trajectory for those at the theoretical secondary school age based on personal, family and contextual factors of interest. Alternative specifications of the models were tested, seeking to achieve a parsimonious model that included factors representative of all the dimensions considered relevant. The two preferred models, in terms of their goodness of fit, are presented in Table 4.

Table 4. Factors associated with the probability of having a desirable trajectory

Explanatory factors	Model 1		Model 2	
	Coefficient (Significance)	Odd-ratio	Coefficient (Significance)	Odd-ratio
Age	-0.454***	0.635	-0.497***	0.608
Male	-0.390 (ns)	0.677	-0.465*	0.628
No health coverage	-0.713*	0.490	-0.574 (ns)	0.563
Adult years of schooling	0.128*	1.136	0.111 (ns)	1.117
Low income	-0.904**	0.405	-0.433 (ns)	0.648
Persons per room	-0.478***	0.620	-0.380***	0.684
Deprivation in housing assets	-0.369 (ns)	0.691	-0.150 (ns)	0.860
Precarious housing tenure	0.595 (ns)	1.813	0.771**	2.162
Households with deprivation in employment	0.012 (ns)	1.012	0.012 (ns)	1.012
Households with deprivation in social security	0.137 (ns)	1.147	0.249 (ns)	1.282
Access to ICT			1.119***	3.062
Number of observations	358		356	
Percentage correctly classified	78.21%		80.06%	
Adjusted R <sup>2</sup>	0.207		0.220	

Notes: \*\*\* significance at 1%; \*\* significance at 5%, and \* significance at 10%; (ns) not significant.

Source: EPUE-21. Compiled by the authors.

Both models have high explanatory power and include variables representative of different dimensions of household economic and sociocultural capital, which specialized literature has identified as relevant.

First, both estimates indicate that age is negatively linked to the probability of attending school on time. This is consistent with the fact that repeating a year of school is a cumulative phenomenon and that the opportunity costs of schooling increase with age. Gender is another personal factor - which is significant in some estimated specifications - suggesting, inconclusively, that males are less likely than females to achieve a desirable trajectory.

Model 1 indicates that the educational capital of the household, represented by the average years of education of the primary earner and their spouse, is a significant factor that positively influences the academic success of young people. On the contrary, living in a low-income household significantly reduces the chances of such success. The same is true for those who do not have health coverage, which can indicate both personal health status and the quality of the labor market insertion of the adults in the household.

The number of people per room is significant in terms of housing and family composition. It has a negative effect linked to the possibility of overcrowding, economic capital and the availability of space for family members.

Model 2 introduces the variable of access to ICT, which is significant and positively impacts the chances of a desirable educational trajectory, as seen in Alderete *et al.* (2020).

In short, the data analyzed for the city show that the possibility of remaining in school at secondary school age and advancing in studies without repeating a school year is closely linked to circumstances beyond the individual control of potential students, influenced by aspects such as income, material resources and the educational climate of the home, as well as age and gender. Although far from being exhaustive, the set of factors incorporated allows 80% of the observed value of the dependent variable to be correctly predicted.

When comparing both models, it was observed that including access to ICT reduces the effect of other variables of the household's socioeconomic level. This is probably due to the high correlation between this set of indicators, so all the variables that presented significant effects in relation to the different specifications considered were taken into account as relevant.<sup>3</sup>

Cluster analysis: educational inequalities in the urban space

Next, we further explore how educational opportunities for youth vary among the city's neighborhoods, considering mainly the characteristics of the households living in each neighborhood and some attributes of the neighborhoods that could affect the educational outcomes of their residents.

First, a cluster analysis was carried out to identify groups of neighborhoods whose populations showed similarities in the factors affecting school success. To choose a reduced set of variables that would allow segments to be meaningfully differentiated (Mooi and Sarstedt, 2011), selecting factors should follow theoretical and practical logic. Thus, the clustering variables were selected based on their significance in the logistic regression analysis presented previously: average years of schooling of adult household members; low income; persons per room; no health coverage; and access to ICT, which were averaged at the neighborhood level and standardized, giving each one the same weighting.

