Students, Parents and School-Choices. Gendered Trajectories in the Italian Education System

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Abstract: The main aim of this paper is to describe and analyze gender differences and gaps in the Italian education system in terms of three main dimensions: students, teachers and students' families in childcare services, primary, secondary and tertiary education. The focus is on learning processes and educational outcomes, school-track choices and family socio-cultural backgrounds. The paper also examines Italian students' expectations and prospects to enrol in higher education, their failures and successes according to gender stereotypes, and unconventional educational patterns.

Keywords: gender differences, education inequalities, Italy.

Introduction

In this paper I will try to describe and analyze the reproduction of gender differences and inequalities along the learning trajectories in the Italian education system. Given that the available literature on the topic is extraordinarily extensive and the biographical period covered from nursery school to university so extensive, I will rely on a selective use of available research and data based on the following criteria: where available, national data coverage, recent update of research findings, a gender approach that is as inclusive as possible of different identities.

In addition, I will adopt a quasi-literary expedient, that is, I invite the reader to follow two imaginary fictional persons – Ada and Lorenzo – trying to decline their facing of chances and opportunities, impediments and social dispositions to develop educational attainments, learning achievements, orientations and expectations for each step of their early-life cycle and according to both stereotyped and unconventional social influences. I will enact Ada's and Lorenzo hypothetical trajectories displaying the effects of the main independent variables that have been included in the field of the sociology of education so far (social origins, family background, parents' education attainments, geographical divides, school-track choices and academic fields of studies).

What I am proposing is thus an illustrative and the same time analytical display of educational careers, fictionally covering the period from the 2000s to the present time. Its aim is to try to "frame" the general state of the art of gender differences and inequalities along the Italian educational process leading to the completion of compulsory and higher education. We know that this process goes hands in hands not only with the definition of gender identities during transition to adult life, but also with social factors impacting on gender differences and inequalities in the family, in the labour market, in daily life and in society at large (Lipman-Blumen, 1976; Shields, 2008; Risman, 2018). In tracing Ada's and Lorenzo's educational paths, I will also include relations and links to main proximal actors – parents and teachers – and ostensibly peer groups and traditional and new media. Hence, I hope to be able to unfold all the fundamental features bridging gender dichotomies in education, learning and socialization.

1. Forging Gender Identities in Early Educational Stages

Let us imagine the likely educational trajectories of two Italian students, Ada and Lorenzo, born in the new millennium. As soon as they enter our world, the parents of the two children will follow Italian customs for communicating to the community the important event of their children's birth

by hanging a pink bow outside at Ada's house and a blue one outside for Lorenzo. Already at this point they adhere to the chromatic tradition binding new-borns to social beliefs about gender belonging. As the months go by, the issue of enrolling in early childcare structures or nurseries, public or private, will be addressed by both Ada's and Lorenzo's parents. They are not likely to consider the appropriateness of early education for a boy *vs* a girl in terms of socialization with peers, the value of a progressive pedagogical approach to counteract gender stereotypes or research suggesting that extra-familial *stimuli* will better prepare children for the future. Rather, in Italy, the decision to enrol a son or daughter in a nursery or early childcare centre usually depends mainly on whether the mother is employed full-time and both parents have high educational levels, two conditions that are, however, closely related (Alleanza per l'infanzia, 2020; ISTAT, 2020; Marucci, Rosiello, 2021). Their choice will also be conditioned by the availability of public facilities and whether or not there are stringent eligibility requirements for accessing early childhood services in the area where Ada and Lorenzo live or where their respective parents work. Less than a quarter of Italian children aged 0-3 usually access kindergartens, with wide gaps in access depending on regional location, town dimensions and parents' socio-professional statuses (Carta, Rizzica, 2018). There are not enough early childcare services in Italy to meet demand and coverage is uneven around the country, as facilities are concentrated in large northern cities and more economically developed areas. This divide not only reflects the country's central-north *vs* south economical divide, but also the gap between urban areas and inland or rural ones (ISTAT, 2020).

Above all, however, whatever kindergarten they might attend, be it municipal or private and staffed by young or older educators, Ada and Lorenzo will mainly interact with women: male childcare workers are quite scarce in early childhood education and care services in Italy. So unusual, in fact, that their professional identity is often called into question because it seems that caring for young children is not something men are supposed to do. In 2019, approximately 98.6% of Italian pre-primary education personnel were female workers (OECD, 2021).

An increasing number of scientifically-grounded publications and reports find that a gender-mixed team offers boys and girls the chance to learn from each other (Rohrmann, Brody, 2015; Hjelmér, 2020; Brody *et al.*, 2020). Nonetheless, Italian educational institutions and policies – and above all, common ways of thinking – do not intervene to prevent the consolidation of gender segregation in both the demand for and provision of qualified childcare services personnel (Saraceno, 1994; Naldini, Jurado, 2013).

