

CHALLENGES AND OPPORTUNITIES OF THE SCHOOL SYSTEM

IX Seminar "Data from and for
educational systems: tools for research
and teaching"

edited by
Patrizia Falzetti

FrancoAngeli



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2. The gender gap in school-to-university transition in Italy: Insights from the integration between INVALSI and ANS data sources

by Valentina Tocchioni, Gabriele Lombardi, Samuele Milone

The issue of the gender gap in university enrolment is widely investigated across the world. Very few studies have comprehensively addressed the topic of university enrolment in Italy by gender, as most research has primarily focused on issues related to academic careers. Nonetheless, female students have consistently shown higher enrolment rates and lower drop-out rates than males. This study aims to describe the transition from upper secondary school to university in Italy, identifying potential gender inequalities based on school macro-region, type of school attended, and the socio-economic status of the upper secondary school. The proposed descriptive analysis may serve as a starting point for: i) Identifying schools that exhibit gender-balanced enrolment trends; ii) Assessing whether gender inequalities exist at the macro level, which could, in turn, encourage further micro-level analyses of the school-to-university transition in Italy and help design targeted policies to promote more equitable access to higher education.

La questione del divario di genere nell'iscrizione universitaria è ampiamente investigata in tutto il mondo. Per l'Italia, pochi studi hanno affrontato il tema dell'immatricolazione universitaria suddivisa per genere, concentrandosi maggiormente su questioni relative alla carriera accademica. Tuttavia, le ragazze hanno tassi di iscrizione più elevati e tassi di abbandono più bassi rispetto ai loro coetanei maschi. Questo lavoro intende descrivere la transizione scuola-università in Italia degli studenti provenienti dalle scuole secondarie di secondo grado, individuando eventuali disuguaglianze di genere in relazione alla macro-area geografica della scuola, alla tipologia di scuola frequentata e allo status socio-economico e culturale dell'istituto. L'analisi proposta può essere considerata un punto di partenza per: i) identificare le scuole che presentano un equilibrio di genere nelle immatri-

colazioni universitarie; ii) verificare l'esistenza di disuguaglianze a livello macro, le quali potrebbero stimolare analisi a livello micro sulla transizione scuola-università in Italia.

1. Introduction

The issue of the gender gap in university enrolment is widely investigated across the world. The United States has experienced a long-term increase in female students' university enrolment and admissions, including in disciplines traditionally dominated by their male counterparts (Adebayo, 2008). This trend is driven by well-documented evidence that females outperform males, thereby gaining an advantage in selection procedures (Conger, 2015). Nonetheless, studies on European countries indicate that this long-term trend has only resulted in approximately equal representation in enrolment (Francesconi and Parey, 2018; Steinmann and Rutkowski, 2023).

With regard to Italy, few studies have examined transition rates to university in terms of gender gaps, as research has predominantly focused on differences in young women's and men's academic careers. Nonetheless, females have higher enrolment rates and lower drop-out rates than their male counterparts (Contini *et al.*, 2018), although these outcomes are significantly influenced by both prior schooling tracks (Contini and Salza, 2020) and financial conditions (Contini and Zotti, 2022). The ANVUR report on gender disparities in Italian higher education indicates that, while the female enrolment rate declined by one percentage point between 2012 and 2021, it has consistently remained above the European average, particularly in fields such as Arts and Humanities and Health Studies (ANVUR, 2024). Since 2018, Italy has also maintained a female enrolment rate above the European average in Natural Sciences, Mathematics, Statistics, and Engineering – fields crucial to the labour market but historically male-dominated (D'Agostino *et al.*, 2021).

Given this context, this study examines the transition to higher education among upper secondary school graduates in Italy, focusing on enrolment in an Italian university. Utilising individual-level data and maintaining a focus on gender differences, we present three upper secondary school-level indicators that enable us to assess the school-to-university transition in Italy and how it varies by gender.

Furthermore, these indicators are analysed by stratifying them according to three key characteristics: the geographical area in which the upper secondary schools attended by graduates are located; the type of upper secondary school attended; and the average socio-economic and cultural background

of the students' schools. This approach accounts for important variations in school characteristics at the end of upper secondary education and thus plays a role on graduates' university enrolment decisions.

The chapter proceeds as follows. First, we present the data used in this study and the three types of indicators calculated for each Italian upper secondary school – separately for both genders and jointly for males and females. Second, we present the results, stratified by geographical area, type of upper secondary school attended, and the school's average socio-economic and cultural background. Finally, a concluding discussion brings the chapter to a close.

2. Materials and Methods

2.1. Data

This article aims to describe gender differences in university entry rates by upper secondary schools. We rely on the MOBYSU.IT¹ database, which merges two administrative data sources.

The primary data source comes from the Istituto nazionale per la valutazione del sistema educativo di istruzione e di formazione (INVALSI), namely the National Institute for the Evaluation of the Education and Training System. This source provides information on all Italian upper secondary schools, enabling us to analyse each student enrolled in the 2018/2019 school year (s.y.) in the 13th grade, who took the INVALSI test – a standardised national assessment in Italian, English, and Mathematics – and graduated in the same s.y.

The second source is the Anagrafe nazionale studenti (ANS), namely the National Student Registry, which contains information on all students enrolled in Italian universities during the 2019/2020 academic year (a.y.).

Overall, the INVALSI data for the 2018/2019 s.y. includes 449,482 students enrolled in grade 13th in 7,425 upper secondary schools (to be noticed that 125 schools do not have male graduates, and 329 schools do not have female graduates). Of these, 225,593 students were registered in the Anagrafe Nazionale Studenti (ANS) database as enrolled in Italian tertiary education

¹ The data used in this study have been processed in accordance with the research protocol for the study *From high school to the job placement: analysis of university careers and university mobility from Southern to Northern Italy* among the Ministry of University and Research, the Ministry of Education and Merit, the University of Palermo as the lead institution, and the INVALSI Institute. The reference researcher for the University of Florence is Bruno Bertaccini.

for the 2019/2020 a.y. Thus, the overall transition rate from upper secondary school to university is 50.2% in that a.y.

