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WHERE THE NORTH-SOUTH GAP IN HUMAN CAPITAL BEGINS: AN ANALYSIS OF EDUCATIONAL OUTCOMES ACROSS THE ITALIAN REGIONS

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Abstract: Promoting education is a priority for most of the world's governments, but, in some cases, beneficial access to school curricula and student achievement is influenced by the socioeconomic background. We investigate the influence of many aspects of the Italian socioeconomic background on school achievement, specifically on mathematical capabilities, at two school levels (primary and secondary) by using regional data over the period 2013-2019. Italy is a country with a solid scholastic tradition that, especially in the past, had a strong imprint mainly of humanistic and social culture. Investments are currently being made in human capital (HC), particularly in the scientific, mathematical and computer fields; however, the results vary according to region. The results show that in the central-northern regions, a virtuous circle of HC enrichment can be triggered, while in the southern regions, economic support is necessary. In addition, we observe that a sort of family safety net (a form of social capital) could play a positive role in sustaining the students' learning efforts in the southern area. It seems that the different support for school education that underlies the Italian "North-South problem" is one of the causes of the gap in the local levels of HC development.

Keywords:

student achievement gaps;
scholastic performance;
human capital;
Italian regions

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Introduction

The development of human capital (HC) is both a policy objective and a strategic resource that goes beyond the economic contribution that it generates, since it creates many direct and indirect effects (Guisan and Neira 2006, Ogundari and Awokuse 2018, Rahim et al. 2021). Among the effects of education, researchers include developing capabilities for improving individuals' living conditions and decreasing the risk of poverty (Lanzi 2007, Duarte et al. 2018), reducing inequalities (Lee and Lee 2018) by influencing the wage structure and the economic returns to education (Goldin and Katz 2007), having better health and lifespans (Raghupathi and Raghupathi 2020), and the ability to take care of others (Boyle et al. 2006, Sonego et al. 2013). The positive outcomes are related to the adequate growth of HC based on quality education, which is the 4th goal of the 2030 Agenda for Sustainable Development Goals by the United Nations (2015).

The basis of adequate HC is commonly traced back to school education (Becker 1994), although positive experiences and academic success derive both from student characteristics (Day et al. 2018) and from the influence of the environment in which they live (Berkowitz et al. 2017, Osman et al. 2021).

In this study, we consider the different elements that influence the student performance at regional (aggregate) level and we examine them in the Italian context. We investigate the main factors that influence achievements at various school levels, and we consider the two macro areas of the Centre-North and the South separately. We explore whether there may be local characteristics that explain the early potential stages of dualism in educational pathways, reinforcing, in turn, a de facto territorial dualism, which we may assume is the beginning of the HC gap. We must consider that early-stage efforts related to education are a key policy aspect since they condition HC development (Yamauchi and Liu 2013).

Our research starts from the observation of the empirical evidence from the reports of the Italian National Institute for the Evaluation of the Education and Training System (INVALSI 2013-2019) which show a growing, observable, gap in the polarisation of test scores with the increase in school levels (i.e., scores progressively higher in the northern regions and lower in the southern regions). In our analysis, we did not include the years of the COVID-19 pandemic, which impacted the educational pathways, and it made school performance abnormal due to limitations and new forms of teaching (Tejedor et al. 2020).

In fact, Italy may represent an anomalous and controversial case study, in part due to the substantial divergence in educational outcomes between the "richest" and "poorest" areas of the country, similarly to what happens for the economic development paths of the two areas (Capello 2016). Italy's "North-South divide" is characterised by numerous

socioeconomic gaps (Odoardi and Muratore 2018), which are connected to an evident gap in educational terms, despite the centralised school system (Ballarino et al. 2014). In particular, the North-South dualism in HC has been noted since the unification of the country in 1861 (Felice 2012) and it can be observed more recently from the school results (OECD 2019) up to the research activity (Abramo et al. 2016) and labour productivity (Gitto and Mancuso 2015). It is possible that the issues underlying the uneven economic development among central-northern and southern regions are also connected to issues that undermine the formation of HC that begins with school education.

To answer our main research question, we need to examine three issues. First, we analyse the factors influencing school performance (observed through test scores in mathematics) in the Italian regions. Second, we compare a school level with homogeneous results among regions in test scores with another in which the gap widens to observe the differences in causes. Third, we search for the disparities between the Centre-North and the South.

In this framework, Italy represents an interesting field of inquiry for analysing the critical issues that affect education: (i) Italy is the eighth economy in the world (according to the 2019 GDP levels, from World Bank data), but its productive structures of technological and HC intensity do not represent the typical high-tech economy, being characterised by a large population of micro and small firms, scarce investment in innovation, widespread low-skilled and labour-intensive sectors (Dell'Agostino and Nenci 2018, Brunetti et al. 2022). On the other hand, the investment in education and training, as well as the average levels of education achieved, are below that of the EU and OECD countries (European Commission 2019); (ii) Italy offers the opportunity to consider two macro-areas with divergent development paths and different levels of HC, i.e., the Centre-North and the South (Ballatore and Mariani 2019); (iii) The social/cultural consideration of education also differs between macro-areas. For example, despite national (INVALSI data) and international surveys (PISA data, OECD 2019) showing dualism in the educational performance, on average, grading in the South is more "generous" compared to performances that are worse than in the North (Argentin and Triventi 2015); (iv) Overall socioeconomic conditions (including school facilities) are also strongly at a disadvantage in the South and they could influence the educational path of children and subsequent inequalities (Ballarino et al. 2014). For example, southern students are more prone to interrupt studies after compulsory school, with rates up to 20% in some regions, on ISTAT data, representing the percentage of the population aged 18-24 with at most the middle-school certificate, who has not completed a professional training course recognized by the region for more than 2 years and who does not attend school courses or participate in training. Following secondary school, many continue their university career in the central-northern regions, as they attribute a greater value to university degrees in these regions (an interregional brain-drain, Ciriaci 2010).

A particular focus of our analysis is on the representation of the economic and cultural characteristics at regional level, i.e., the socioeconomic status (SES) that affects the education achievements of young Italians (Brunello and Checchi 2005). We include macro data representing the average characteristics of households. The effect of SES starts with the economic possibility of investing in education (Liu et al. 2020), almost describing a real "transfer of human capital" between generations (Becker and Tomes 1979, Tomes 1981); the creation of a home environment favourable to school education (Tramonte and Willms 2010); and the possible support for the continuation of advanced studies (Gorard 2010, Alfieri et al. 2015).

In the context of the many studies on the relationship between SES and school performance, considering the effects on subsequent school levels (Li and Qiu 2018) and on mathematics (Wu and Tian 2008), we propose a double comparison. The first comparison is between classes and the second one is between geographic areas, searching for the causes of the divergence in school test scores.

In this respect, INVALSI (2013-2019) offers an aggregation framework to measure various aspects of learning among the Italian students. In this article, we report data related to mathematics learning carried out from 2013 to 2019 at regional level. Specifically, we consider the outcomes of INVALSI sample classes of 5th grade (final class of the primary school) and 10th grade (the class that concludes compulsory education). We focus on students' mathematical skills because they are associated with the reasoning ability and they appear universal for the continuation of formal schooling (Pagani et al. 2017, Xu and Dadgar 2018). Achievement in mathematics also gives high satisfaction to parents (Chen and Feng 2013) and, thus, the subject may possibly be more influenced by parental interest in the children's education.

Factors affecting student achievements

Considerable debate exists among researchers about the direction and causes of changes in student achievement (Ramirez et al. 2006). In general, key factors that impact the students' learning are found in external and political environments, where countries make a variety of choices about education reflecting both national objectives (e.g., increasing the proportion of graduates) and the availability of resources and infrastructure (e.g., teacher salaries, working time, teacher training, OECD 2022). Therefore, the sociopolitical culture (including economic, political, social, and religious aspects) of each country tends to shape the education system according to its needs and it can encourage specific learning practices (Rubenstein 2006). Among them, the nature of school culture makes a significant contribution to students' academic achievement (Maslowski 2001, Melesse and Molla 2018). The absence of a healthy school culture, including teaching aids and peer cooperation, and the lack of effective methods of studying, in fact, could affect students' achievement (MacNeil et al. 2009).

Students' school performance is also associated with the quality of the school management, the teachers' commitment, and the motivation of students (Hoy and Miskel 2013, Ferrer et al. 2022). For example, it has been proven that when teachers support children from families with low levels of social capital, their scholastic performance increases both in reading and in maths (Rose et al. 2013).