Three groups of neighborhoods were obtained as a result: i) the "favorable conditions" cluster comprises 45% of neighborhoods; ii) the "intermediate conditions" cluster, containing 39% of neighborhoods; and iii) the "unfavorable conditions" cluster, comprising the remaining 16% of neighborhoods (see Table 5). The selected solution presents good quality, with a cohesion and separation silhouette measure of 0.5, indicating that the data provides reasonable evidence of the structure of the clusters (Kaufman and Rousseeuw, 1987; Mooi and Sarstedt, 2011; Rubio-Hurtado and Vilà-Baños, 2017). The most important factors of discrimination between neighborhoods were the possession of health coverage and access to ICT.

Table 5. Composition of the neighborhood clusters

Characteristics	Favorable conditions	Intermediate conditions	Unfavorable conditions
Number of neighborhoods	41 (44.6%)	36 (39.1%)	15 (16.3%)
Number of people	122 515 (41.4%)	144 958 (48.9%)	28 399 (9.6%)
Number of people at theoretical secondary school age	7 929 (30.6%)	14 412 (55.6%)	3 563 (13.8%)

Source: EPUE-21. Compiled by the authors.

A first observation of interest is that the location of the neighborhood clusters in the urban space is consistent with the evidence of residential segregation in the city of Bahía Blanca. Figure 2 shows that the neighborhoods belonging to the conglomerate with favorable conditions are located mainly in the center and north of the city. In contrast, the group with intermediate conditions corresponds to the poor outskirts, and the conglomerate with unfavorable conditions includes some settlements with a very vulnerable population. Likewise, although the correspondence between Figures 1 and 2 is not strict, it is clear that the unequal distribution of the conditions of educability of the population in the territory is linked to the unequal distribution of their educational results.

Figure 2. Socio-spatial segregation: location of neighborhood clusters





Source: EPUE-21. Prepared in collaboration with Dr. Marina Tortul (IIESS, UNS-CONICET).

As expected, the three groups of identified neighborhoods differ significantly regarding the clustering variables. These emerged as significant explanatory factors for repeating a school year and school permanence among those of theoretical secondary school age. Thus, considerable inequalities are observed in the educational and socio-economic capital of the households belonging to each group. Therefore, key gaps exist in the percentage of adolescents in each cluster who achieve a desirable trajectory (see Table 6).

Table 6. Characterization of the clusters according to desirable academic trajectory and main explanatory factors

Characteristics	Favorable conditions (% or average)	Intermediate conditions (% or average)	Unfavorable conditions (% or average)
Desirable academic record***	91.8	75.3	57.5
No health coverage***	10.3	36.7	71.7
Years of schooling for adults***	13.6	10.7	8.9
Persons per room***	1.4	1.8	3.2
Low income***	7.7	18.7	47.0
Access to ICT***	86.9	63.9	23.9

Notes: Except for “desirable academic trajectory”, the proportions of the variables were calculated in relation to the total population of each cluster; \*\*\* the association with the cluster of belonging is significant at 1% according to the Chi-2 test.

Source: EPUE-21. Compiled by the authors.

The information provided by the EPUE-21 made it possible to characterize the three groups of neighborhoods further, finding that the population's living conditions differ significantly between them (see Table 7). Thus, multidimensional poverty is substantially higher in the conglomerate with unfavorable conditions, followed by the intermediate one due to a higher prevalence of all types of deprivation: in housing, services, health and employment. Although the estimation of the explanatory models of the desirable trajectory did not identify significant effects of each of these factors, they are dimensions recognized as relevant in specialized literature and together, they represent more or less favorable scenarios for academic success.