For our analysis, we focus on the school-to-university transition immediately after graduation, considering graduates from upper secondary school who choose whether or not to enrol in an Italian university in the following academic year. The entire region of Valle d'Aosta is excluded due to missing data, likely related to its status as an autonomous region with a distinct administrative framework, which may affect data collection and integration.

2.2. Indicators

To explore differences in gender composition concerning university enrolment from Italian upper secondary schools, we computed three distinct indicators at the school level: Entry Rate, Gender Gap in Entry Rate, and Choice Similarity Index. Each of these indicators is calculated in both a pooled version (i.e., considering both male and female students in the school) and separately by gender (i.e., considering male/female students in the school only), allowing for a comparison of the school-to-university transition between female students and male students². The Gender Gap in Entry Rate is the only exception, as its formulation already takes gender composition differences into account.

The Entry Rate is defined as the percentage of students from a given school who enrol in the higher education system. This indicator is calculated as follows:

Overall Entry Rate

$$n\%_j = \frac{n_j}{N_j} \times 100$$

Female Entry Rate

$$n\%_j^{(F)} = \frac{n_j^{(F)}}{N_j^{(F)}} \times 100$$

Male Entry Rate

$$n\%_j^{(M)} = \frac{n_j^{(M)}}{N_j^{(M)}} \times 100$$

Thus, N_j represents the number of students in grade 13th in school j who took the INVALSI test and graduated during the 2018/2019 s.y., where $N_j^{(F)}$ and $N_j^{(M)}$ indicate the number of female and male students, respectively. Similarly, n_j , $n_j^{(F)}$, $n_j^{(M)}$ represent the total number of students, as well as the number of female and male students, respectively, in grade 13th in school j who enrolled in university during the 2019/2020 a.y. The entry rate ranges from

² Although our measure captures sex assigned at birth, we refer throughout the manuscript to “gender” gaps, on the grounds that the observed differences are largely driven by gender norms, expectations, and stereotypes rather than by biological sex itself.

0% to 100%, where a value of 0% indicates that no students from the school enrolled in higher education, while a value of 100% means that all students proceeded to university.

The second proposed indicator is the Gender Gap in Entry Rate (for brevity: Gender Gap Index), which represents the excess percentage of female students enrolling in university compared to male students. This indicator is calculated as follows:

$$GG\%_j = \frac{n\%_j^{(F)} - n\%_j^{(M)}}{n\%_j^{(F)} + n\%_j^{(M)}} \times 100$$

Thus, the Gender Gap Index is an indicator that ranges from -100% to 100%, where negative values indicate a higher proportion of male students enrolling in university compared to female students, while positive values indicate a higher proportion of female students enrolling compared to male students. Within this framework, the percentage of female or male students from school j who enrolled in university corresponds to the female or male Entry Rate, respectively³.

Finally, the third proposed indicator is the Choice Similarity Index, a reinterpretation of Simpson's Diversity Index (Simpson, 1949), which measures the distribution of different characteristics within a group. In our context, we aim to assess the extent to which upper secondary school graduates choose to enrol in the same university as their peers from the same school and graduating cohort. In this study, we focus exclusively on the choice of the same higher education institution, irrespective of the chosen field of study. We consider it the most appropriate starting point for a first implementation of this indicator, because examining similarity in institutional choice – rather than in field of study – allows us to capture the extent to which students from the same peer community remain embedded in a shared social context during the transition. This, in turn, provides novel insight into how peer concentration within the same destination institution may shape enrolment decisions, even when students pursue different academic pathways. To achieve this, we compute the Choice Similarity Index as follows:

³ If a school does not have neither female graduates nor male graduates that enrolled in university, both entry rates are equal to 0%, and thus the Gender Gap Index cannot be calculated and is missing.

$$CSI\%_j = \frac{\sum n_{jk}(n_{jk} - 1)}{n_j(n_j - 1)} \times 100$$

In this formula, n_{jk} represents the number of students in grade 13th in school j who took the INVALSI test and graduated during the 2018/2019 s.y. who enrolled in university k . The summation is taken over all possible K universities chosen by students from school j . In the denominator, n_j denotes the total number of students from school j who enrolled in university⁴.

A $CSI\%_j$ value of 0% indicates that each student from school j enrolled in a different university, while a value of 100% indicates that all students from the same school who enrolled in university (at least two) have chosen the same athenaeum. This indicator is calculated overall, as well as separately for female and male students. At a later stage, we will compute the Choice Similarity Index by simultaneously taking into account both the university of enrolment and the chosen field of study, for which an application can be found in Sulis, Tocchioni and Vitale (2026). By doing so, the shared destination social context among upper secondary school graduates becomes even more narrowly defined, further highlighting the extent to which peers' choices may be similar or dissimilar depending on their school of origin.

However, when presenting these indicators, we accounted for the size of each school by applying a weighted average approach, based on the number of students in each school. The sample size reported in the tables refers to the number of schools within each specific stratum.

3. Results

This section presents some descriptive statistics for the three indicators illustrated above, namely Entry Rate, Gender Gap Index, and Choice Similarity Index. In particular, the weighted average values are reported on the basis of three main stratification criteria: geographical location of the upper secondary school, type of upper secondary school, and socio-economic and cultural status of the school. Firstly, we present the mean values of the indicators for the five Italian macro-regions defined by the NUTS1 classification: North-West, North-East, Centre, South, and Islands. Secondly, mean values

⁴ If a school does not have female and/or male graduates who enrolled in university, the Choice Similarity Index cannot be calculated and is missing. Similarly, the index is also missing when only one student from the school enrolls in university, as it requires a comparison between at least two students.

are presented by type of upper secondary schools, considering the main curricula offered by the Italian education system, which includes six types of lyceums (Classical, Scientific, Linguistic, Social Sciences, Artistic and a residual category, Other lyceums), two types of technical institutes (Economic and Technological) and Vocational schools. The ESCS (Economic, Social, and Cultural Status) indicator, provided by INVALSI, is calculated at the individual, student-level and is based on various economic, social, and cultural factors (INVALSIopen, 2020). For this analysis, we use a school-level measure, obtained by averaging the ESCS values of all students within each school. Based on this average, schools are assigned to one of the four quartiles at the regional level. The original ESCS index ranges from -2.62 to 1.82, with higher values indicating a higher socio-economic and cultural status. The four quartiles are defined as *low*, *lower-middle*, *upper-middle*, and *high* socio-economic and cultural status.