Moreover, numerous aspects concerning the background of individuals influence academic performance. Many studies have emphasised the relationship between family background and education (Wu et al. 2015, Li and Qiu 2018); in this framework, parental SES is recognized for its major role across countries (White 1982, Sirin 2005, Chmielewski 2019). SES, mainly through the education level and income of parents, influences the beliefs and behaviours of parents and it affects the children's performance (Davis-Kean 2005). It has been observed that the role of parental education starts early, already influencing the choice of the study pathway and children's cognitions, thus, demonstrating the interconnection of the lives of parents and children (Astone and McLanahan 1991, Hortaçsu 1995, Vergolini and Vlach 2017). For example, Dickson et al. (2016) found a direct and continued positive effect of parents' educational attainment on children's outcomes throughout the school career in the UK. Saw (2016) observes in Malaysia a strong relationship between the students' maths and science achievements and the parents who have postsecondary degrees. Following Landeras's (2009) model of education, Kuehn and Landeras (2014) observe that the students' marginal productivity of effort depends on their family background. More specifically, among students aged 12 to 15, a higher parental education is associated with more time spent on homework (Kuehn and Landeras 2014).

In early school grades, the high SES should have a positive influence on students' performance. Financial resources at the household level acquire a major role in subsequent school years, e.g., by equipping students to remain involved in the educational process that interests them or provides some educational opportunities that otherwise would not be accessible (Thomson et al. 1994, Teachman 2008). Indeed, family wealth influences the chances of completing studies and the opportunities to receive a better education and to get a better job, even in rather egalitarian societies (Chesters 2019). Following Kao and Tienda (1998) and MacLeod (2018), adolescents from less advantaged socioeconomic families rarely have high educational ambitions when parental income is scarce or in the case of education's diminishing returns due to their discrimination in labour markets. In the same way, parental beliefs about the children's academic performance change according to their economic status: parents in more advantaged households are very realistic about the educational outcomes of their children compared to the optimistic attitude of less affluent parents (DeBacker and Routon 2017).

Many other aspects of family behaviour, structure and social relations play a role. For example, social mobility matters, and this aspect influences teenagers in adapting their academic choices (Mocca et al. 2019). Some studies also underline that students from high-SES families tend to build social networks with classmates of similar status and they take advantage of them to learn more than other students (Crosnoe 2004). Students in marginalised populations, instead, often have negative interactions with their classmates, increasing the likelihood of poor scholastic skills (Ream 2003). Positive classmates' family factors and home education resources are correlated with a better student reading performance in 33 countries (Chiu and Chow 2015). Parental attitudes are bound to their attitudes of their children, while an increase in parents' social activities leads to children with low educational progress (Zunich 1966, Hoard and Shepard 2005, Oncu and Unluer 2012), which is particularly true in the case of mothers (Fagan and Barnett 2003).

The home environment is another factor linked to academic achievement. For instance, reading at home with parents provides a stimulating literacy environment that is positively linked to the children's academic achievement (Keith et al. 1993). Moreover, parental affective support and communication have a strong influence on student outcomes (Deslandes et al. 1998, Davalos et al. 2005). Among a variety of home background factors, the family structure can have repercussions on the students' performance (Coleman 1988), as in the case of residential mobility, for which the transfers (negatively) affect the school results with an effect that can last over time (Voight et al. 2012). For example, Astone and McLanahan (1994) found that children from single-parent families are more exposed to school mobility risking lower educational attainment; and students from single-parent and stepparent families run a higher risk of low school performance. For disrupted families, any move is linked to an adverse school life, while children who have changed school several times are not significantly damaged if they live with both biological parents (Tucker et al. 1998).

The spacing of children and the size of the family are positively and negatively related to the scholastic outcomes, respectively (Steelman et al. 2002). The students' achievement is even influenced by the order of birth in the family (i.e., older siblings are likely to obtain more schooling, Kim 2020) and the sibship size (although the dilution of resources in families with a few children, compared to one child, should not create problems, Lao and Lin 2022). In higher socioeconomic strata, students who are early siblings perform better than last-born siblings (Glass et al. 1974, Bu 2016). The same occurs in poor and rural contexts, where the economic and educational conditions of families are low, as Effiong and Igiri (2015) confirm that the significant effect of birth order on academic achievement in basic science. Possible explanations lie in the dilution of parental time and other family resources (Blake 1981) and in the interactions between the siblings and their parents (Zajonc and Sulloway 2007), even if the time that parents devote to looking after their children seems positively connected

to the level of education (Gimenez-Nadal and Molina 2013). However, the effects of birth order on intelligence seem to be limited in larger families (Sulloway 2007).

Methodology

To examine whether and to what extent socioeconomic local features influence the mathematical scores obtained by different categories of students, we estimate the following equation:

$$\begin{aligned} lnMATHS_{it} = {} & \beta_1 HC_{it-1} + \beta_2 lnGDP_{it-1} + \beta_3 POVERTY_{it-1} + \beta_4 SC_{it-1} \\ & + \beta_5 CRIME_{it-1} + \beta_6 CHILD_{it-1} + \beta_7 YOUNG_{it-1} + \beta_8 DENS_{it-1} \\ & + \mu_i + \tau_t + \varepsilon_{it} \end{aligned} \quad (1)$$

in which the dependent variable is the INVALSI score in mathematics (at two school levels, *MATHS5* and *MATHS10*); *HC* and *GDP* represent the SES in the average endowment of HC and income (which on average are the characteristics of families in each region, Goldhaber and Brewer 1997). The other regressors represent known factors that influence the school results, as presented below. Data refer to the 21 Italian regions and autonomous provinces (i) for the period (t) 2013-2019. The regression (1) includes a full set of time dummies, τ_t, which represent time-specific factors that can affect the dependent variable *MATHS*, and the regional time-invariant characteristics, μ_i, while $\varepsilon_{i,t}$ is the idiosyncratic error term.

In our case, the endogeneity due to reverse causality is related to the fact that mathematical scores influence the HC value, since mathematical skills could be considered one of the components of HC estimation (Goldsmith et al. 1997). For this reason, to consider this endogeneity issue, we adopt an instrumental variable approach—a two-stage least squares (2SLS) procedure—aimed at obtaining the exogenous variation in individuals aged 25-64 with tertiary education by means of two external instruments. We consider that cultural capital, observed through cultural consumption, has been shown to be a useful resource for fostering tertiary training, as proven by Crociata et al. (2020). In line with this study, we consider two types of cultural consumption at regional level, i.e., the percentage of children aged 6+ who at least once in the last year visited an archaeological site and went to the cinema (on the respective population, ISTAT data).

However, it is necessary to demonstrate the instruments' relevance and orthogonality to the error terms in Equation (1). First, to verify the relevance of the instruments, we implemented the underidentification test. This is a Lagrange multiplier (LM) test that allows to evaluate if the correlation between the excluded instruments and endogenous variables is high enough and, thus, that the excluded instruments are "relevant". However, in the presence of heteroskedasticity, as in our case where the standard errors are clustered by region, we had to look at the LM and Wald versions of the Kleibergen

and Paap (2006) rk statistics instead of Anderson LM and Cragg–Donald Wald statistics. By looking at the results of the several tests performed, it is possible to confirm that the models are correctly identified, as the null hypothesis seems to be rejected. Second, since the model is overidentified and the standard errors are robust to heteroskedasticity, we tested the validity of our instruments by relying on Hansen's (1982) J test, which is confirmed by the fact that the null hypothesis cannot be rejected at 10%.

Data: A look at the Italian school system, student assessment and the INVALSI tests

The Italian education system is open and mandatory to all resident children aged between six and sixteen. Nevertheless, from the age of three, resident children can start attending nursery school. Basic education is divided into three levels: primary school, middle school, and high school.

Drawing on international verification tests (OECD-PISA, IEA-TIMMS, IEA-PIRLS), INVALSI verifies two explicit aspects of learning: (i) strictly numerical, comparing educational syllabus of Italian schools with national guidelines, as well as with European and international curricula; and (ii) methodological, referring to a standardised and systematic learning approach usually adopted by advanced economic countries. In wider terms, INVALSI depicts rich assets between psychometrics and didactics for analysing basic disciplinary skills in mathematics and Italian language (English language skills are also recently tested).

Our approach is based on a seven-year (2013-2019) dataset that includes two classes. To detect fraudulent and cheating behaviours and to obtain a greater guaranteed reliability of the collected data (Quintano et al. 2009), we selected only sample classes, where it is mandatory that an external observer to be included (we therefore excluded the second primary class because the students are not completely autonomous in completing the tests). The INVALSI (2013-2019) reports allow us to include annual data and to make comparisons between students of different ages.

Following a large literature on school/student grades and mathematical aptitudes (Floyd et al. 2003, Fuchs et al. 2006, Saß et al. 2017), we selected mathematical literacy as the Science, Technology, Engineering, and Mathematics (STEM) of students' performance. Mathematical literacy is an individual's ability to formulate, employ, and interpret mathematics in broader contexts. INVALSI tasks are based upon reasoning mathematically and using mathematical concepts, procedures, facts, and tools to describe, explain, and predict phenomena (OECD 2013).

Control variables: Some causes of students' school performance

In our analysis, we included a set of independent variables that control for some of the main factors that affect school performance (Table 1).