Not only will Ada and Lorenzo have only female and no male educators, the creative and educational activities in which they participate will also

reinforce gender stereotypes. The programming will likely encourage the formation of peer groups based on opposing, gender-based demarcations and feed social patterns that are polarized according to gender expectations (Ghighi, 2009). Ada and Lorenzo will interact with a game culture that will become crucial in the formation of their own identity (Sutton-Smith, 1997). Through playing and then gaming, Ada and Lorenzo will socialize, express the socio-cultural model they have been taught to follow and learn to respect moral codes. They will also explore and test out their gender identities during playing and gaming (Ricchiardi, Venera, 2005). It is very likely that Ada will be taught to play more often indoors, usually in smaller groups or pairs, participating more in talking and conversation. She will become accustomed to using smaller spaces and taking up less room, being more likely to take turns and, if she does dominate a situation, doing so through courtesy. It is also likely that Ada will develop a love for dressing up to appear glamorous, taking on other traditional and stereotyped female roles such as princesses and fairies and learning that it is appropriate to express interest in "girly outfits", dresses, make-up and accessories (Abbatecola, Stagi, 2017). Lorenzo will instead prefer to play outdoors, take part in large groups, and run around. He will learn to be physical, becoming accustomed to rough-and-tumble play, taking up more room when playing, being competitive in socially male games and sometimes being more physically aggressive with other boys – and possibly girls – in front of his peer group. He will also develop a preference for heroic and war-like themes and use objects as play-weapons for killing or rescuing (Cocever, 2002). Of course, the respective gender *habitus* awaiting Ada and Lorenzo is unwritten, and it might well be that one or both will deviate from the socially established standard. Such independence would depend mainly on their parents' willingness, attitudes, and motivation to counterbalance traditional stereotypes, however, as well as on contextual social surroundings. As a matter of fact, gender stereotypes influence preschool boys and girls as they first construct their interests; it is only later that such stereotypes condition their attitudes (Halim *et al.*, 2017).

Moreover, it is the professional profile of childcare educator that is most directly reminiscent of the traditional function of maternal care, especially in Italy. In Italian pre-primary education centres, caregiving skills are prioritized over pre-literacy learning and the over-feminization of the teaching profession is due in part to the deeply rooted image of early childhood education as "maternal" (Colombo, Barabanti, 2021). Indeed, it was only in 2007 that the term for Italian pre-primary education was changed to *scuola per l'infanzia* – childhood school – from its decades-old name of *scuola materna* – maternal school. Men tend to only be drawn to jobs in the childcare sector if the professionalism of the positions in question is not gender-bound, in other words, not based on the maternal role (Ottaviano, Persico, 2019). This

tendency provides still more evidence of the traditional and evident "gender-ization" of professions in the labour market.

At their pre-primary school, Ada and Lorenzo will be recognizable by the colour of the aprons they are required to wear and will interact with nearly all female teachers. Italian women employed at pre-primary schools have long been represented through images of maternal femininity, described and framed as the "mother-surrogate", and associated with social or familial and care-taking tasks rather than intellectual and professional skills (Nardone, 2014).

Furthermore, Ada and Lorenzo will encounter the first books containing images, representations, games and later the *stimuli* for pre-literacy social-ization. Researchers in other European countries and the USA (Blumberg, 2009) but especially Italy (Seveso, 2016; Satta, Biemmi, 2017; Abbatecola, Sta-gi, 2017) have long noted and criticized the recurrence of gender stereotypes in children's books. Several studies have shown that females in these books are typically portrayed as passive, dependent and even not fully capable of solving problems on their own, while males were predictably represented as active, independent, and generally competent (Biemmi, 2015). Stereotyped patterns were found to be consistent across a variety of reading materials, including picture-books and pre-primary schools course textbooks.

In recent decades, an increasing awareness of this problem has led to a recognition the identity models and codes of conduct conveyed in school texts need to be changed. At the European level, regulations have been drawn up calling on publishers to become more sensitive to the problem of gender differences. However, these efforts have been limited to the enlight-ened intellectual mainstream and have yet to influence Italian publishing for children. The texts released in Italy seem to have remained rooted in highly stereotypical images and models of gender imbalance (Porzionato, 2016; Seveso, 2016). This is surprising considering that fiction books aimed at young people are found to be much more attentive to the gender dimension and currently use illustrations, covers and representations that are much less stereotypical than in the recent past (Fierli *et al.*, 2015). It is therefore curious that book production aimed at pre-primary and primary education has remained so insensitive to this issue.