Table 7. Characterization of dusters according to household deprivation

Characteristics	Favorable conditions (%)	Intermediate conditions (%)	Unfavorable conditions (%)
Intense to severe multidimensional poverty***	6.4	35.7	80.3
Deprivation in housing materials***	7.6	21.3	36.2
Precarious housing tenure***	6.0	10.8	23.4
Electricity deprivation****	0.9	7.6	34.7
Food security deprivation***	4.6	18.9	47.3
Employment deprivation***	5.2	13.0	25.1

Notes: proportions calculated in relation to the total population of each cluster; \*\*\* the association with the cluster of membership is significant at 1% according to the Chi-2 test.  
Source: EPUE-21. Compiled by the authors.

In line with the increased economic deprivation experienced by the population in the intermediate and unfavorable groups, the proportion of people receiving UCA is higher, as is the proportion of young people of secondary school age who are working (see Table 8). The composition of households also varies significantly, with a higher proportion of single-parent families in the cluster in unfavorable conditions. Likewise, more health problems are observed, such as the presence of people with disabilities. Regarding issues that may be indicative of attitudes, values and expectations, the problems of absenteeism and lateness to school among children and adolescents from households in the intermediate and unfavorable clusters are also more evident.

Table 8. Characterization of the clusters according to population attributes

Characteristics	Favorable conditions (%)	Intermediate conditions (%)	Unfavorable conditions (%)
Receives UCA***	7.7	28.5	63.6
Two-parent household***	71.8	70.7	63.7
Has a disability***	5.4	7.9	12.0
Working***	4.92	15.74	30.78
School absenteeism***	24.5	29.9	49.0
Late for school***	12.0	16.3	24.2

Notes: With the exception of the variable “works,” the proportions are calculated in relation to the total population of each cluster; \*\*\* the association with the cluster of belonging is significant at 1% according to the Chi-2 test.  
Source: EPUE-21. Compiled by the authors.

Finally, given that specialized literature has identified the contextual or neighborhood dimension as relevant in determining educational outcomes, the clusters are compared in relation to some salient characteristics of the neighborhoods that comprise them (see Table 9). For example, in the group presenting favorable conditions, there seems to be a more significant presence of the State and other private sector institutions in the territory, which affects the neighborhood's connection with the rest of the city or the availability of different services and spaces. There are more significant environmental and health problems in the group with unfavorable conditions.

Table 9. Characterization of the clusters according to neighborhood attributes

Characteristics	Favorable conditions (%)	Intermediate conditions (%)	Unfavorable conditions (%)
There is a sports area***.	81.3	75.6	72.8
There is a pharmacy***.	78.1	56.9	50.4
There is a police station***	55.4	50.1	42.9
There is a bus stop***.	94.8	93.5	91.1
Daily garbage collection***	81.0	80.5	66.5
Nearby garbage dump***	16.2	26.5	49.5
Burning site nearby***	12.4	20.3	43.8
Flood zone***	32.2	41.3	68.6

Notes: proportions calculated in relation to the total population of each cluster; \*\*\* the association with the cluster of membership is significant at 1% according to the Chi-2 test; \*\* significance at 5%.  
Source: EPUE-21. Compiled by the authors.



Cluster analysis: decomposition of urban spatial segregation

As explained above, taking as a minority the secondary school-age population that achieves a desirable trajectory, a moderate level of segregation is observed, indicating an unequal distribution of this population among the city's neighborhoods. However, the estimates in Table 10 show that, within each cluster, the levels of population segregation between neighborhoods are very different. In the group of neighborhoods with favorable conditions of origin, the low percentage of young people with undesirable trajectories seems to be concentrated in certain neighborhoods since the Dissimilarity index is very high, indicative of a situation of hyper-segregation. There is also inequality in the distribution of this group of young people among the neighborhoods belonging to the cluster of unfavorable conditions. In contrast, there seems to be a more uniform distribution in the intermediate cluster throughout the territory.

Table 10. Breakdown of the segregation indexes of the population with desirable trajectory by clusters

Conglomerates		Square Root Index	
	Dissimilarity Index	Inter-clusters	Intra-clusters
		0.055 (23.2%)	0.184 (76.8%)
Favorable conditions	0.681		0.466
Intermediate conditions	0.291		0.091
Unfavorable conditions	0.394		0.208

Source: EPUE-21. Compiled by the authors.