Table 1. Variables definitions and sources

	Variables	Definition	Source
1	*MATHS5*	Average score in mathematics from Italian students in primary school, class 5th	INVALSI
2	*MATHS10*	Average score in mathematics from Italian students in high school, class 10th	INVALSI
3	*HC*	Population aged 25-64 with tertiary education over total population (%)	EUROSTAT
4	*GDP*	Gross Domestic Product *per capita* at the 2015 values	ISTAT
5	*POVERTY*	People at risk of poverty rate (%)	EUROSTAT
6	*SC*	Percentage of people aged 14+ who believe that most people are trustworthy out of total people aged 14+ (%)	ISTAT
7	*CRIME*	Number of robberies per 1,000 inhabitants	ISTAT
8	*CHILD*	Couples with single child over total couples (%)	ISTAT
9	*YOUNG*	Share of individuals aged 0-15 over total population (%)	ISTAT
10	*DENS*	Population per square kilometre	EUROSTAT

First, the effect of SES was observed through the level of the HC of the population (proxied by the share of the adult population with advanced education) and the average income (proxied by the gross domestic product *per capita*, see GDP). These variables can approximate the average SES of families, which role is the main determinant of children's school performance, and this is confirmed for the Italian case (Odoardi 2020). We considered two known features: (1) the educational level of parents affects their children's learning; and (2) family income plays a major role in HC formation (Li and Qiu 2018, Cai and Wu 2019, Husain et al. 2019).

Second, we considered the risk of poverty rate (POVERTY) because deprivation in children is a major cause of poor school performance (Hegedus 2018), and this is a significant concern also observed in highly developed countries (Hirn et al. 2018).

Third, we included a measure of social capital (SC, proxied by the level of trust) since such intangible capital, through the relationships and the structure present in a society is a recognized factor that influences the students' performances (Plagens 2011). Social capital can be considered useful in school success through networking and bridging opportunities (Allan and Catts 2014).

Fourth, we included a measure of crime (CRIME, proxied by the ratio of robberies on the population) since the negative relationship between the spread of crime and school performance is known (Boxer et al. 2020), and evidence exists on the specific relationship with the INVALSI results in southern Italy (Cavalieri et al. 2021). A violent community environment appears to have a negative impact on school achievement (Gershenson and Tekin 2018), and Burdick-Will (2013) shows that school violent crime

in Chicago Public High schools had a negative effect on maths standardised test scores. Also, Torrats-Espinosa (2020) observes that in the same U.S. school districts, children who start at a school system with a low violent crime rate score higher than children from the same district but who entered the school system when there was a higher violent crime rate.

Fifth, we considered three demographic aspects. The first is related to the composition of families, including the percentage of those with an only child (CHILD) who should have greater expectations and commitment to their children's school performance (Tsui and Rich 2002, Yamamoto and Holloway 2010). The second, related to the age structure of the society, is the percentage of people under the age of 15 (YOUNG). This represents a control on demography that influences, for example, the demand for education and the age of lecturers and researchers in higher education (Willekens 2008). The third is population density (DENS), since human capital-related aspects could benefit from the agglomeration economies that are presumably present in the most populated areas (Thisse 2018).

We present the summary statistics for Italy and the two macro-areas in Table 2. The average values highlight the differences in terms of academic results alongside the more evident ones in the field of average education (HC) and economic well-being (GDP, POVERTY).

Table 2. Summary statistics

Variable	Area	Obs.	Mean	Std. Dev.	Min	Max
	Italy	147	201.224	6.289	181	220
MATHS5	Centre-North	91	203.670	3.455	194	213
	South	56	197.250	7.714	181	220
	Italy	147	201.250	11.938	174	229
MATHS10	Centre-North	91	208.659	7.587	190	229
	South	56	189.214	6.768	174	203
	Italy	147	17.869	2.820	13.1	26.1
HC	Centre-North	91	19.235	2.405	14.8	26.1
	South	56	15.650	1.882	13.1	20.5
	Italy	147	27451.27	7817.32	15844.48	45875.21
GDP	Centre-North	91	32532.17	5169.05	23366.85	45875.21
	South	56	19194.82	2525.26	15844.48	24338.45
	Italy	147	19.097	10.216	5.4	42.3
POVERTY	Centre-North	91	12.111	3.466	5.4	21.8
	South	56	30.45	6.738	18.7	42.3
	Italy	147	22.187	5.635	11.8	41.7
SC	Centre-North	91	24.923	5.161	17.8	41.7
	South	56	17.741	2.866	11.8	23.5

Variable	Area	Obs.	Mean	Std. Dev.	Min	Max
	Italy	147	0.957	0.711	0.1	4.4
CRIME	Centre-North	91	0.969	0.491	0.1	2
	South	56	0.937	0.973	0.2	4.4
	Italy	147	47.413	5.670	35.7	57.8
CHILD	Centre-North	91	50.280	4.709	36.9	57.8
	South	56	42.753	3.654	35.7	53.1
	Italy	147	0.133	0.012	0.111	0.163
YOUNG	Centre-North	91	0.134	0.011	0.111	0.163
	South	56	0.132	0.012	0.112	0.159
	Italy	147	181.213	113.785	38.6	439.2
DENS	Centre-North	91	193.602	111.075	38.6	439.2
	South	56	161.080	116.246	55.7	438

Source: Authors' elaborations on EUROSTAT and ISTAT data

Figure 1 illustrates the "polarisation" of school result performance (MATHS5 and MATHS10); at the lowest level, (a) shows "outlier" cases in the South, while the advanced level (b) shows high values in the northern area only.

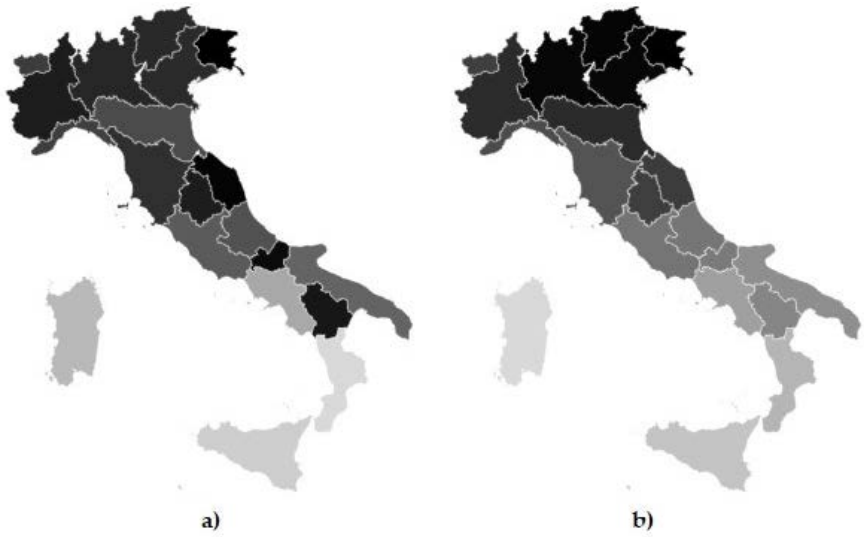

Figure 1. Average values (2013–2019) of levels in maths results at grades 5 (a) and 10 (b) (darker colours correspond to higher values). Source: Authors' elaborations on INVALSI data

Results

We present the results on the two levels of test scores in mathematics according to the INVALSI data for the students of all regions (Italy), Centre-North and South. Fixed-effects two-stage least squares (FE 2SLS) models are considered.

The support of widespread advanced HC has no statistical significance (Table 3) for the lowest educational level analysed (corresponding to 11-year-old children of the final class of primary education), probably because even a relatively low parental education, on average, may be sufficient at this level (Smits and Hoşgör 2006). Furthermore, the effect of HC could be mediated by a sort of individual compensation effect between the continuous improvement of school quality and the role of parental education, as historically observed in Italy (Brunello and Checchi 2005).