The data slow suggest that, if Ada's and Lorenzo's respective parents are highly educated and inspired by progressive values, they will certainly make repeated attempts in daily life to counterbalance the traditional, ste-reotypical gendered models conveyed by school. They might set up games and opportunities for play aimed at reversing gender stereotypes, or exert direct pressure and provide incentives designed to convey alternative codes and values (Leonelli, 2011). Nonetheless, we also know that, not matter how resolute and single-minded these parental approaches may be, the messages

the children receive in school will still fix habits and preferences, tastes, styles and vocational orientations that will reverberate in the years to come. The influence from peer groups, demarcation lines and gender oppositions drawn in the school environment through uncritical daily practices and increasing exposure to old and new media devices will nonetheless push the children towards binary codes of difference (Durst, 2006).

Moreover, spatial division in pre-schools reinforces and encourages gender dualism (Prezza *et al.*, 2001; Abbatecola, Stagi, 2017): Ada and Lorenzo are likely to unconsciously incorporate the division of male *vs* female space as one of the first elements shaping participatory group activities. Also, different verbal and non-verbal communication styles and various practices enacted in a "differentiated" manner will be part of Ada's and Lorenzo's socialization.

Ada and Lorenzo will then be enrolled in primary school and again, in this case for five years, they will attend lessons taught by mainly female teachers using textbooks that once again rarely seek to counter gender stereotypes (Biemmi, 2010; Corsini, Scierri, 2016). According to OECD data (2021), the proportion of women in the total Italian primary school teaching population was 95.4% in 2019, meaning that both Ada and Lorenzo have over 9 chances out of 10 to be taught by female teachers during their five years of primary education.

The effects of the early steps of socialization begin to reproduce in the form of differentiated gendered preferences and attitudes towards teaching, learning and classroom behaviours, preferences and attitudes that are reinforced by teachers' orientations, assessments and categorizations. Ada will likely be more steered towards and praised when inclined to reading, understanding, comprehending, concentrating, multitasking and becoming engaged, while Lorenzo will probably be more steered towards and praised when competing, problem solving, monotasking, instrumentally focusing, doing science and acting in a physically energetic way (Corbisiero, Berritto, 2020).

According to INVALSI (2020) data, in second grade primary education, Ada will have a 1.7 chance out of ten to develop reading and language skills below the level considered minimally sufficient, while for Lorenzo the odds rise to 2.2 out of 10. Much depends, however, on the geographical area in which Ada and Lorenzo live: if our example girl lived in Campania, her chances of being among the students with the lowest level of reading and understanding of Italian would be 2.3 out of 10, but if she lived in the Marche region, these chances would be reduced to 1.1 out of 10. If Lorenzo lived in Calabria, he would have a 2.4 out of 10 chances of attaining a low level of reading and language understanding, whereas if he lived in Umbria this probability would drop to 1 out of 10. Lombardy is the Italian region where

the share of second female graders in primary school with an insufficient level of reading and understanding of Italian is the lowest compared to that of male pupils. If we consider mathematics, the likelihood that Ada will be among the girls whose skills are below the sufficiency level increases to 2.8 out of 10, while for Lorenzo the likelihood has been found to be 2.6 out of 10.

As has been measured in many other European countries, in Italy as well children begin to display the first evidence of gendered differentiations when are 7-8 years old and their preferences for certain school subjects become more pronounced. However, for reading and understanding the mother tongue language (an area in which the gender gap is minimal) as well as math in which gender gaps are wide, Ada and Lorenzo's chances of excelling (or not) also depend on the region in which they live: if Ada lived in Campania, her chances of being among the students with the lowest level of mathematical skills would be the highest in Italy, as high as 3.5 out of 10, while if she lived in Basilicata, her chances would be the lowest in Italy, falling to 1.4 out of 10. Lorenzo, on the other hand, would have the highest likelihood (3.4 out of 10) of belonging to the group of students with the poorest mathematical skills if he lived in Calabria and the lowest (1.4 out of 10) if he lived in Umbria (INVALSI, 2020).

Three years later, when Ada and Lorenzo are in fifth grade, gender gaps in learning widen – although still remaining at low levels. If Ada represented the average of Italian girls and Lorenzo that of Italian boys, the former would exceed the latter by 9 points in reading and understanding the Italian language, while the gap in math would reverse in Lorenzo's favour by 6 points.