3.1. Indicators by macro-region of upper secondary school

Figure 1 shows the values of the Entry Rate and Gender Gap Index, whose values can be observed in detail by looking at Table 1. In terms of Entry Rate, it is evident that the overall mean for the central (53.0%) and north-western (52.0%) macro-regions is above the national average (50.2%), while the lowest share of students who choose to enrol in university is reported for the Islands (46.9%). Regarding gender composition, the female Entry Rate is consistently higher than the male rate across all macro-regions by at least 9.3 percentage points. The highest values are recorded for the Central macro-region for both subgroups (females: 59.0%; males: 47.0%).

Concerning the Gender Gap Index, the values reported in Figure 1 are quite homogeneous across macro-regions. Italy is characterised by a general excess of female students over male ones who choose to enrol in university after graduating from upper secondary school (the Gender Gap Index varies between 5.7% in the North-East and 8.7% in the Centre, with a national average of 7.3%). Moreover, the Gender Gap Index highlights that the two macro-regions with the highest excess of females over males in university enrolment are the North-West (7.5%) and the Centre (8.7%). However, the South and the Centre exhibit the highest variability in terms of interquartile range (South: 33.6%; Centre: 27.9%), while the North-East emerges as the more gender-balanced (26.5%), with fewer schools having a particularly high excess of male and female students over the opposite gender.

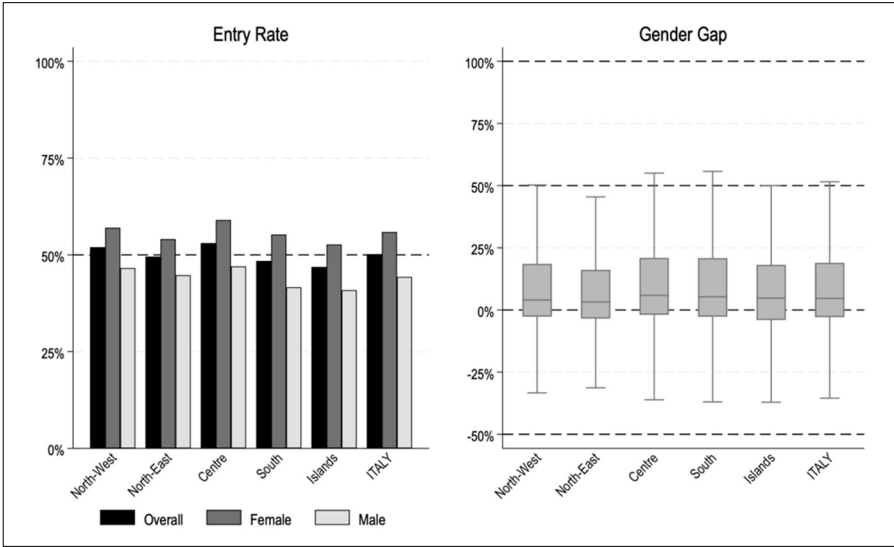


Fig. 1 – Entry Rate and Gender Gap Index by macro-region of upper secondary school

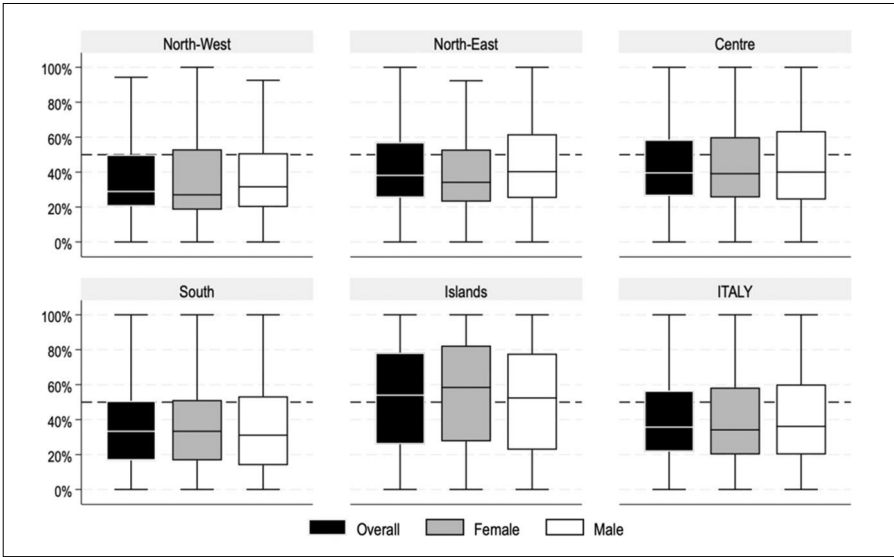


Fig. 2 – Choice Similarity Index by macro-region of upper secondary school

Figure 2 shows the values for the Choice Similarity Index by macro-region, as detailed in Table 1. Notably, the CSI is consistently higher for males than for females. This evidence suggests a more pronounced ten-

dency for male students to enrol in the same university as their peers who graduated in the same school and year. In particular, schools located in the Islands exhibit, on average, the highest levels of choice similarity (52.8%), likely due to the limited connections between Sicily and Sardinia and the mainland, which restricts choices to the most accessible universities with transportation (e.g., those reachable by aeroplane or ferry), or to the few universities located in those islands (4 in Sicily and 2 in Sardinia). In contrast, schools in the South show lower levels of choice similarity, with an overall CSI of 35.8%, and even lower values when broken down by gender (Females: 36.0%; Males: 36.9%).