Table 3. Maths grade 5 results for Italy and the two macro-areas (2013-2019)

Dependent variable	Italy	Centre-North	South
	***MATHS5* (1)**	***MATHS5* (2)**	***MATHS5* (3)**
HC_{t-1}	-0.0009	0.0024	0.0105
	(0.0045)	(0.0074)	(0.0147)
GDP_{t-1}	0.2706**	0.1903	0.5203***
	(0.1153)	(0.1379)	(0.185)
$POVERTY_{t-1}$	-0.0016*	-0.0014**	-0.001
	(0.0009)	(0.0007)	(0.0015)
SC_{t-1}	-0.0004	-0.0003	0.0002
	(0.0006)	(0.0006)	(0.0017)
$CRIME_{t-1}$	0.0031	0.0116	-0.0172
	(0.0079)	(0.0116)	(0.0252)
$CHILD_{t-1}$	0.0004	0.0005	-0.0026
	(0.0007)	(0.0006)	(0.0033)
$YOUNG_{t-1}$	1.1797	3.0672	4.0898
	(1.7167)	(3.1413)	(4.6041)
$DENS_{t-1}$	-0.0001	-0.0001	0.0006
	(0.0005)	(0.0005)	(0.0012)
N*T	147	91	56
N	21	13	8
Time effects	YES	YES	YES
Provincial effects	YES	YES	YES
Under-identification test (*p-value*)	16.422 (0.000)	4.671 (0.097)	6.604 (0.037)
Hansen's J Test	0.787	0.992	0.917

*Note: *statistically significant at the 10% level; **statistically significant at the 5% level; and ***statistically significant at the 1% level. Standard errors clustered by provinces are given in parentheses. All models are fixed-effect two-stage least squares estimates where HC is treated as an endogenous variable and instrumented with two external instruments (two proxies of cultural capital: % of people aged 6+ who at least once in the last year visited an archaeological site and went to cinema). The control variables are assumed to be exogenous.*

In contrast, the economic aspect has a significant influence at this schooling level (Peraita and Pastor 2000), since income has an observed role in affecting the specific case of mathematics test scores (Conwell 2021), as observed particularly for the

southern area. In general, this latter effect could derive from the better conditions of life, health and opportunities that increase for children as family income increases, as it is extensively observed in the literature (Weinberg 2001, Akee et al. 2010, Reinhold and Jürges 2012).

In Maths grade 5, we notice a first North-South difference. In the South, a better average economic condition positively influences school performance (i.e., the geographic area where family support is most needed in the face of scarcity of external services and aid), while only the extreme condition (connected to poverty) has an effect, obviously with the opposite sign, in the wealthiest area (Centre-North).

The other control variables have no effect on the academic performance in elementary school.

Table 4 shows the result for the highest educational level (approximately 15-year-olds in the second year of high school, the last year of compulsory education). These results show evidence of the dualism between the two Italian macro-areas in terms of the SES effects. In the South, the level of average income continues to be an important aspect influencing education performance, as it is the case for the lower level. In the Centre-North, the mechanism hypothesised for HC is observed, and the increase in the level of education of the adult population plays a role in assisting children in improving school results.

Table 4. Maths grade 10 results for Italy and the two macro-areas (2013-2019)

Dependent variable	**Italy**	**Centre-North**	**South**
	***MATHS10* (1)**	***MATHS10* (2)**	***MATHS10* (3)**
HC_{t-1}	0.0140***	0.0354*	0.0138
	(0.0054)	(0.0212)	(0.0122)
GDP_{t-1}	-0.0085	-0.3564	0.3239**
	(0.1428)	(0.3734)	(0.1492)
$POVERTY_{t-1}$	-0.0030***	-0.0039**	-0.0009
	(0.0009)	(0.0016)	(0.0014)
SC_{t-1}	0.0006	0.0013	0.0022**
	(0.0006)	(0.0016)	(0.001)
$CRIME_{t-1}$	-0.0185*	0.0117	-0.0344**
	(0.0101)	(0.0288)	(0.0173)
$CHILD_{t-1}$	0.0012	0.0016	0.0032
	(0.001)	(0.0017)	(0.0023)
$YOUNG_{t-1}$	5.1953***	13.5491	6.5298**
	(1.8886)	(8.5829)	(3.2906)
$DENS_{t-1}$	-0.0007	-0.0018	0.0022***
	(0.0005)	(0.0012)	(0.0008)

Dependent variable	Italy	Centre-North	South
	***MATHS10* (1)**	***MATHS10* (2)**	***MATHS10* (3)**
N*T	147	91	56
N	21	13	8
Time effects	YES	YES	YES
Provincial effects	YES	YES	YES
Under-identification test (*p-value*)	16.422 (0.000)	4.671 (0.097)	6.604 (0.037)
Hansen's J Test	0.724	0.757	0.632

*Note: *statistically significant at the 10% level; **statistically significant at the 5% level; and ***statistically significant at the 1% level. Standard errors clustered by provinces are given in parentheses. All models are fixed-effect two-stage least squares estimates where HC is treated as an endogenous variable and instrumented with two external instruments (two proxies of cultural capital: % of people aged 6+ who at least once in the last year visited an archaeological site and went to cinema). The control variables are assumed to be exogenous.*

On the one hand, the effect observed for the South could be linked to close family ties (Fukuyama 1995) that suggest a high level of support from parents for their children (e.g., by paying private lessons). On the other hand, the highest level of graduates in the Centre-North would trigger virtuous circles toward the education of children, and in general, more virtuous aspects in the education framework, from enrolment rates to the risk of dropout, up to labour opportunities (Contini et al. 2018). In fact, when considering advanced education, the effect of parental HC should be predominant on financial constraints (Edwards and Pasquale 2003, Li 2007), also considering the absence of tuition fees in Italy.

The role of the family, or the extended family group typical of the South, could also explain the negative effect of POVERTY only in the Centre-North. For example, the relationship between poverty and PISA scores in mathematics is demonstrated in Italy (Daniele 2021). Family ties would counteract the difficulties in studies due to deprivation (e.g., reducing health-related behaviour with an influence on test scores, Gunter and Daly 2013) through the support that would come from the extended family network and that would be weaker in the Centre-North. This result, in which the role of supportive kinship networks is supposed, could also explain the unexpected positive effect of social capital only in the area where it is relatively scarcer, i.e., the South. In our analysis by area, it could acquire relevance precisely by having the effect of decreasing the social inequalities that would affect the children of the economically and culturally disadvantaged social classes (Cemalcilar and Gökşen 2014) that are more widespread in the southern regions.

The effect of CRIME is observed only in the South, confirming the role of some types of criminal activities as a known deterrent to HC formation, for example, by discouraging investment in education (Coniglio et al. 2010). In the same area, the demographic control of the composition of the population (YOUNG) could be influenced by the negative effect of the demographic shock on labour market

opportunities (Biagi and Lucifora 2008) for young people approaching the job market, which probably tends to reinforce the effort in education. Finally, the positive effect of population density on school grades in the South can be considered a positive aspect of the economies of agglomerations that could support the (insufficient) role of local HC.

Discussion

In this article, we observe that the mechanism that should link SES and school performance is recognized, although it works through different channels in the wealthy Centre-North and in the less developed South. In this first area, the level of advanced education of the adult population has a positive influence on the students' secondary school performance. This mechanism, however, does not work in the less "endowed" regions in terms of HC, the South.

In the southern regions of Italy, financial resources are instead important in contributing to higher student achievement. This confirms that economic conditions matter for educational outcomes, particularly in mathematics, in relatively low-income contexts (Okpala et al. 2001).

In this framework, an expression of regional dualism seems evident: the North retains the characteristic of creating virtuous circles of HC reinforcement, while in the South, the economic condition plays the major role in supporting children's education. These differences show the restriction on the desirable convergence of HC levels between the two areas since the average income in the South is approximately 60% of that in the Centre-North (on ISTAT data). Nevertheless, limits on educational convergence lie in the risk of persistence of the education weaknesses present in disadvantaged social groups that are prevalent in the South, thus adding intraregional inequalities (Contini et al. 2018) to the inequalities between regions. In fact, the lack of convergence would add to a difficult intergenerational social mobility, being the schooling systems essential for promoting equality of opportunities (Ammermueller 2013).

The present article is an original exploratory study that investigates school performance through the educational attainment of students, considering the regional dualism that influences and is influenced by these outcomes. An evident limit in our analysis lies in the possibility of integrating microdata into our dataset that would better explain the role of the SES, particularly regarding the economic status. Furthermore, our results connected to social capital pose a possible development of future research, which should consider the effects of both bridging and bonding social capital.

Conclusions

What supports students in their scholastic performance? The answer is that supports vary locally and have different effects. We have observed how the North-South gap in

education that exists in secondary school levels is due to differences in the level and type of support needed to be successful in studies, such as the economic condition or the average level of education in the region. But these differences can create a serious problem, to the detriment of the poorest area, given the local heterogeneity present in many countries such as Italy. This is an evident limit to the development of national HC – in a typical case of North-South divide – with consequences for the country's economic development.

A possible strategy to counteract the divergence may lie in a different type of support suggested by our findings. We hypothesise that the support of a specific type of social capital whose social group is halfway between the family and the whole community could potentially limit the malaise due to the condition of economic deprivation. Social capital and interpersonal relationships can be useful precisely for targeted help and to alleviate the conditions of poverty (Méreiné Berki et al. 2017). In our study, we can assume some kind of support from the family, or extended family, which is more present in the southern regions (and it is stronger in beyond the parent-child relationship, Micheli 2012) which are less endowed with "formal" social capital. This could be linked to the strong Italian tradition of attention to childcare with the almost exclusive support of the family (Del Valle et al. 2013), worsened in the 2007-2008 crisis and the austerity measures that followed to the detriment of household resources (León and Pavolini 2014), combined with the traditional strong family ties in the South, even as a type of kinship network (Costabile and Coco 2017).