At the age of 10, boys and girls tend to perceive their sense of self-efficacy – that is, they develop beliefs about their own abilities. Such beliefs are almost never based on the effective and unbiased evaluation of their potential; rather, they reflect children's interpretations of their own predispositions as conditioned by social constructions and gendered binarism. These binary constructions are confirmed by the daily experiences, practices and routines developed in interactions with other students – peers of both their own and the other gender – with female teachers, and with parents and family figures. By reiterating common sense and discourses about girls being less math savvy, these constructions become a self-fulfilling prophecy. By perceiving the forms of social reinforcement that consolidate girls' dedication to reading and supposed superior abnegation and devotion to studying in general, boys likewise come to believe that they are naturally not gifted with literary talents (Brozo *et al.*, 2014). Students tend to behave in the way culture defines as appropriate for their gender (Berenbaum *et al.*, 2008).

Of course, children are not «sponge models of identity» (MacNaughton, 2000); rather, they, as rational actors, interact with other children and adults to continuously define and redefine their own specific identities. Children's

agency begins from their very early years, together with their cognitive ability to interpret, reproduce and shape their roles in socialization and learning processes. They thus have the potential to actively resist teachers' and the media's intended and unintended pressures to conform to classical gendered dividing lines. However, this kind of resistance or alternative model-setting requires some degree of social reference points and contextual legitimation in order to persevere. Italian primary school settings, teachers' unintentional or explicit stances, the content of curricula, and peers' tendency to gender differentiation and isomorphism all contribute to reproducing stereotypes and influencing the education of gender. A descriptive factor of traditional gender expectations hampers girls and boys efforts to avoid conforming, as they are perceived and labelled as lacking the necessary attributes to succeed in fields dominated by the opposite gender. A prescriptive factor of gender expectations, on the other end, triggers disadvantages for girls and boys who violate shared beliefs about how female or male students must behave.

In Italian state primary schools, curricula and special programs dedicated to deconstructing traditional gender stereotypes have been marginalized in recent years. Due to a misleading ideological culture that equates gender-sensitive theories with an agenda to impose and forge "deviant" sexual behaviours and preferences, it has become more difficult to organize and disseminate critical perspectives (Colombo, Salmieri, 2020). A fierce partisan ideologization of gender issues deriving from the traditional Catholic hegemony exercised over the Italian public sphere is at work. In 2015, an education reform was designed by the left-wing government called the *Buona Scuola* – "Good School" – reform, formally Law 107. Article 5 of this legislation stated that the duty of each state school is to «promote the realization of equal opportunity for girls and boys, by teaching the education of gender parity in every school grade, the prevention of gender violence and of all forms of discrimination, through sensibilization and information». In response, a conservative countermovement demanded that this article be removed, arguing the law would have given gays and lesbians the freedom to "dictate that all children learn sex and alternative sexual orientations at school" and "force all children to betray their own nature" [sic!]. There are currently few initiatives at the primary educational level that have been able to escape the censorship associated with this simplistic framing, meaning that Ada and Lorenzo will likely have few chances to learn the occasion to learn deconstructing gender expectations nor access to special programmes aiming at simply fostering gender equality. They will be influenced from an early age in terms of their school pathways and vocational orientations by the assumption that women are naturally gifted or superior to men in caring for others and process that tend to transform «constraint into preference» (Correll, 2004). Ada and Lorenzo will interiorize conformist gender patterns,

taking these patterns on via teachers' attitudes towards legitimized gendered behaviours.

2. Preferences and Educational Outcomes in Lower Secondary Education

The Italian education system provides a comprehensive and common curriculum from primary to the completion of lower secondary education (*scuola media*). Once Ada and Lorenzo have completed primary school, their respective parents will not have to choose a particular educational track. Ada and Lorenzo will be automatically enrolled in the first year of lower secondary school based on considerations including proximity to the school, quality and reputation of the school, the prestige of its teaching staff and possibly the social status of the parents of the other children potentially attending the school.

It is unlikely that Ada and Lorenzo's schooling trajectories will become irregular before the end of lower secondary education: MIUR (2018) has reported that only 0.4% and 3.7% of pupils are held back in primary and lower secondary education, respectively, whereas irregular courses of study account for a total of 3.3% and 10% in these two stages. Ada's probability of retention during primary school is almost nil. If it were to occur, it would be as a result of serious social problems or issues at home. Although slightly higher, Lorenzo's chances also remain below the threshold of 4%. For both, the likelihood of total school failure increases during the lower secondary cycle. Failure is more likely for Lorenzo than for Ada, although the probability is correlated with very low parental education levels and familial cultural-economic capital. In addition, the share of students who do not pass from one grade to the next in aggregate terms is concentrated among students with foreign-born parents. Newly arrived foreign students in particular are enrolled in schools at lower grade levels when their competences are deemed inadequate to fruitfully join peers in the regular path[1].