Tab. 1 – Descriptive Statistics for the Entry Rate, Gender Gap Index and Choice Similarity Index by macro-region of upper secondary school

	<i>Entry Rate</i>				
	<i>N schools/</i>	<i>Mean</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>
<i>Macro-region</i>	<i>Overall</i>				
North-West	1,704	52.0%	27.0%	0.0%	100.0%
North-East	1,130	49.5%	27.3%	0.0%	100.0%
Centre	1,471	53.0%	27.8%	0.0%	100.0%
South	2,160	48.4%	30.2%	0.0%	100.0%
Islands	960	46.9%	27.6%	0.0%	100.0%
Italy	7,425	50.2%	28.3%	0.0%	100.0%
	<i>Female</i>				
North-West	1,641	57.0%	25.1%	0.0%	100.0%
North-East	1,079	54.1%	26.1%	0.0%	100.0%
Centre	1,413	59.0%	26.1%	0.0%	100.0%
South	2,070	55.2%	29.1%	0.0%	100.0%
Islands	893	52.7%	26.8%	0.0%	100.0%
Italy	7,096	55.9%	26.9%	0.0%	100.0%
	<i>Male</i>				
North-West	1,692	46.6%	29.4%	0.0%	100.0%
North-East	1,122	44.8%	29.1%	0.0%	100.0%
Centre	1,448	47.0%	29.7%	0.0%	100.0%
South	2,106	41.6%	31.0%	0.0%	100.0%
Islands	932	40.9%	28.7%	0.0%	100.0%
Italy	7,300	44.3%	29.9%	0.0%	100.0%

(to be continued)

Tab. 1 – Descriptive Statistics for the Entry Rate, Gender Gap Index and Choice Similarity Index by macro-region of upper secondary school

<i>Gender Gap Index</i>					
<i>Macro-region</i>	<i>N schools*</i>	<i>Mean</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>
North-West	1,611	7.5%	26.9%	-100.0%	100.0%
North-East	1,060	5.7%	29.3%	-100.0%	100.0%
Centre	1,371	8.7%	29.2%	-100.0%	100.0%
South	1,946	7.4%	35.2%	-100.0%	100.0%
Islands	833	6.7%	32.1%	-100.0%	100.0%
Italy	6,821	7.3%	30.8%	-100.0%	100.0%
<i>Choice Similarity Index</i>					
<i>Overall</i>					
North-West	1,642	38.2%	24.3%	0.0%	100.0%
North-East	1,081	42.4%	21.7%	0.0%	100.0%
Centre	1,381	43.4%	23.2%	0.0%	100.0%
South	1,897	35.8%	22.9%	0.0%	100.0%
Islands	831	52.8%	29.4%	0.0%	100.0%
Italy	6,832	40.9%	24.4%	0.0%	100.0%
<i>Female</i>					
North-West	1,477	38.0%	26.2%	0.0%	100.0%
North-East	965	38.8%	21.4%	0.0%	100.0%
Centre	1,212	42.7%	23.3%	0.0%	100.0%
South	1,653	36.0%	23.3%	0.0%	100.0%
Islands	703	53.9%	29.8%	0.0%	100.0%
Italy	6,010	40.2%	25.1%	0.0%	100.0%
<i>Male</i>					
North-West	1,477	39.3%	25.3%	0.0%	100.0%
North-East	957	47.2%	25.5%	0.0%	100.0%
Centre	1,216	44.9%	26.8%	0.0%	100.0%
South	1,581	36.9%	26.6%	0.0%	100.0%
Islands	695	52.2%	32.1%	0.0%	100.0%
Italy	5,926	42.6%	27.3%	0.0%	100.0%

* The number of schools for these indicators differs from the number of schools for the Entry Rate because schools without any students enrolled, or without students of both genders graduated, result in missing values for the calculation of the Gender Gap Index and the Choice Similarity Index.

As the Italian framework is characterised by regional peculiarities, Figure 3 provides a comparison at the NUTS2 level for all the proposed indicators. The female Entry Rate is consistently higher than the male Entry Rate, even

at the regional level. On average, the Gender Gap Index is also consistently positive. However, regions such as Umbria, Molise, and Basilicata exhibit a particularly high excess of females over males enrolling in university, while Emilia Romagna, Campania, and Sicily show a more balanced gender representation.

Finally, some useful insights can be gleaned regarding the CSI. From Figure 3, it can be inferred that the lowest levels of Choice Similarity Index are found in the southern regions, while students from Piedmont, Liguria, Tuscany, and Emilia Romagna (along with their peers from the Islands, as explained above), tend to exhibit a higher tendency to make similar choices as their school colleagues. This evidence could reflect, for students residing in the North-West and Centre, the tendency at applying in nearer university, as they are already settled in attractive territories (Lombardi and Ghellini, 2019).

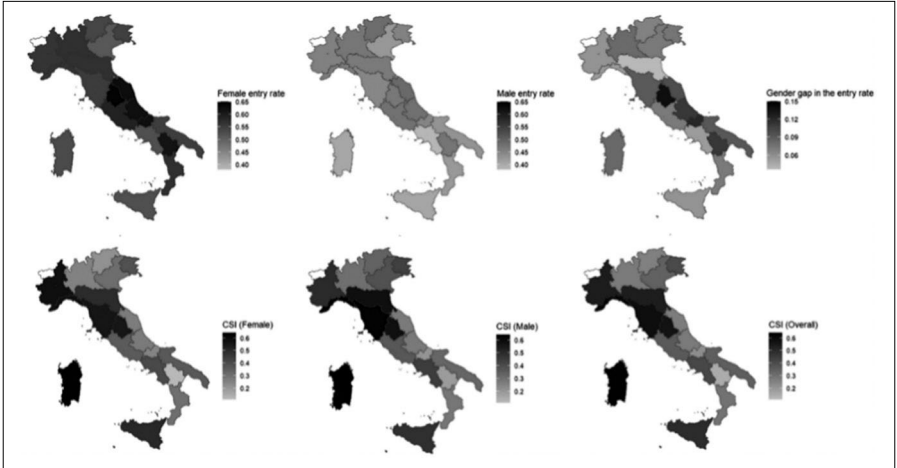


Fig. 3 – Female and male Entry Rates, Gender Gap Index (on the top), and female, male, and overall CSI (on the bottom) by Italian regions

3.2. Indicators by upper secondary school curriculum

Figure 4 shows results for Entry Rate and Gender Gap Index grouped by upper secondary school curriculum, as detailed in Table 2. Even in this case, female Entry Rates are consistently higher than male ones. Unsurprisingly, on average the highest Entry Rates attain to Classical (83.4%) and Scientific (80.9%) lyceums, which are considered as the most academic tracks in

the Italian upper secondary education system. On the other side, Vocational schools (12.4%) and the residual category of Other lyceums (9.5%) are characterised by the lowest mean rates of enrolment.