In synthesis, this would suggest that in the relatively poorer areas, this presumed "extended family network" is able to avoid the inconveniences of poverty for children (as an extreme condition) and it would directly benefit from improved economic conditions. The first results imply that the North-South dualism itself affects the support for students (in fact, it is self-fuelling), and that other resources can support the most vulnerable among the vulnerable.

Our findings suggest some changes and areas of intervention. The first change should concern public intervention and support. We show that the gap in terms of HC between North and South begins during compulsory education and that the support that families on average could afford is not homogeneous. The goal of reducing the gap by strengthening the southern area could therefore start by supporting the finances of the poorest families and by improving the delicate interventions in the field of social welfare (Rontos et al. 2021), as, for example, it is expected from the post-COVID-19 EU Recovery Fund. The latter seems to be an opportunity and a fundamental turning point in the period of the post-COVID emergency (Luo 2022).

Second, a different consideration of the social capital available in the South should be developed, with reference to the support for students and their education. There are many criticisms and revisions of Banfield and Putnam's research (Tarrow 1996, Macry

1997, Huysseune 2020). Our results suggest that the form of present social networks, although they may be imperfect for economic development, as suggested by the literature, can at least support a part of the fragile population (young people) in the less resilient context of Italy. The role of the parental and kinship networks in the South has developed due to historical circumstances (Macry 1997) and it could be exploited to support intergenerational ties (e.g., the known "family welfare" that supports young people leaving the family nest) as a continuous economic support while on the educational path (even before the expensive tertiary education).

Third, it is possible that some adjustments are needed in the school system. We must emphasise the meaning of our dependent variables. Investment in STEM education is a primary goal for many governments (Johnson 2012) because of the benefits that it represents in shaping the development of future HC. Battistin and Meroni (2016) observed that lengthened instruction time in contexts with low socioeconomic backgrounds has a positive effect on mathematics skills. This suggests that there is room for improvement where it is most needed. In fact, numerous studies have examined school dropout after compulsory school or noncontinuation to university studies, especially in the South (for which the income and parents' educational level are relevant aspects, Aina 2013). The focus of policy actions should be moved to the lower levels of education to prevent early dropout and to possibly apply support toward those students most at risk, i.e., those who cannot benefit from the support (mainly economic) of the family network. This approach should be implemented to avoid further deterioration in the southern school system that shows, in some cases, lower educational attainment than the rest of the country and it may even tend to worsen the situation of the already disadvantaged students (Agasisti et al. 2017).

References

ABRAMO G., D'ANGELO C. A., ROSATI F. (2016) The north–south divide in the Italian higher education system, Scientometrics 109, 2093-2117, https://doi.org/10.1007/s11192-016-2141-9.

AGASISTI T., IEVA F., PAGANONI A. M. (2017) Heterogeneity, school-effects and the North/South achievement gap in Italian secondary education: evidence from a three-level mixed model, Statistical Methods & Applications 26, 157-180, https://doi.org/10.1007/s10260-016-0363-x.

AINA C. (2013) Parental background and university dropout in Italy, Higher Education 65, 437-456, https://doi.org/10.1007/s10734-012-9554-z.

AKEE R. K. Q., COPELAND W. E., KEELER G., ANGOLD A., COSTELLO E. J. (2010) Parents' incomes and children's outcomes: A quasi-experiment using transfer payments from casino profits, American Economic Journal: Applied Economics 2 (1), 86-115.

ALFIERI S., SIRONI E., MARTA E., ROSINA A., MARZANA D. (2015) Young Italian

NEETs (not in employment, education, or training) and the influence of their family background, Europe's Journal of Psychology 11 (2), 311-322, https://doi.org/10.5964/ejop.v11i2.901.

ALLAN J., CATTS R. (2014) Schools, social capital and space, Cambridge Journal of Education 44 (2), 217-228, https://doi.org/10.1080/0305764X.2013.863829.

AMMERMUELLER A. (2013) Institutional features of schooling systems and educational inequality: Cross-country evidence from PIRLS and PISA, German Economic Review 14 (2), 190-213, https://doi.org/10.1111/j.1468-0475.2012.00565.x.

ARGENTIN G., TRIVENTI M. (2015) The North-South divide in school grading standards: New evidence from national assessments of the Italian student population, Italian Journal of Sociology of Education 7 (2), 157-185, https://doi.org/10.14658/PUPJ-IJSE-2015-2-7.

ASTONE N. M., MCLANAHAN S. S. (1991) Family structure, parental practices and high school completion, American Sociological Review 56 (3), 309-320, https://doi.org/10.2307/2096106.

ASTONE N. M., MCLANAHAN S. S. (1994) Family structure, residential mobility, and school dropout: A research note, Demography 31 (4), 575-584, https://doi.org/10.2307/2061791.

BALLARINO G., PANICHELLA N., TRIVENTI M. (2014) School expansion and uneven modernization. Comparing educational inequality in Northern and Southern Italy, Research in Social Stratification and Mobility 36, 69-86, https://doi.org/10.1016/j.rssm.2014.01.002.

BALLATORE R. M., MARIANI V. (2019) Human capital differentials across urban and rural areas in Italy. The role of migrations, Italian Economic Journal 5, 307-324, https://doi.org/10.1007/s40797-019-00098-9.

BATTISTIN E., MERONI E. C. (2016) Should we increase instruction time in low achieving schools? Evidence from Southern Italy, Economics of Education Review 55, 39-56, https://doi.org/10.1016/j.econedurev.2016.08.003.

BECKER G. S. (ed.) (1994) Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education (3rd Edition), The University of Chicago Press, Chicago.

BECKER G. S., TOMES N. (1979) An equilibrium theory of the distribution of income and intergenerational mobility, Journal of Political Economy 87 (6), 1153-1189.

BERKOWITZ R., MOORE H., ASTOR R. A., BENBENISHTY R. (2017) A Research synthesis of the associations between socioeconomic background, inequality, school climate, and academic achievement, Review of Educational Research 87 (2), 425-469, https://doi.org/10.3102/0034654316669821.

BIAGI F., LUCIFORA C. (2008) Demographic and education effects on unemployment in Europe, Labour Economics 15 (5), 1076-1101, https://doi.org/10.1016/j.labeco.2007.09.006.

BLAKE J. (1981) Family size and the quality of children, Demography 18 (4), 421-442,

https://doi.org/10.2307/2060941.

BOXER P., DRAWVE G., CAPLAN J. M. (2020) Neighborhood violent crime and academic performance: A geospatial analysis, American Journal of Community Psychology 65 (3-4), 343-352, https://doi.org/10.1002/ajcp.12417.

BOYLE M. H., RACINE Y., GEORGIADES K., SNELLING D., HONG S., OMARIBA W., HURLEY P., RAO-MELACINI P. (2006) The influence of economic development level, household wealth and maternal education on child health in the developing world, Social Science & Medicine 63 (8), 2242-2254, https://doi.org/10.1016/j.socscimed.2006.04.034.

BRUNELLO G., CHECCHI D. (2005) School quality and family background in Italy, Economics of Education Review 24 (5), 563-577, https://doi.org/10.1016/j.econedurev.2004.09.001.

BRUNETTI I., CIRILLO V., FERRI V. (2022) The higher educated, the lower paid: the fixed-term wage penalty within highly educated workers in Italy, Studies in Higher Education 47 (11), 2253-2272, https://doi.org/10.1080/03075079.2022.2043841.

BU F. (2016) Examining sibling configuration effects on young people's educational aspiration and attainment, Advances in Life Course Research 27, 69-79, https://doi.org/10.1016/j.alcr.2015.09.003.

BURDICK-WILL J. (2013) School violent crime and academic achievement in Chicago, Sociology of Education 86 (4), 343-361, https://doi.org/10.1177/0038040713494225.

CAI W., WU F. (2019) Influence of income disparity on child and adolescent education in China: A literature review, New Directions for Child and Adolescent Development 163, 97-113, https://doi.org/10.1002/cad.20268.

CAPELLO R. (2016) What makes Southern Italy still lagging behind? A diachronic perspective of theories and approaches, European Planning Studies 24 (4), 668-686, https://doi.org/10.1080/09654313.2015.1128402.

CAVALIERI M., FINOCCHIARO CASTRO M., GUCCIO C. (2021) Does the fish rot from the head? Organised crime and educational outcomes in Southern Italy, ZBW - Leibniz Information Centre for Economics, Retrieved from: www.econstor.eu.

CEMALCILAR Z., GÖKŞEN F. (2014) Inequality in social capital: social capital, social risk and drop-out in the Turkish education system, British Journal of Sociology of Education 35 (1), 94-114, https://doi.org/10.1080/01425692.2012.740807.

CHEN Y., FENG S. (2013) Access to public schools and the education of migrant children in China, China Economic Review 26, 75-88, https://doi.org/10.1016/j.chieco.2013.04.007.

CHESTERS J. (2019) Egalitarian Australia? Associations between family wealth and outcomes in young adulthood, Journal of Sociology 55 (1), 72-89, https://doi.org/10.1177/1440783318777293.