During the three school years of lower secondary education, the gender gap in math between Lorenzo and Ada that arose during primary education will probably widen. When completing lower secondary education, there is a 3-point gap in maths in favour of boys. As evidenced by research carried out by De Simone (2013), half of 8th graders girls report doing more than 2 hours of homework, whereas just 1 out of 5 8th graders boys report doing that same among. From this finding we can infer that some of the divide

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[1] Research by Berchialla and colleagues (2011) finds that, in a representative sample of 44,490 Italian students aged 11 and 13, the probability of a delay in the course of study for a first-generation immigrant student is 17.85 times higher at grade 6 and 19.32 times higher at grade 8 with respect to that of a native peer.

in maths achievement is also absorbed through the hard work of girls. The gender gap in maths observed at the 8th grade level was generated during the primary school years: what is done is done and in fact the gap does not tend to decrease as schooling continues.

Both school levels – primary and lower secondary education – simultaneously contribute to the emergence of Ada's lower performance not only in maths, but also in science (De Simone, 2013). When we look at performances in science, Ada is likely to score around 10 points lower than Lorenzo. When estimated past achievement is taken into account, however, the gap is cut to less than half and is no longer significant. Ada's gap in science as compared to Lorenzo would be even wider had she not previously compensated through the dedicated work at home that typifies the link between girls and extra-school homework. This point proves that the roots of the gender gap in science learning come to be incorporated in the early years of school, due mainly to the influences of gender stereotypes. Furthermore, in both math and science, lower secondary schools seem to be responsible for most of the learning divide as a result of factors linked to family background. On the other hand, in both subjects, most of the learning divide caused by family background originates at the lower secondary level.

In contrast, the gender gap in Italian is 9 points in Ada's favour. As for English as a foreign language, in the third year of lower secondary education, Ada is likely to earn a score 7 points higher than Lorenzo in the listening test and 8 points higher in the reading test (INVALSI, 2019).

Nonetheless, these gender gaps are inconsistent along the entire range of skills: in the reading and comprehension of Italian, the gap becomes wider among students at the lowest levels. The opposite is true in maths, a subject in which the gap in favour of Lorenzo and his peers widens among students at the highest levels. INVALSI tests results in the third year of lower secondary education show that the shares of boys and girls who are at the lowest level in Italian reading and comprehension are 60% and 40% respectively, while of those who achieve the highest scores in math tests, 57% are male and 43% female.

Learning gaps between Ada and Lorenzo also increase or decrease depending on family environments, parents' educational attainments and their cultural capital: in the first cycle of the Italian education system these factors are particularly incisive, even more for boys than for girls, and they also manifest later, in the lower secondary cycle. By 8th grade, students with a disadvantaged background (i.e., parents with at most lower secondary education) score nearly a half of a standard deviation lower in both maths and science than their peers with highly educated parents. In other words, with other factors being equal, 1 out of 4 students lag behind their peers because of their sociocultural background.

We also know that there is significant in-school social segregation at the class level in Italian lower secondary education: under certain circumstances, families can systematically interfere with class-formation policies. When this occurs, peer effects can further improve the achievement of students with highly educated parents (self-selected in specific classes) and further depress the achievement of socially disadvantaged students. These strategies might be played out independent of students' gender, but we can infer that Lorenzo will tend to benefit from class composition controls more than Ada. She will instead tend to increase her individual effort (time spent doing homework), an area that is significantly associated with learning for female students. Finally, it is often mothers rather than their male partners who serve as the point of contact with teachers and the lower secondary education system. Many fathers avoid dealing with teachers on the assumption that women "naturally" tend to agree with each other. Moreover, mothers exhibit a preference for female staff in lower secondary schools, tend to trust each other more, and express feelings of discomfort when the person taking care of their children is a man. These attitudes might be shaped by the fact that 78% of the teaching staff in Italian lower secondary schools are women (OECD, 2021).

3. Track-effects and the Rise of Constructed Gender Preferences

Both learning and gender identification are cumulative processes in which students' current knowledge and identities are built on past knowledge and socialization. Therefore, students' achievements and gender-oriented subject preferences observed at a given step reflect their past achievements and preferences at earlier steps of the schooling ladder.

There is extensive research-based literature examining the first moment that students and families are asked to choose a specific school track after having completed the so-called "common track", a choice Ada and Lorenzo will make around the age of thirteen when passing from lower to upper secondary school. These studies find that this is a very crucial decision in terms of shaping the chances for their further studies and entry into the labour market (Brunello, Checchi, 2007; Barone, 2011; Azzolini, Vergolini, 2014; Ballarino, Panichella, 2016; Barone et al., 2021).