Consistent results emerge when looking at the Gender Gap Index. Indeed, Classical and Scientific lyceums are characterised by the most gender balanced values (mean values of 1.5% and 1.2%, respectively), associated with the lowest standard deviations (respectively 9.9% and 9.8%, see Table 2). In this case, Artistic, Other lyceums and Vocational schools exhibit an average female student enrolment that exceeds male enrolment by more than 10%. This reflects the trend that females are more likely to enrol in universities than males, particularly when they come from these types of schools.

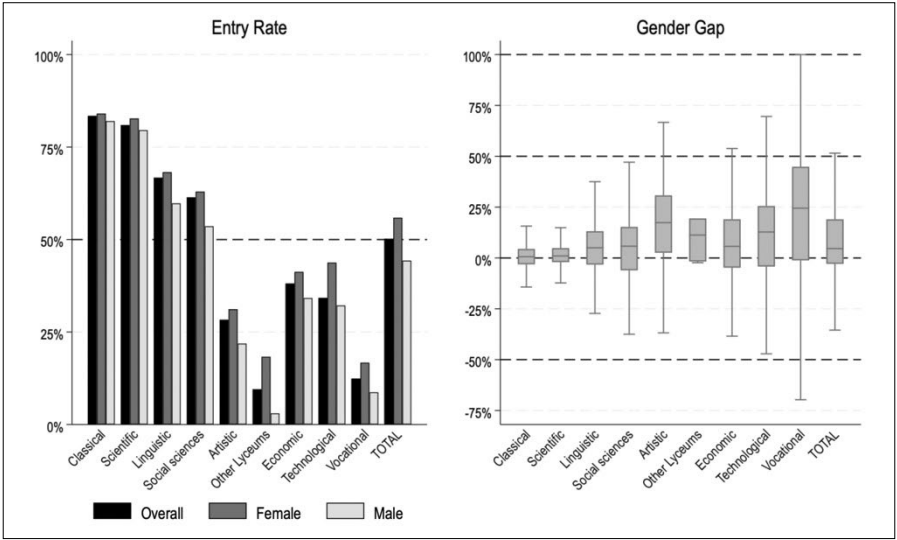


Fig. 4 – Entry Rate and Gender Gap Index by upper secondary school curriculum

When examining the Choice Similarity Index, as shown in Figure 5 and detailed in Table 2, it becomes evident that the CSI is not consistently higher for males than for females across all curricula. Overall, the lowest average scores are observed in Classical (34.3%), Linguistic (36.3%), Artistic (36.8%), and Scientific (38.3%) lyceums, while the highest average scores correspond to Economic (43.9%), Vocational and Technological schools (both 44.8%), and the group of Other lyceums (65.8%).

Regarding the most notable gender differences, the smallest gaps in the Choice Similarity Index are observed in Economic schools (0.7 percentage points in favour of females) and Vocational schools (0.5 percentage points

in favour of females), indicating that male and female students in these curricula exhibit similar patterns in university choice similarity. Conversely, the largest differences are found in the category of Other lyceums, where the CSI is 14.7 percentage points higher for females than for males, followed by Technological schools, where males show a 3.2 percentage point higher CSI than females. Social Sciences also show a notable gender difference, with female students exhibiting a CSI that is 3.1 percentage points higher than their male counterparts. These patterns suggest that in Technological schools, male students tend to enrol in the same universities as their male peers more often than female students do with their female peers, while in Social Sciences and Other lyceums, female students show a stronger tendency to choose the same university as their female colleagues.

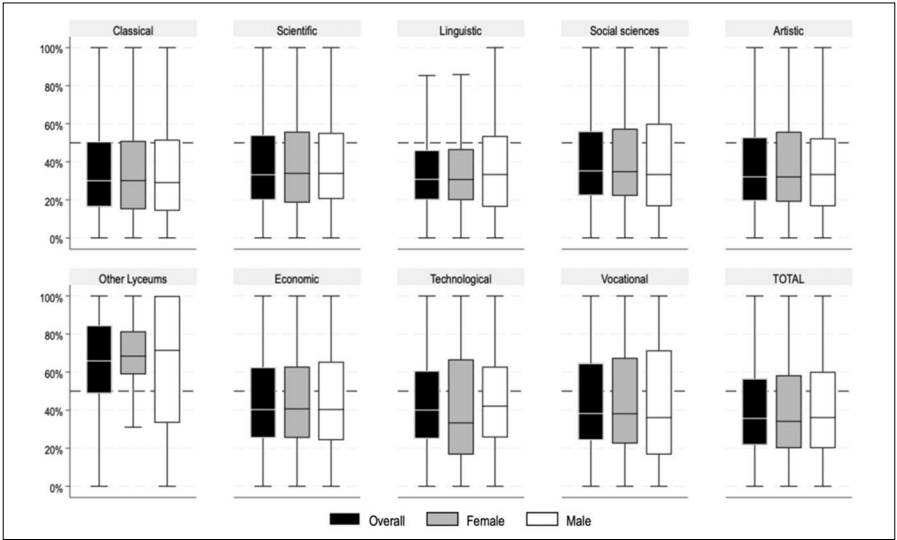


Fig. 5 – Choice Similarity Index by upper secondary school curriculum

Table 2 provides a detailed exploration of the results described above. As expected, the overall picture highlights the fundamental role of Classical and Scientific lyceums in fostering participation in the Italian tertiary education system. These two curricula exhibit the highest Entry Rates and the lowest levels of gender disparity. Their CSI scores are also the lowest (34.3% and 38.3%), with minimal differences even when the indicator is broken down by gender (1.2 percentage points higher for males in both cases).