CHIU M. M., CHOW B. W.-Y. (2015) Classmate characteristics and student achievement in 33 countries: Classmates' past achievement, family socioeconomic status,

educational resources, and attitudes toward reading, Journal of Educational Psychology 107 (1), 152-169, https://doi.org/10.1037/a0036897.

CHMIELEWSKI A. K. (2019) The global increase in the socioeconomic achievement gap, 1964 to 2015, American Sociological Review 84 (3), 517-544, https://doi.org/10.1177/0003122419847165.

CIRIACI D. (2010) University quality, interregional brain drain and spatial inequality. The case of Italy, Luiss Lab of European Economics, Retrieved from: www.aiel.it.

COLEMAN J. S. (1988) Social capital in the creation of human capital, American Journal of Sociology 94, S95-S120.

CONIGLIO N. D., CELI G., SCAGLIUSI C. (2010) Organized crime, migration and human capital formation: evidence from the South of Italy, Southern Europe Research in Economic Studies – S.E.R.I.E.S., University of Bari.

CONTINI D., CUGNATA F., SCAGNI A. (2018) Social selection in higher education. Enrolment, dropout and timely degree attainment in Italy, Higher Education 75, 785-808, https://doi.org/10.1007/s10734-017-0170-9.

CONWELL J. A. (2021) Diverging disparities: Race, parental income, and children's math scores, 1960 to 2009, Sociology of Education 94 (2), 124-142, https://doi.org/10.1177/0038040720963279.

COSTABILE A., COCO A. (2017) Social actors and social ties in multiple modernity: Familism and social change in the South of Italy, European Journal of Cultural and Political Sociology 4 (1), 76-99, https://doi.org/10.1080/23254823.2017.1274119.

CROCIATA A., ODOARDI I., AGOVINO M., SACCO P. L. (2020) A missing link? Cultural capital as a source of human capital: evidence from Italian regional data, The Annals of Regional Science 64, 79-109, https://doi.org/10.1007/s00168-019-00954-7.

CROSNOE R. (2004) Social capital and the interplay of families and schools, Journal of Marriage and Family 66 (2), 267-280.

DANIELE V. (2021) Socioeconomic inequality and regional disparities in educational achievement: The role of relative poverty, Intelligence 84, 101515, https://doi.org/10.1016/j.intell.2020.101515.

DAVALOS D. B., CHAVEZ E. L., GUARDIOLA R. J. (2005) Effects of perceived parental school support and family communication on delinquent behaviors in Latinos and White non-Latinos, Cultural Diversity and Ethnic Minority Psychology 11 (1), 57-68, https://doi.org/10.1037/1099-9809.11.1.57.

DAVIS-KEAN P. E. (2005) The influence of parent education and family income on child achievement: The indirect role of parental expectations and the home environment, Journal of Family Psychology 19 (2), 294-304, https://doi.org/10.1037/0893-3200.19.2.294.

DAY I. N. Z., VAN BLANKENSTEIN F. M., WESTENBERG P. M., ADMIRAAL W. F. (2018) Explaining individual student success using continuous assessment types and student characteristics, Higher Education Research & Development 37 (5),

937-951, https://doi.org/10.1080/07294360.2018.1466868.

DEBACKER J. M., ROUTON P. W. (2017) Expectations, education and opportunity, Journal of Economic Psychology 59, 29-44, https://doi.org/10.1016/j.joep.2017.01.004.

DEL VALLE J. F., CANALI C., BRAVO A., VECCHIATO T. (2013) Child protection in Italy and Spain: Influence of the family supported society, Psychosocial Intervention 22 (3), 227-237, https://doi.org/10.5093/in2013a26.

DELL'AGOSTINO L., NENCI S. (2018) Measuring patterns of specialization using trade in value added: the case of manufacturing in Italy, Applied Economics Letters 25 (21), 1487-1492, https://doi.org/10.1080/13504851.2018.1430316.

DESLANDES R., BOUCHARD P., ST-AMANT J. C. (1998) Family variables as predictors of school achievement: Sex differences in Quebec adolescents, Canadian Journal of Education 23 (4), 390-404, https://doi.org/10.2307/1585754.

DICKSON M., GREGG P., ROBINSON H. (2016) Early, late or never? When does parental education impact child outcomes?, The Economic Journal 126 (596), F184-F231, https://doi.org/10.1111/ecoj.12356.

DUARTE R., FERRANDO-LATORRE S., MOLINA J. A. (2018) How to escape poverty through education?: intergenerational evidence in Spain, Applied Economics Letters 25 (9), 624-627, https://doi.org/10.1080/13504851.2017.1352073.

EDWARDS L. N., PASQUALE M. K. (2003) Women's higher education in Japan: Family background, economic factors, and the Equal Employment Opportunity Law, Journal of the Japanese and International Economies 17 (1), 1-32, https://doi.org/10.1016/S0889-1583(03)00004-2.

EFFIONG O. E., IGIRI C. E. (2015) The influence of family background on the academic achievement of students in basic science, International Letters of Social and Humanistic Sciences 59, 20-27, https://doi.org/10.18052/www.scipress.com/ILSHS.59.20.

EUROPEAN COMMISSION (2019) Education and Training Monitor 2019 – Italy, Luxembourg: Publications Office of the European Union, Luxembourg.

FAGAN J., BARNETT M. (2003) The relationship between maternal gatekeeping, paternal competence, mothers' attitudes about the father role, and father involvement, Journal of Family Issues 24 (8), 1020-1043, https://doi.org/10.1177/0192513X03256397.

FELICE E. (2012) Regional convergence in Italy, 1891–2001: testing human and social capital, Cliometrica 6, 267-306, https://doi.org/10.1007/s11698-011-0076-1.

FERRER J., RINGER A., SAVILLE K., PARRIS M. A., KASHI K. (2022) Students' motivation and engagement in higher education: the importance of attitude to online learning, Higher Education 83, 317-338, https://doi.org/10.1007/s10734-020-00657-5.

FLOYD R. G., EVANS J. J., MCGREW K. S. (2003) Relations between measures of Cattell-Horn-Carroll (CHC) cognitive abilities and mathematics achievement

across the school-age years, Psychology in the Schools 40 (2), 155-171, https://doi.org/10.1002/pits.10083.

FUCHS L. S., FUCHS D., COMPTON D. L., POWELL S. R., SEETHALER P. M., CAPIZZI A. M., SCHATSCHNEIDER C., FLETCHER J. M. (2006) The cognitive correlates of third-grade skill in arithmetic, algorithmic computation, and arithmetic word problems, Journal of Educational Psychology 98 (1), 29-43, https://doi.org/10.1037/0022-0663.98.1.29.

FUKUYAMA F. (1995) Social capital and the global economy, Foreign Affairs 74 (5), 89-103, https://doi.org/10.2307/20047302.

GERSHENSON S., TEKIN E. (2018) The effect of community traumatic events on student achievement: evidence from the Beltway sniper attacks, Education Finance and Policy 13 (3), 513-544, https://doi.org/10.1162/edfp_a_00234.

GIMENEZ-NADAL J. I., MOLINA J. A. (2013) Parents' education as a determinant of educational childcare time, Journal of Population Economics 26, 719-749, https://doi.org/10.1007/s00148-012-0443-7.

GITTO S., MANCUSO P. (2015) The contribution of physical and human capital accumulation to Italian regional growth: a nonparametric perspective, Journal of Productivity Analysis 43, 1-12, https://doi.org/10.1007/s11123-013-0362-y.

GLASS D. C., NEULINGER J., BRIM O. G. (1974) Birth order, verbal intelligence, and educational aspiration, Child Development 45 (3), 807-811, https://doi.org/10.2307/1127851.

GLOMM G., RAVIKUMAR B. (1992) Public versus private investment in human capital: Endogenous growth and income inequality, Journal of Political Economy 100 (4), 818-834.

GOLDHABER D. D., BREWER D. J. (1997) Why don't schools and teachers seem to matter? Assessing the impacts of unobservables on educational productivity, The Journal of Human Resources 32 (3), 505-523, https://doi.org/10.2307/146181.

GOLDIN C., KATZ L. F. (2007) Long-run changes in the wage structure: Narrowing, widening, polarizing, Brookings Papers on Economic Activity 38 (2), 135-167.

GOLDSMITH A. H., VEUM J. R., DARITY W. JR. (1997) The impact of psychological and human capital on wages, Economic Inquiry 35 (4), 815-829, https://doi.org/10.1111/j.1465-7295.1997.tb01966.x.

GORARD S. (2010) School experience as a potential determinant of post-compulsory participation, Evaluation & Research in Education 23 (1), 3-17, https://doi.org/10.1080/09500791003605110.

GUISAN M.-C., NEIRA I. (2006) Direct and indirect effects of human capital on world development, 1960-2004, Applied Econometrics and International Development 6 (1), 17-34.