Families and students tend to choose between general schools (*licei*) and technical and vocational schools (*istituti technici* and *istituti professionali*) in a way that reproduces social stratification: the former are predominantly chosen by children from the middle and higher social classes while the latter mainly enrol children from the working and lower classes. Moreover, the higher their parents' socio-economic and cultural status, the less students' gender counts in their choice to enrol in one of the various types of

liceo available in the Italian upper secondary education system, that is, humanities and antiquity (*liceo classico*), mathematics and science (*liceo scientifico*), foreign languages (*liceo linguistico*), psychology and pedagogy (*liceo delle scienze umane*), economy (*liceo economico-sociale*), or the fine arts (*liceo artistico*). If Ada and Lorenzo are from higher or middle-class families and especially if their parents hold degrees, they will likely enrol in *liceo*. This will most likely be the case for Ada even if her parents are middle-low class, while in the case of Lorenzo's, even if his parents are also middle-low class, his chances of enrolling in a *liceo* depend much more on previous learning outcomes and school grades as well as the guidance provided by lower secondary leading teachers. If Ada and Lorenzo come from the working or lower class, they are more likely to be sent to one of the many curricular programmes provided by technical or professional schools. This move contains the implicit expectation that they will not then be enrolling in tertiary education even though Italian law provides for free access to tertiary education regardless of students' school track.

The overall result is that Ada will have a slightly more than 62% chance to enrol in a *liceo,* 19.3% in a technical school and 18.4% in a vocational school, while Lorenzo will have a 39.1% chance to enrol in a *liceo*, 42.2% in a technical school and 18.7% in a vocational school (Giancola, De Vita, 2021).

If we analyse parental influence via ESCS[2] on Ada's and Lorenzo's school track choices, we find that, if Ada's comes from a low socio-economic and cultural level family, she will have a 43% probability of enrolling in a *liceo*, 27% in a technical curriculum and 30% in a professional one. If Lorenzo comes from a similar family context, the distribution of probabilities would change significantly: he would have only a 17% probability of attending a *liceo*, as high as a 50% chance to enrol in a technical school and a 30% chance of going to a vocational school.

Let us image, however, that Ada and Lorenzo have middle-class families with a medium socio-economic and cultural level: in that case, she would have a 63% chance of enrolling in *liceo*, 19% odds of attending a technical

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[2] ESCS is a measure of students' access to family resources (financial capital, social capital, cultural capital and human capital) which determine the social position of the student's family/household. It is the most commonly used variable in reports and secondary analysis of data from the Programme for International Student Assessment (PISA) and is derived from several variables related to students' family backgrounds that are then grouped into three components: parents' education, parents' occupations, and an index synthesizing a number of resources available at home that can be taken as proxies for material wealth and cultural capital, such as possession of a car, the existence of a quiet room to study, access to the internet, and the number of books and other educational tools available in the home. The index summarising home possessions is computed differently for all new waves, and some items may be included in a way specific to each country, in order to take into account distinctive use by countries.

school and 18% odds of going to vocational school, while he would have a 35%, 48% and 17% chance, respectively.

Finally, if Ada's and Lorenzo's familial context were positioned in an upper socio-economic and cultural stratum, the likelihood the former would attend a *liceo* would be 83%, a technical school 11% and a vocational school only 6%. The school-track destiny for Lorenzo would be different, since his likelihood to enrol are 61%, 29% and 10%, respectively.

Whatever track they choose, in the second grade of upper secondary education Ada and Lorenzo will score significantly differently in reading and comprehension in favour of Ada. In maths, in contrast, Ada's and Lorenzo's scores are highly likely to differ in favour of Lorenzo (OECD, 2021). At the age of 15, Ada will probably outperform Lorenzo in reading and comprehension. In fact, on average, the gap between girls' and boys' scores in reading was 25 points in 2018 (OECD, 2019). The gender gap in math was 16 points in favour of boys and in science just 3 points, but in this case as well in favour of boys. In maths, Ada and her female friends average a score of 488 points compared to the 504 that Lorenzo and his male peers score on average. In science, Ada and her female friends reach 474 points compared to the 477 achieved by Lorenzo and his male friends. It should be noted that the correlation between mathematics and science that begins forming in primary school is consolidated with the passing of the years (OECD, 2019).

Nevertheless, we know that girls tend to achieve better results on tests that present scientific and mathematical problems similar to those they usually face in the classroom or at home. This finding may represent indirect evidence that girls develop deeper engagement and a greater sense of school duty than boys, while boys are more oriented towards the competitive settings typical of Programme for International Students Assessment (PISA) standardized testing.

Considering instead the aggregate of students from the three school tracks, if both Ada and Lorenzo had enrolled in a technical track, the gap in math and science scores would be significantly wider and the gap in Italian slightly in favour of Ada would have been nearly eliminated.