Tab. 2 – Descriptive statistics for the Entry Rates, Gender Gap Index and Choice Similarity Index by upper secondary school curriculum

	<i>N schools</i>	<i>Entry Rate</i>			
		<i>Mean</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>
<i>Curriculum</i>		<i>Overall</i>			
Classical	649	83.4%	7.6%	0.0%	100.0%
Scientific	1,448	80.9%	10.6%	4.5%	100.0%
Linguistic	762	66.7%	10.9%	7.7%	100.0%
Social Sciences	677	61.4%	14.2%	0.0%	100.0%
Artistic	399	28.3%	8.8%	0.0%	100.0%
Other lyceums	233	9.5%	18.4%	0.0%	100.0%
Economic	1,071	38.1%	14.7%	0.0%	100.0%
Technological	1,158	34.2%	13.7%	0.0%	93.3%
Vocational	1,028	12.4%	8.0%	0.0%	100.0%
Total	7,425	50.2%	28.3%	0.0%	100.0%
		<i>Female</i>			
Classical	645	84.1%	8.3%	0.0%	100.0%
Scientific	1,435	82.7%	10.9%	0.0%	100.0%
Linguistic	762	68.2%	10.6%	0.0%	100.0%
Social Sciences	676	63.0%	13.6%	0.0%	100.0%
Artistic	398	31.2%	10.1%	0.0%	100.0%
Other lyceums	146	18.3%	23.5%	0.0%	100.0%
Economic	1,063	41.3%	15.3%	0.0%	100.0%
Technological	1,027	43.8%	20.2%	0.0%	100.0%
Vocational	944	16.7%	10.6%	0.0%	100.0%
Total	7,096	55.9%	26.9%	0.0%	100.0%
		<i>Male</i>			
Classical	639	82.0%	12.4%	0.0%	100.0%
Scientific	1,447	79.6%	12.2%	0.0%	100.0%
Linguistic	743	59.8%	19.1%	0.0%	100.0%
Social Sciences	636	53.6%	22.8%	0.0%	100.0%
Artistic	390	21.9%	11.4%	0.0%	100.0%
Other lyceums	203	3.0%	11.1%	0.0%	87.5%
Economic	1,068	34.2%	16.9%	0.0%	100.0%
Technological	1,157	32.2%	13.3%	0.0%	78.4%
Vocational	1,017	8.7%	6.7%	0.0%	100.0%
Total	7,300	44.3%	29.9%	0.0%	100.0%

(to be continued)

Tab. 2 – Descriptive statistics for the Entry Rates, Gender Gap Index and Choice Similarity Index by upper secondary school curriculum

<i>Gender Gap Index</i>					
<i>Curriculum</i>	<i>N schools*</i>	<i>Mean</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>
Classical	634	1.5%	10.0%	-100.0%	100.0%
Scientific	1,434	1.2%	9.8%	-100.0%	100.0%
Linguistic	743	7.2%	19.2%	-100.0%	100.0%
Social Sciences	632	9.0%	26.1%	-100.0%	100.0%
Artistic	386	19.0%	31.5%	-100.0%	100.0%
Other lyceums	15	20.1%	47.3%	-100.0%	100.0%
Economic	1,053	6.2%	30.7%	-100.0%	100.0%
Technological	1,022	3.8%	40.0%	-100.0%	100.0%
Vocational	902	18.8%	46.0%	-100.0%	100.0%
Total	6,821	7.3%	30.8%	-100.0%	100.0%
<i>Choice Similarity Index</i>					
<i>Overall</i>					
Classical	643	34.3%	20.5%	0.0%	100.0%
Scientific	1,437	38.3%	22.0%	0.0%	100.0%
Linguistic	756	36.3%	21.5%	0.0%	100.0%
Social Sciences	663	40.6%	23.5%	0.0%	100.0%
Artistic	370	36.8%	23.8%	0.0%	100.0%
Other lyceums	16	65.8%	22.5%	0.0%	100.0%
Economic	1,013	43.9%	25.0%	0.0%	100.0%
Technological	1,079	44.8%	25.4%	0.0%	100.0%
Vocational	855	44.8%	28.1%	0.0%	100.0%
Total	6,832	40.9%	24.4%	0.0%	100.0%
<i>Female</i>					
Classical	632	34.3%	21.0%	0.0%	100.0%
Scientific	1,368	38.1%	23.0%	0.0%	100.0%
Linguistic	749	36.0%	21.6%	0.0%	100.0%
Social Sciences	654	41.4%	23.7%	0.0%	100.0%
Artistic	352	37.2%	24.8%	0.0%	100.0%
Other lyceums	12	69.7%	18.0%	31.1%	100.0%
Economic	895	45.3%	25.5%	0.0%	100.0%
Technological	682	42.8%	30.1%	0.0%	100.0%
Vocational	666	45.5%	29.9%	0.0%	100.0%
Total	6,010	40.2%	25.1%	0.0%	100.0%

(to be continued)

Tab. 2 – Descriptive statistics for the Entry Rates, Gender Gap Index and Choice Similarity Index by upper secondary school curriculum

Curriculum	Choice Similarity Index				
	N schools*	Mean	SD	Min	Max
Male					
Classical	593	35.5%	24.2%	0.0%	100.0%
Scientific	1,420	39.3%	22.6%	0.0%	100.0%
Linguistic	621	38.7%	28.9%	0.0%	100.0%
Social Sciences	478	38.3%	30.6%	0.0%	100.0%
Artistic	258	38.4%	30.3%	0.0%	100.0%
Other lyceums	11	55.0%	37.6%	0.0%	100.0%
Economic	872	44.6%	29.0%	0.0%	100.0%
Technological	1,033	46.0%	25.9%	0.0%	100.0%
Vocational	640	45.0%	33.6%	0.0%	100.0%
Total	5,926	42.6%	27.3%	0.0%	100.0%

* The number of schools for these indicators differs from the number of schools for the Entry Rate because schools without any students enrolled, or without students of both genders graduated, result in missing values for the calculation of the Gender Gap Index and the Choice Similarity Index.

In summary, Classical and Scientific lyceums contribute the largest number of students to higher education while also displaying the greatest heterogeneity in students’ choices in terms of higher education institution and the lowest levels of gendered behaviour. This is consistent with the well-known evidence that these curricula correspond to the most academic tracks in the Italian upper secondary education system. However, it should also be emphasised that their students, on average, exhibit a higher socio-economic status, providing them with greater resources for academic investment (Tocchioni, Milone and Lombardi, 2025).