In turn, the decomposition of the Square Root index allows us to conclude that a significant proportion of the overall segregation between neighborhoods (23%) is explained by an unequal distribution of each group of young people between the three clusters.

Cluster analysis: representative and atypical cases

In principle, and based on the characterization of the identified clusters, those belonging to the group of neighborhoods with "favorable conditions" for schooling are more likely to achieve a desirable trajectory than those residing in neighborhoods in the cluster with "unfavorable conditions" (see Table 6).

To illustrate this situation, based on logistic regression Model 1, the probability of having a desirable educational trajectory for a person of secondary school age representative of each extreme cluster was estimated. For this case, a representative person is defined as the one characterized by the most frequent values of the cluster in the case of dichotomous variables and by average values in the case of continuous variables.

Thus, this fictitious young person in the "favorable conditions" cluster has health coverage, lives in a household whose adults have an average of 14 years of education, where income is not low and where there are 1.5 people per room. In contrast, the representative person in the "unfavorable conditions" cluster does not have health coverage and lives in a household whose adults only have an average of 9 years of education, where income falls into the first distribution quintile and where there are 3.3 people per room.

In the favorable scenario, the probability of achieving a desirable trajectory is 94%, while in the unfavorable scenario, it is only 41%. Knowing one's place of residence clearly contributes to predicting one's chances of educational success in the city.

It is also interesting to investigate those "atypical" cases that fall short of the expected situation for the group to which they belong, showing either an undesirable educational trajectory in the favorable cluster (atypical negative cases) or a desirable trajectory in the unfavorable conglomerate (atypical positive or resilient cases).

Based on these cases, we explore other variables that have not been used to characterize the clusters but which can shed light on the factors that favor these less-expected results. Tables 11 and 12 detail the variables that showed statistically significant differences between typical and atypical cases in each extreme cluster.

Furthermore, Table 11 shows that, within the favorable cluster, the probability of having an atypical negative result is higher for young people who live in neighborhoods characterized as vulnerable. This condition refers to a precariousness in terms of access to essential services.

Table 11. Cluster with favorable conditions: variables showing differences between typical and atypical negative cases

Characteristics	Percentage with undesirable trajectory	
Vulnerable neighborhood**	Yes	28.6%
	No	7.5%
Loneliness**	Yes	27.3%
	No	6.9%
School absenteeism**	Yes	19.0%
	No	6.0%

Notes: \*\* association with the membership cluster is significant at 5% according to the Chi-2 test.

Source: EPUE-21. Compiled by the authors.

Likewise, a higher proportion of atypical negative cases is found among those who live in a household where the person who responded to the survey reported feelings of loneliness in the neighborhood. The same is true for those living in a household where at least one child was absent from school in the days before the survey.

Although it is outside the scope of this paper to explain the causes of these findings, it will be of interest in the future to continue exploring how, on the one hand, the neighborhood context can hurt the educational results of those who enjoy favorable conditions at home; and, on the other hand, how certain emotional or non-cognitive factors in the family, linked to personal satisfaction, commitment and appreciation of education, can influence academic trajectories.

Meanwhile, in Table 12, we took the group with unfavorable conditions and observed a significant difference in the proportion of young people identified as "atypical positive cases" between those who work and those who do not. No resilient cases were found in the employed group, which could be because they have less time for study than the rest of their cluster members. Something very similar happens when considering those who participate economically, either working or looking for work.

**Table 12. Cluster with unfavorable conditions: variables showing differences between typical and atypical positive cases**

<i>Characteristics</i>	<i>Percentage with desirable trajectory</i>	
Works***.	Yes	0.0%
	No	60.0%
Active***	Yes	9.1%
	No	61.5%
Moving house**	Yes	0.0%
	No	59.3%
School absenteeism***	Yes	42.1%
	No	75.0%
The neighborhood has a bus stop***	Yes	63.3%
	No	12.5%

Notes: \*\*\* The association with the cluster of membership is significant at 1% according to the Chi-2 test; \*\* it is significant at 5%.  
Source: EPUE-21. Compiled by the authors.