The highest gaps in science and mathematics between Ada and Lorenzo would manifest if both had enrolled in a *liceo*. In contrast, the gap between Ada and Lorenzo would not be significant in either Italian or the two tests of English as a second language.

Gendered parental expectations also seem to exert influence on Ada and Lorenzo's educational attainments during upper secondary school. In fact, parents' (and teachers') beliefs play a fundamental role in shaping the different abilities of male and female students in differentiated subjects, in keeping with the stereotype that boys are more predisposed towards scientific subjects while girls tend towards literary subjects. These beliefs have

been found to have a significant influence on students' perceptions of their own capacities (beliefs about themselves) and therefore affect their real performance (Riegle-Crumb, 2005; Fryer, Levitt, 2010). Parents have different behaviours and expectations towards sons *vs* daughters and a different perception of their abilities and successes in mathematics (Tomasetto, 2013). These expectations are reflected in the perceptions students have of their own abilities, thus acting to the disadvantage of girls in scientific subjects and especially mathematics (Spinath, Spinath, 2005). The success of sons is often associated with a talented, gifted or at any rate natural predisposition for the discipline while daughters' success is more often considered the result of commitment and constancy; parents instead tend to explain failure in these subjects as a lack of commitment by their sons and poor ability on the part of their daughters.

The impact that teachers' and parents' convictions have on students' abilities is remarkable. The fact that female students are deemed to be less gifted in mathematics than their male peers means that they themselves have less confidence in their abilities and therefore achieve poorer results. It is not only parents who have expectations, moreover; teachers also show that they are influenced by the same beliefs and tend to credit boys with greater mathematical skills than girls (Philipp, 2007).

In upper secondary school, 2 out of 3 teachers are female. In Italy, the gender division of teaching parallels the tripartition of the upper secondary system: male teachers are more likely to work in the technical and vocational schools that tend to enrol more male students than female ones, while female teachers are more likely to work in *licei* where female students are more likely to study. Men seem to prefer teaching professional subjects more than women. At the university level offering higher wages and greater prestige, the sex ratio reverses in favour of men (Guerrini, 2015).

Learning outcomes, grades and teachers' assessments of Ada and Lorenzo's "disposition" towards maths and sciences in upper secondary education will produce a significant difference in their respective likelihoods of aspiring to jobs in techno-scientific field. This tendency reflects a mechanism of self-reinforcement according to which the better students' results in maths and science are the higher aspirations they develop; the more their aspirations rise (a process that depends on family socialization and educational training) the greater their propensity to perform well in technical and scientific fields.

Finally, Ada will enjoy a consistent relative advantage over Lorenzo in terms of her probability to aspire to higher university studies. This advantage is remarkable even net of controls based on both the results of cognitive tests and school track choices that normally tend to absorb part of the direct influence exerted by social origins (Giancola, Salmieri, 2022). What

this means, therefore, is that the differentiation stemming from being divided up into school tracks operates as a mix of gender and social origin effects according to two steps: students from higher social backgrounds and female students in general have an advantage in choosing the most rewarding school track in terms of prospects for higher education enrolment and success; subsequently, when forming attitudes and aspirations in relation to higher education, these primal factors not only continue to exert their influence but are also combined with school-track effects.

4. Higher Education Choices and Gender Re-segregation Before and After Graduation

Beginning with those born in the 1980s, young women have overtaken young men in Italian higher education to such an extent that many Italian faculties and university degree programmes have ended up being feminized. Others that were traditionally the domains of prestigious training for men are beginning to display an increasingly balanced gender mix. This phenomenon is much more evident for girls from families with high and medium educational levels (Salmieri, Giancola, 2020). Therefore, female attendance in Italian tertiary education as well as girls' positive performance in terms of graduating have quickly become two salient features of Italian higher education: girls currently far exceed boys in registering for university and obtaining degrees each year (Salmieri, 2017). Ada' advantage over Lorenzo in terms of the likelihood to enrol in university is wholly explained by her greater previous educational achievements and the fact that girls tend to be more densely represented at more academically oriented upper secondary schools (*licei*). Ada and Lorenzo choose whether to proceed to university or not based on rational reasoning regarding their chances of success.

Long-term trends for Italy show a significant increase in the numbers of female students in several fields of study once dominated by men (Triventi, 2010; Romito *et al.*, 2021). The humanistic *vs* scientific gender divide does not tell the whole story about gender segregation among students in tertiary education: there is also evidence of gender imbalance in the humanities or sciences, an imbalance that reveals an opposition between care and technical fields (Barone, 2011). As a result of the recent but extremely rapid feminization of tertiary education, women have come to outnumber men among both enrolees and graduates even in the broad sector of "hard science" educational programmes. Looking at the population of graduates and then employees in this broad sector, women largely prevail over men. The progressive feminization of university classrooms has also increased the number of women employed in STEM sectors (De Vita, Giancola, 2017).