GUNTER W. D., DALY K. (2013) Health behaviors and standardized test scores: The impact of school health climate on performance, International Journal of School & Educational Psychology 1 (3), 166-175, https://doi.org/10.1080/21683603.2013.

805173.

HANSEN L. P. (1982) Large sample properties of generalized method of moments estimators, Econometrica 50 (4), 1029-1054, https://doi.org/10.2307/1912775.

HEGEDUS A. (2018) Evaluating the relationships between poverty and school performance, NWEA, Retrieved from: www.nwea.org.

HIRN R. G., HOLLO A., SCOTT T. M. (2018) Exploring instructional differences and school performance in high-poverty elementary schools, Preventing School Failure: Alternative Education for Children and Youth 62 (1), 37-48, https://doi.org/10.1080/1045988X.2017.1329197.

HOARD D., SHEPARD K. N. (2005) Parent education as parent-centered prevention: A review of school-related outcomes, School Psychology Quarterly 20 (4), 434-454, https://doi.org/10.1521/scpq.2005.20.4.434.

HORTAÇSU N. (1995) Parents' education levels, parents' beliefs, and child outcomes, The Journal of Genetic Psychology: Research and Theory on Human Development 156 (3), 373-383, https://doi.org/10.1080/00221325.1995.9914830.

HOY W., MISKEL C. (2013) Educational Administration: Theory, Research, and Practice, McGraw-Hill Ltd., New York.

HUSAIN N. I. A. E., MEISENBERG G., BECKER D., BAKHIET S. F., ESSA Y. A. S., LYNN R., AL JULAYGHIM F. M. H. (2019) Intelligence, family income and parental education in the Sudan, Intelligence 77, 101402, https://doi.org/10.1016/j.intell.2019.101402.

HUYSSEUNE M. (2020) Theory travelling through time and space: The reception of the concept of amoral familism, International Journal of Politics, Culture, and Society 33, 365-388, https://doi.org/10.1007/s10767-019-09335-6.

INVALSI (2013-2019) Rapporto prove INVALSI, National Institute for the Evaluation of the Educational System, Rome, Retrieved from: invalsi-areaprove.cineca.it.

JOHNSON C. C. (2012) Implementation of STEM education policy: challenges, progress, and lessons learned, School Science and Mathematics 112 (1), 45-55, https://doi.org/10.1111/j.1949-8594.2011.00110.x.

KAO G., TIENDA M. (1998) Educational aspirations of minority youth, American Journal of Education 106 (3), 349-384.

KEITH T. Z., TROUTMAN G. C., TRIVETTE P. S., KEITH P. B., BICKLEY P. G., SINGH K. (1993) Does parental involvement affect eighth-grade student achievement? Structural analysis of national data, School Psychology Review 22 (3), 474-496, https://doi.org/10.1080/02796015.1993.12085668.

KIM Y.-J. (2020) Born to be more educated? Birth order and schooling, Review of Economics of the Household 18, 165-180, https://doi.org/10.1007/s11150-019-09462-1.

KLEIBERGEN F., PAAP R. (2006) Generalized reduced rank tests using the singular value decomposition, Journal of Econometrics 133 (1), 97-126, https://doi.org/10.1016/j.jeconom.2005.02.011.

KUEHN Z., LANDERAS P. (2014) The effect of family background on student effort, The B.E. Journal of Economic Analysis & Policy 14 (4), 1337-1403, https://doi.org/10.1515/bejeap-2013-0150.

LANDERAS P. (2009) Student effort: standards vs. tournaments, Applied Economics Letters 16 (9), 965-969, https://doi.org/10.1080/13504850701222129.

LANZI D. (2007) Capabilities, human capital and education, The Journal of Socio-Economics 36 (3), 424-435, https://doi.org/10.1016/j.socec.2006.12.005.

LAO Y., LIN S. (2022) Comparison of educational performance between the only children and children in two-child families, Scientific Reports 12, 15355, https://doi.org/10.1038/s41598-022-19730-3.

LEE J.-W., LEE H. (2018) Human capital and income inequality, Journal of the Asia Pacific Economy 23 (4), 554-583, https://doi.org/10.1080/13547860.2018.1515002.

LEÓN M., PAVOLINI E. (2014) 'Social investment' or back to 'familism': The impact of the economic crisis on family and care policies in Italy and Spain, South European Society and Politics 19 (3), 353-369, https://doi.org/10.1080/13608746.2014.948603.

LI W. (2007) Family background, financial constraints and higher education attendance in China, Economics of Education Review 26 (6), 724-734, https://doi.org/10.1016/j.econedurev.2007.09.001.

LI Z., QIU Z. (2018) How does family background affect children's educational achievement? Evidence from Contemporary China, The Journal of Chinese Sociology 5, 13, https://doi.org/10.1186/s40711-018-0083-8.

LIU J., PENG P., LUO L. (2020) The relation between family socioeconomic status and academic achievement in China: A meta-analysis, Educational Psychology Review 32, 49-76, https://doi.org/10.1007/s10648-019-09494-0.

LUO C. (2022) The COVID-19 crisis: The EU Recovery Fund and its implications for European integration – A paradigm shift, European Review 30 (3), 374-392, https://doi.org/10.1017/S106279872100003X.

MACLEOD J. (2018) Ain't No Makin' It: Aspirations and Attainment in a Low-Income Neighborhood, Routledge, New York, https://doi.org/10.1201/9780429495458.

MACNEIL A. J., PRATER D. L., BUSCH S. (2009) The effects of school culture and climate on student achievement, International Journal of Leadership in Education 12 (1), 73-84, https://doi.org/10.1080/13603120701576241.

MACRY P. (1997) Rethinking a stereotype: Territorial differences and family models in the modernization of Italy, Journal of Modern Italian Studies 2 (2), 188-214, https://doi.org/10.1080/13545719708454947.

MASLOWSKI R. (2001) School culture and school performance: an explorative study into the organizational culture of secondary schools and their effects, Twente University Press, Enschede.

MÉREINÉ BERKI B., MÁLOVICS G., TÓTH J., CREŢAN R. (2017) The role of social

capital and interpersonal relations in the alleviation of extreme poverty and spatial segregation of Romani people in Szeged, Journal of Urban and Regional Analysis 9 (1), 33-50, https://doi.org/10.37043/JURA.2017.9.1.2.

MELESSE S., MOLLA S. (2018) The contribution of school culture to students' academic achievement: The case of secondary and preparatory schools of Assosa Zone, Benshangul Gumuz Regional state, Ethiopia, Research in Pedagogy 8 (2), 190-203, https://doi.org/10.17810/2015.83.

MICHELI G. A. (2012) Two strong families in Southern Europe? Re-examining the geography of kinship regimes stemming from the reciprocity mechanisms between generations, European Journal of Population 28, 17-38, https://doi.org/10.1007/s10680-011-9245-y.

MOCCA E., ROJON C., HERNÁNDEZ J. (2019) Great expectations? A systematic review of the relationship between the school-to-higher education transition and social mobility, Sociological Spectrum 39 (4), 264-280, https://doi.org/10.1080/02732173.2019.1669235.

ODOARDI I. (2020) Can parents' education lay the foundation for reducing the inactivity of young people? A regional analysis of Italian NEETs, Economia Politica 37, 307-336, https://doi.org/10.1007/s40888-019-00162-8.

ODOARDI I., MURATORE F. (2018) The Italian regional dualism: A MARS and panel data analysis, The Review of Regional Studies 48 (3), 323-346, https://doi.org/10.52324/001c.7991.

OECD (2013) Synergies for better learning: An international perspective on evaluation and assessment, OECD Publishing, Paris.

OECD (2019) PISA 2018 Results (Volume I): What Students Know and Can Do, PISA, OECD Publishing, Paris, https://doi.org/10.1787/5f07c754-en.

OECD (2022) Education at a Glance 2022: OECD Indicators, OECD Publishing, Paris, https://doi.org/10.1787/3197152b-en.

OGUNDARI K., AWOKUSE T. (2018) Human capital contribution to economic growth in Sub-Saharan Africa: Does health status matter more than education?, Economic Analysis and Policy 58, 131-140, https://doi.org/10.1016/j.eap.2018.02.001.

OKPALA C. O., OKPALA A. O., SMITH F. E. (2001) Parental involvement, instructional expenditures, family socioeconomic attributes, and student achievement, The Journal of Educational Research 95 (2), 110-115.

ONCU E. C., UNLUER E. (2012) Parent s' attitude towards their children before and after parental education, Procedia - Social and Behavioral Sciences 46, 5933-5936, https://doi.org/10.1016/j.sbspro.2012.08.008.

OSMAN A., YDHAG C. C., MÅNSSON N. (2021) Recipe for educational success: a study of successful school performance of students from low social cultural background, International Studies in Sociology of Education 30 (4), 422-439, https://doi.org/10.1080/09620214.2020.1764379.