In addition, moving home is one aspect of personal history that emerges as relevant. There are no atypical positive cases among those who have changed cities in the last five years. On the other hand, those who have had stability in their place of residence are more likely to achieve a desirable trajectory.

Once again, if there are children at home who are absent from school, a possible indicator of the family's attitude towards school, the probability of achieving a positive result seems to be greater, even if they belong to a group with unfavorable conditions.

In addition, among the neighborhood's different characteristics, access to public transportation, which is linked to mobility between home and school and to the more general integration of the neighborhood with the rest of the city, is a differentiating factor that favors achieving an atypical positive school outcome.

5. CONCLUSIONS

Throughout this paper, we analyzed the dynamics of inequality in the intermediate city of Bahía Blanca, Argentina. First, residential segregation with respect to the academic trajectories of adolescents in the city was verified. In other words, there is evidence of an unequal distribution in the urban space of the population of young people according to the educational results they achieve at the secondary school level.

Based on the estimation of a logistic regression model, it was shown how the probability of remaining in school throughout secondary school age and progressing, according to the stipulated theoretical times, is strongly associated with the students' circumstances of origin. Factors related to households' economic and cultural capital, such as income, educational climate or the availability of material resources, especially ICT, emerge as the most relevant.

Subsequently, three groups of neighborhoods were identified that had similarities in a series of conditions of schooling or educability of their populations. By characterizing these groups, it was possible to show that the variables that permitted the creation of the clusters are complemented by others, thus forming scenarios that reinforce the conditions specific to each group.

Thus, in the unfavorable scenario, deprivations of different types, such as housing, home and neighborhood services, the educational climate of the households and neighborhood, and the health and activity status of household members, are superimposed, giving rise to a combination of different forms of vulnerability. Meanwhile, in the cluster with favorable conditions, a scenario is generated in which the variables act together to propitiate a desirable educational trajectory.

In any case, the groups of neighborhoods are not entirely alike, with the cluster with favorable conditions being the one with the highest levels of segregation between its neighborhoods. This diversity between neighborhoods and situations within each group motivated the search for "atypical cases", in which the educational results achieved do not correspond to what was expected, according to the conditions of origin prevailing in the group.

Thus, it was possible to identify some variables that could be linked to the possibility of resilience among students who come from less favorable backgrounds or, on the contrary, to lower educational success among those with better conditions of educability. Although this section of the study is exploratory, it can be affirmed that these variables are associated with aspects of family attitudes or with certain characteristics of the neighborhoods and with the employment status of young people.

Thus, the locality studied showed how socioeconomic inequalities are linked to educational disparities and reflected in the territory. The fragmentation of the urban space means that those who come from homes with less favorable conditions for developing a successful academic trajectory are concentrated in certain areas,

interacting with a population in a similar situation. It is then expected that peer or neighborhood effects will exacerbate the initial disadvantages so that the territory becomes an entity that produces inequalities.

Analyzing territorial configurations and educational and social conditions at the local level can be a valuable tool for designing educational and urban planning policies that evaluate comprehensive interventions at the family, school and neighborhood levels for greater equality of opportunities for youth.

As a next step, we plan to follow up this study with an analysis of the local educational system's institutional differentiation and the population's mobility practices or opportunities, which could both attenuate and deepen socio-educational inequity.

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<sup>1</sup> Prieto (2017) points out that the notion of intermediate city refers not only to the average size of the agglomeration -between 50,000 and 400,000 inhabitants-, but also to its role as an articulator of different flows between rural and urban spaces in its area of influence and more distant territories.

<sup>2</sup> One-level model with cluster-robust errors.

<sup>3</sup> The variable "housing deprivation: precarious tenure", whose effect is not significant in most of the alternative models estimated, was excluded.