3.3. Indicators by ESCS quartiles

Figure 6 shows the results of Entry Rates and the Gender Gap Index grouped by ESCS quartiles. More details are available in Table 3. The most interesting evidence emerging from Figure 6 is that, on one hand, the Entry Rate increases as the ESCS quartile of the schools increases; on the other hand, the Gender Gap Index decreases as the ECSC quartile increases. Indeed, schools in the two highest quartiles are the only ones with Entry Rates above the average for all groups: overall (mid-high: 59.9%, high:

77.8%; average: 50.2%), male (mid-high: 54.5%, high: 76.4%; average: 44.3%), and female (mid-high: 64.1%, high: 79.1%; average: 55.9%). Schools in high socio-economic contexts are also characterised by a substantial gender equality in university enrolment (Gender Gap Index equal to 1.4%). In summary, schools with students with a wealthy socio-economic background exhibit higher Entry Rate and a more equal gender balanced situation.

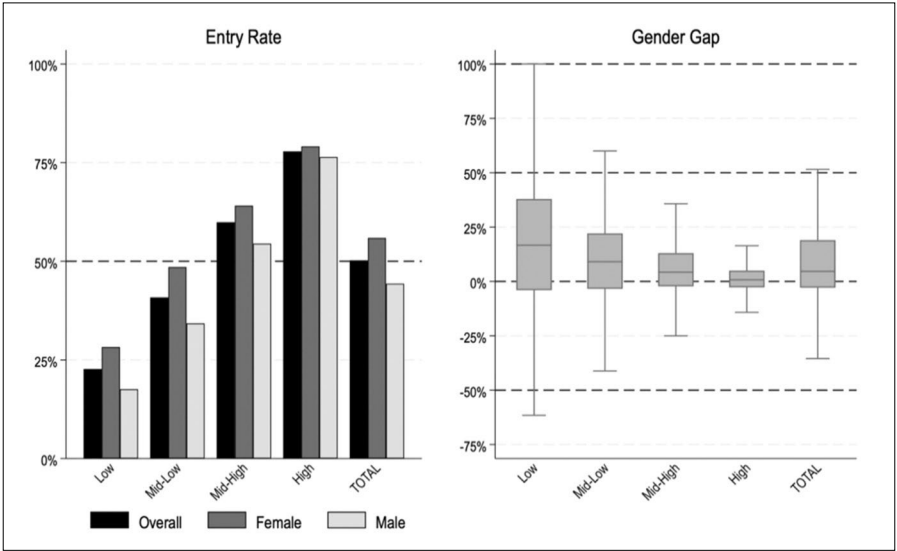


Fig. 6 – Entry Rate and Gender Gap Index by ESCS quartile

Figure 7 plots the Choice Similarity Index, then detailed in Table 3. As usual, male students tend to concentrate in the same universities more than female students. Nonetheless, as in the case of the Gender Gap Index, the tendency to make similar university choices decreases as the ESCS quartile increases. Accordingly, students from the two highest ESCS quartiles are the only ones exhibiting average Choice Similarity Index values below the population average of 40.9 %.

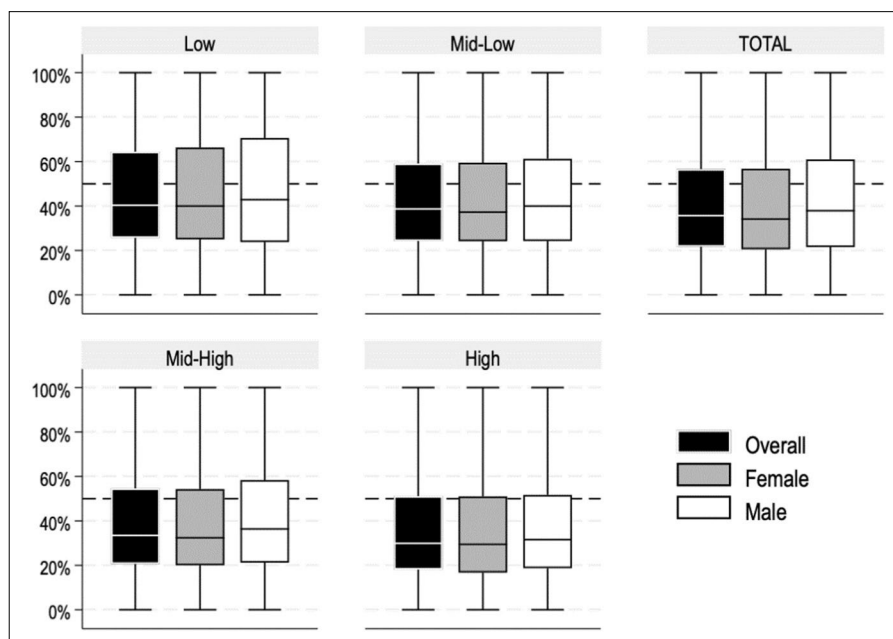


Fig. 7 – Choice Similarity Index by ESCS quartile

Tab. 3 – Descriptive Statistics for the Entry Rates, Gender Gap Index and Choice Similarity Index by ESCS quartile

	<i>N schools</i>	<i>Entry Rate</i>			
		<i>Mean</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>
<i>Curriculum</i>		<i>Overall</i>			
Low	1,883	22.7%	17.6%	0.0%	100.0%
Mid-low	1,738	40.8%	19.5%	0.0%	100.0%
Mid-high	1,873	59.9%	22.7%	0.0%	100.0%
High	1,931	77.8%	17.3%	0.0%	100.0%
Total	7,425	50.2%	28.3%	0.0%	100.0%
		<i>Female</i>			
Low	1,733	28.3%	19.8%	0.0%	100.0%
Mid-low	1,657	48.5%	20.7%	0.0%	100.0%
Mid-high	1,819	64.1%	20.4%	0.0%	100.0%
High	1,887	79.1%	16.0%	0.0%	100.0%
Total	7,096	55.9%	26.9%	0.0%	100.0%

(to be continued)

Tab. 3 – Descriptive Statistics for the Entry Rates, Gender Gap Index and Choice Similarity Index by ESCS quartile