PAGANI L. S., BRIÈRE F. N., JANOSZ M. (2017) Fluid reasoning skills at the high

school transition predict subsequent dropout, Intelligence 62, 48-53, https://doi.org/10.1016/j.intell.2017.02.006.

PERAITA C., PASTOR M. (2000) The primary school dropout in Spain: The influence of family background and labor market conditions, Education Economics 8 (2), 157-168, https://doi.org/10.1080/096452900410721.

PLAGENS G. K. (2011) Social capital and education: Implications for student and school performance, Education and Culture 27 (1), 40-64, https://doi.org/10.1353/eac.2011.0007.

QUINTANO C., CASTELLANO R., LONGOBARDI S. (2009) A fuzzy clustering approach to improve the accuracy of Italian student data. An experimental procedure to correct the impact of outliers on assessment test scores, Statistica & Applicazioni 7 (2), 149-171.

RAGHUPATHI V., RAGHUPATHI W. (2020) The influence of education on health: an empirical assessment of OECD countries for the period 1995–2015, Archives of Public Health 78, 20, https://doi.org/10.1186/s13690-020-00402-5.

RAHIM S., MURSHED M., UMARBEYLI S., KIRIKKALELI D., AHMAD M., TUFAIL M., WAHAB S. (2021) Do natural resources abundance and human capital development promote economic growth? A study on the resource curse hypothesis in Next Eleven countries, Resources, Environment and Sustainability 4, 100018, https://doi.org/10.1016/j.resenv.2021.100018.

RAMIREZ F. O., LUO X., SCHOFER E., MEYER J. W. (2006) Student achievement and national economic growth, American Journal of Education 113 (1), 1-29, https://doi.org/10.1086/506492.

REAM R. K. (2003) Counterfeit social capital and Mexican-American underachievement, Educational Evaluations and Policy Analysis 25 (3), 237-262, https://doi.org/10.3102/01623737025003237.

REINHOLD S., JÜRGES H. (2012) Parental income and child health in Germany, Health Economics 21 (5), 562-579, https://doi.org/10.1002/hec.1732.

RONTOS K., SYRMALI M.-E., SALVATI L. (2021) Unraveling the (intrinsic) linkage between social spending and regional development: An empirical analysis for European Union countries, Journal of Urban and Regional Analysis 13 (1), 5-18, https://doi.org/10.37043/JURA.2021.13.1.1.

ROSE R. A., WOOLLEY M. E., BOWEN G. L. (2013) Social capital as a portfolio of resources across multiple microsystems: Implications for middle-school students, Family Relations 62 (4), 545-558, https://doi.org/10.1111/fare.12028.

RUBENSTEIN I. Z. (2006) Educational expectations: How they differ around the world: Implications for teaching ESL college students, Community College Journal of Research and Practice 30 (5-6), 433-441, https://doi.org/10.1080/10668920500442224.

SAß S., KAMPA N., KÖLLER O. (2017) The interplay of g and mathematical abilities in large-scale assessments across grades, Intelligence 63, 33-44, https://doi.org/

10.1016/j.intell.2017.05.001.

SAW G. K. (2016) Patterns and trends in achievement gaps in Malaysian secondary schools (1999–2011): Gender, ethnicity, and socioeconomic status, Educational Research for Policy and Practice 15, 41-54, https://doi.org/10.1007/s10671-015-9175-2.

SIRIN S. R. (2005) Socioeconomic status and academic achievement: A meta-analytic review of research, Review of Educational Research 75 (3), 417-453, https://doi.org/10.3102/00346543075003417.

SMITS J., HOŞGÖR A. G. (2006) Effects of family background characteristics on educational participation in Turkey, International Journal of Educational Development 26 (5), 545-560, https://doi.org/10.1016/j.ijedudev.2006.02.002.

SONEGO M., LLÁCER A., GALÁN I., SIMÓN F. (2013) The influence of parental education on child mental health in Spain, Quality of Life Research 22, 203-211, https://doi.org/10.1007/s11136-012-0130-x.

STEELMAN L. C., POWELL B., WERUM R., CARTER S. (2002) Reconsidering the effects of sibling configuration: Recent advances and challenges, Annual Review of Sociology 28, 243-269, https://doi.org/10.1146/annurev.soc.28.111301.093304.

SULLOWAY F. J. (2007) Birth order and intelligence, Science 316 (5832), 1711-1712, https://doi.org/10.1126/science.1144749.

TARROW S. (1996) Making Social Science Work Across Space and Time: A Critical Reflection on Robert Putnam's Making Democracy Work, American Political Science Review 90 (2), 389-397, https://doi.org/10.2307/2082892.

TEACHMAN J. D. (2008) The living arrangements of children and their educational well- being, Journal of Family Issues 29 (6), 734-761, https://doi.org/10.1177/0192513X07309742.

TEJEDOR S., CERVI L., PÉREZ-ESCODA A., JUMBO F. T. (2020) Digital literacy and higher education during COVID-19 lockdown: Spain, Italy, and Ecuador, Publications 8 (4), 48, https://doi.org/10.3390/publications8040048.

THISSE J.-F. (2018) Human capital and agglomeration economies in urban development, The Developing Economies 56 (2), 117-139, https://doi.org/10.1111/deve.12167.

THOMSON E., HANSON T. L., MCLANAHAN S. S. (1994) Family structure and child well-being: Economic resources vs. parental behaviors, Social Forces 73 (1), 221-242.

TOMES N. (1981) The family, inheritance, and the intergenerational transmission of inequality, Journal of Political Economy 89 (5), 928-958, https://doi.org/10.1086/261014.

TORRATS-ESPINOSA G. (2020) Crime and inequality in academic achievement across school districts in the United States, Demography 57, 123-145, https://doi.org/10.1007/s13524-019-00850-x.

TRAMONTE L., WILLMS J. D. (2010) Cultural capital and its effects on education outcomes, Economics of Education Review 29 (2), 200-213, https://doi.org/10.1016/j.econedurev.2009.06.003.

TSUI M., RICH L. (2002) The only child and educational opportunity for girls in urban China, Gender & Society 16 (1), 74-92, https://doi.org/10.1177/0891243202016001005.

TUCKER C. J., MARX J., LONG L. (1998) "Moving on": Residential mobility and children's school lives, Sociology of Education 71 (2), 111-129, https://doi.org/10.2307/2673244.

UNITED NATIONS (2015) Transforming Our World: The 2030 Agenda for Sustainable Development, United Nations, Retrieved from: sdgs.un.org.

VERGOLINI L., VLACH E. (2017) Family background and educational path of Italian graduates, Higher Education 73, 245-259, https://doi.org/10.1007/s10734-016-0011-2.

VOIGHT A., SHINN M., NATION M. (2012) The longitudinal effects of residential mobility on the academic achievement of urban elementary and middle school students, Educational Researcher 41 (9), 385-392, https://doi.org/10.3102/0013189X12442239.

WEINBERG B. A. (2001) An incentive model of the effect of parental income on children, Journal of Political Economy 109 (2), 266-280, https://doi.org/10.1086/319556.

WHITE K. R. (1982) The relation between socioeconomic status and academic achievement, Psychological Bulletin 91 (3), 461-481, https://doi.org/10.1037/0033-2909.91.3.461.

WILLEKENS F. (2008) Demography and higher education - The impact on the age structure of staff and human capital formation, in: OECD (ed.), Higher Education to 2030 (Volume 1): Demography, OECD Publishing, Paris, pp. 105-124.

WU Z., SCHIMMELE C. M., HOU F. (2015) Family structure, academic characteristics, and postsecondary education, Family Relations 64 (2), 205-220, https://doi.org/10.1111/fare.12112.

WU X.-Z., TIAN M.-Z. (2008) A longitudinal study of the effects of family background factors on mathematics achievements using quantile regression, Acta Mathematicae Applicatae Sinica, English Series 24, 85-98, https://doi.org/10.1007/s10255-006-6066-6.

XU D., DADGAR M. (2018) How effective are community college remedial math courses for students with the lowest math skills?, Community College Review 46 (1), 62-81, https://doi.org/10.1177/0091552117743789.

YAMAMOTO Y., HOLLOWAY S. D. (2010) Parental expectations and children's academic performance in sociocultural context, Educational Psychology Review 22, 189-214, https://doi.org/10.1007/s10648-010-9121-z.

YAMAUCHI F., LIU Y. (2013) Impacts of an early stage education intervention on

students' learning achievement: Evidence from the Philippines, The Journal of Development Studies 49 (2), 208-222, https://doi.org/10.1080/00220388.2012.700395.

ZAJONC R. B., SULLOWAY F. J. (2007) The confluence model: Birth order as a within-family or between-family dynamic?, Personality and Social Psychology Bulletin 33 (9), 1187-1194, https://doi.org/10.1177/0146167207303017.

ZUNICH M. (1966) Child behavior and parental attitudes, The Journal of Psychology 62 (1), 41-46, https://doi.org/10.1080/00223980.1966.10543023.