Nonetheless, a process of gender re-segregation can be perceived when breaking down STEM sector data into specific scientific fields: male graduates and personnel still predominate in applied technology fields and the "hard sciences" – such as engineering – where considerable research investment and high innovation are the rule. Female graduates and workforces are coming to predominate in those sectors dominated by knowledge intensity such as health, the life sciences and pharmaceutical research. Furthermore, in accordance with new forms of gender re-stereotyping, teachers as well as parents view STEM subjects as suitable for top-performing girls provided that these girls go on to choose caregiving roles from within the STEM professions; on the flipside, they consider languages and teaching less suitable for boys even when these latter express an inclination for communication- and education-related jobs. Secondary-school education programs and curricula have a deep-seated influence on Ada's and Lorenzo's choices regarding their tertiary education prospects. However, there are also other, more important gender-related mechanisms at work in school-to-university transitions.

The degree programs still dominated by male enrolees and graduates, such as computer science, applied and industrial chemistry, and mathematics, are the same ones whose corresponding post-graduation labour markets offer greater economic returns (Giancola, De Vita, 2021).

Even if girls outnumber boys in STEM courses, once we assume that both Ada and Lorenzo have decided to enrol in higher education, Ada is still 18% less likely to choose a STEM course than Lorenzo, irrespective of their socio-demographic features. This gender divide persists even after controlling for past educational performance and the personal reasons for choosing a given course of study (interest in the discipline or perceived better career opportunities, along with other reasons). The type of school track Ada and Lorenzo might have attended in upper secondary education may contribute to a gap reduction of about 5%. The reverse is true for the choice to study social sciences and humanities, as Ada continues to have a 16% higher likelihood of doing so than Lorenzo regardless of their previous school careers and personal motivations (Romito *et al.*, 2021).

If Ada and Lorenzo enrol in academic courses in the "hard sciences", they can look forward to differentiated scientific career paths (Barone, Assirelli, 2020). Ada will probably end up appearing to be much more inclined towards professions in the health sector and life sciences (medicine, biology, health and welfare). Lorenzo, on the other hand, will be more likely to imagine himself as a computer scientist, an expert in information and communications technologies or a professional in applied techno-scientific jobs.

In the case of Italy, Salmieri and Giancola (2020) have found that female investment in higher education over time has become a reference model for

middle and lower-class families as well, thereby influencing the provision of tertiary education as part of a larger trend of educational expansion: the female population took advantage of new opportunities generated as part of a larger process of democratization in access to higher education. Likewise, as it becomes ever more common for fathers and mothers alike to hold higher education degrees, a new process of cultural capital transmission through "matrilineal lines" has become quite widespread. This process is so common, in fact, that the probability of both sons and daughters graduating depends more and more on their mothers' educational qualifications rather than those of their fathers (Salmieri, Giancola, 2020; Giancola, Colarusso, 2020).

Considering the most recent generation, that of Ada and Lorenzo, the lower one moves down the hierarchical scale of parents' educational attainment, the more likely sons, and not daughters, will not enrol in or fail to complete higher education. This facet of the overall story raises concerns about the high male disinvestment in higher education that currently distinguishes the Italian case.

We also face a paradox: the widening gap between women' educational and degree attainment rates and their still-low employment rates, a condition that constitutes a cornerstone of inequality in the Italian labour markets. Gender inequalities in the labour market persist despite women's on-average better performance than men in tertiary education. Rising female employment rates have narrowed the gender gap in the labour market, but they have not dissolved other basic gender disparities. Inequalities stemming from contract type, career opportunities and the duration of periods of unemployment are still evident, especially in southern Italy. Women from the youngest generations work under fixed-term contracts and in part-time jobs more often than their male peers. Girls are much less likely than boys to secure a job that matches their field of educational preparation or to pursue a career that would grant them access to high-level positions in the professional hierarchy (Salmieri, 2008).

In summary, gender inequalities have been dismantled only in education but not in the labour market: Ada may overperform Lorenzo in educational attainment and degree earning, but that is not likely to translate into occupational and economic returns. At the end of the 1990s, Italian women came to outnumber men in the total share of university enrolees and, more importantly, in the total share of graduates (Salmieri, Giancola, 2020). These trends mark the unfolding of a silent revolution in trajectories of cultural mobility, driving younger generation women to invest more in education than do men. In my opinion, this key fact signals women's vigorous advancement in the fields of scientific knowledge and advanced education; on the other hand, it also reveals the difficulties and discrimination women still

face in the labour market, where it is instead men who continue to enjoy unfair advantage.

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