	Entry Rate				
	N schools	Mean	SD	Min	Max
Curriculum	Male				
Low	1,846	17.6%	15.9%	0.0%	100.0%
Mid-low	1,708	34.2%	18.1%	0.0%	100.0%
Mid-high	1,841	54.5%	26.3%	0.0%	100.0%
High	1,905	76.4%	20.3%	0.0%	100.0%
Total	7,300	44.3%	29.9%	0.0%	100.0%
	Gender Gap Index				
Low	1,616	14.4%	41.2%	-100.0%	100.0%
Mid-Low	1,597	7.9%	33.1%	-100.0%	100.0%
Mid-High	1,759	5.6%	25.4%	-100.0%	100.0%
High	1,849	1.4%	17.2%	-100.0%	100.0%
Total	6,821	7.3%	30.8%	-100.0%	100.0%
	Choice Similarity Index				
	Overall				
Low	1,590	46.1%	26.4%	0.0%	100.0%
Mid-low	1,617	43.0%	24.2%	0.0%	100.0%
Mid-high	1,767	39.2%	24.0%	0.0%	100.0%
High	1,858	35.4%	21.5%	0.0%	100.0%
Total	6,832	40.9%	24.4%	0.0%	100.0%
	Female				
Low	1,295	45.9%	28.1%	0.0%	100.0%
Mid-low	1,383	42.7%	24.8%	0.0%	100.0%
Mid-high	1,608	38.5%	24.2%	0.0%	100.0%
High	1,724	35.0%	22.0%	0.0%	100.0%
Total	6,010	40.2%	25.1%	0.0%	100.0%
	Male				
Low	1,260	47.3%	31.3%	0.0%	100.0%
Mid-low	1,390	44.4%	26.5%	0.0%	100.0%
Mid-high	1,574	41.5%	26.5%	0.0%	100.0%
High	1,702	36.8%	23.2%	0.0%	100.0%
Total	5,926	42.6%	27.3%	0.0%	100.0%

* The number of schools for these indicators differs from the number of schools for the Entry Rate because schools without any students enrolled, or without students of both genders graduated, result in missing values for the calculation of the Gender Gap Index and the Choice Similarity Index.

3.4. Concluding remarks

This work has proposed three indicators calculated at the school level aiming at investigating gender differences in university enrolment. The integration of INVALSI data, which provides information about 13th grade graduates in 2018/2019, and ANS data, which informs about university enrolment in 2019/2020, represents an invaluable tool for exploring this topic.

The first indicator, the Entry Rate, is highest in central regions and decreases towards peripheral areas. Entry Rates then decrease as students belong to schools with lower socio-economic backgrounds on average. Moreover, this category of students typically opts for low academic tracks in upper secondary school, specifically Technological and Vocational schools, which are indeed characterised by the lowest Entry Rates, while Classical and Scientific lyceums by the highest.

In this framework, female Entry Rates are consistently higher than male rates, especially in Vocational schools, southern regions, and among students from lower socio-economic backgrounds. It is noteworthy that the poorer the students' context, the higher the female university Entry Rate compared to the male rate. This conclusion is further supported by the second indicator proposed. Indeed, the Gender Gap Index, which measures the excess of females over males enrolling in university, appears to be amplified as the socio-economic and cultural background of students decreases. The indicators presented offer a descriptive representation of reality but suggest hypotheses that warrant further investigation. In particular, the wider values for the Gender Gap Index observed in Vocational schools, southern regions, and among students from lower socio-economic backgrounds suggest that male students are especially disadvantaged in their educational trajectories when facing more challenging contexts.

The final indicator proposed is the Choice Similarity Index, which represents the main novelty of our work. As far as we know, this is the first time such an index has been employed in the educational framework. The primary evidence obtained indicates that males tend to enrol in the same university as their peers who graduated from the same school and year more than females. This suggests that for male students, the presence of an existing social context during university enrolment plays a crucial role in their academic decisions. Even more, students from Sardinia and Sicily exhibit particularly high levels of choice similarity. We attribute this evidence to the poor connections between these islands and the mainland, which limit access to easily reachable universities.

Finally, the Choice Similarity Index tends to increase as the social context of origin declines (e.g., Technological and Vocational schools, and low-

ESCS schools). This finding suggests two mechanisms at play, which should be tested in further research. First, students in Vocational curriculum in the Italian upper secondary education system seem to rely more on their peers, namely, to enrol in the same university as their peers do. Second, students attending upper secondary schools with, on average, higher socio-economic backgrounds tend to face fewer constraints in their university career choices. Owing to their family of origin, they are likely to enjoy greater flexibility in selecting their institution of enrolment, which in turn may lead to more diverse and heterogeneous educational pathways.

Further research will involve recalculating this indicator on the basis of fields of study, rather than solely on the institution chosen. As previously noted, these three indicators, along with the three proposed stratifications, provide valuable insights for a deeper analysis of gender differences in university enrolment within the Italian education system. This provides a foundation for further development. These indicators can be used to empirically investigate whether, and to what extent, these factors concurrently contribute to Italian students' participation in tertiary education. Currently, the analysis of these dynamics cannot be fully explored without benefiting from the valuable integration of INVALSI and ANS data sources. Synergies between different public institutions collecting administrative data about the Italian education system are already yielding positive research outcomes, and this approach should always be promoted and incentivized.

3.5. Acknowledgments

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linguistica, storia

Politica, diritto

Psicologia, benessere,
autoaiuto

Efficacia personale

Politiche
e servizi sociali



FrancoAngeli

La passione per le conoscenze

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In recent decades, educational inequalities have emerged as a central issue in scientific and political debate. Educational systems are now expected to do more than guarantee access to education; they must also promote equity in educational outcomes and learning opportunities. Factors such as gender, social background, migrant status, and economic conditions have a significant impact on educational pathways, creating cumulative advantages and disadvantages throughout students' lives.

This volume is situated within this analytical framework, bringing together six papers presented at the ninth edition of the INVALSI Seminar "Data from and for educational systems: tools for research and teaching", which was held in Rome from 17 to 19 October 2024.

Taken together, the contributions provide a detailed, multi-level picture of educational inequalities in Italy. They show that the observed gaps do not result from isolated individual factors, but emerge from the interplay between social contexts, institutional frameworks, public policies, and educational practices. Understanding these mechanisms is essential for constructing a more equitable and inclusive education system that can realise the potential of all students in an increasingly diverse society.

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