



# From Choice to Performance in Secondary Schools: Evidence from a Disadvantaged Setting in Italy

Anna Bussu<sup>1</sup> · Dimitri Paolini<sup>2,3</sup> · Manuela Pulina<sup>2</sup>  · Giuseppe Zanzurino<sup>2</sup>

Received: 18 March 2021 / Accepted: 26 November 2021 / Published online: 30 January 2022

© The Author(s) under exclusive licence to Società Italiana di Economia (Italian Economic Association) 2021

## Abstract

This study employs detailed micro-data to uncover the factors influencing secondary school choice and performance and, ultimately, dropout risks within a multidimensional framework. The findings reveal that young people's choice of a comprehensive secondary school, characterised by a higher dropout rate, is highly influenced by future expectations and family background. Further, teachers' role, learning methods and technology positively drive performance. Perceived cognitive skills only affect students' performance given their choice. Besides, an ANOVA analysis assesses that the interaction between cognitive and non-cognitive skills impacts performance. Peer study is pivotal for success in individuals with perceived cognitive difficulties.

**Keywords** Young people · Secondary school · Choice · Performance · Non-cognitive skills

**JEL Classification** D91 · I24 · C21 · O52

---

✉ Manuela Pulina  
mpulina@uniss.it

Anna Bussu  
anna.bussu@edgehill.ac.uk

Dimitri Paolini  
dpaolini@uniss.it

Giuseppe Zanzurino  
zanzurinogiuseppe@gmail.com

<sup>1</sup> Department of Applied Health and Social Care, Edge Hill University, Ormskirk, UK

<sup>2</sup> Department of Economics and Business (DiSEA) and CRENoS, University of Sassari, Sassari, Italy

<sup>3</sup> CORE, Université Catholique de Louvain, Louvain, Belgium

## 1 Introduction

The school dropout rate is a key issue for a country's economic and social development, which can undermine the potential growth of human capital as a primary production factor (OECD 2017). As Sauer and Zagler (2012; 2014) pointed out, education obtained through the formal schooling cycle plays a fundamental role not only for income generation but also for equality in opportunities and economic development at the macro level. As Freeman and Simonsen (2015, pp. 205–206) emphasised: "...young adults, who did not complete high school, are more likely to be unemployed, to be welfare recipients, and when employed, to make less money on average than their peers who did complete high school. High school dropout is also more likely to suffer from depression or other mental health issues, join gangs or be involved in other criminal activities, and serve time in jail".

The strategy 'Europe 2030' identifies some critical actions that the European Union (EU) governments should pursue to boost growth and employment, especially for young people. Education and lifelong learning are amongst these essential goals. The objective is to reduce the number of early school dropouts below 10%. While 17 of 28 countries ranked below the threshold of 10%, Spain (17.9%), Malta (17.5%), Romania (16.4%) and Italy (14.5%) remain well above the EU target. In the EU, the quota of early dropouts from education and training ranged from 3.3% in Croatia to 17.9% in Spain (Eurostat 2019).

An early school dropout amongst young people aged 18–24, who has not attained a secondary school qualification, is likely to drive job market inactivity and, potentially, diminished individual well-being and social unrest. In this respect, the EU agenda promotes more inclusive and equitable access to education, a stronger focus on addressing the learning crisis and teacher deficit and more support in education and training in emergencies and protracted crises (European Commission 2020). As far as Italy is concerned, in July 2020, the unemployment rate amongst Italian young people (aged 15–24) was 31.1% (ISTAT 2020) against 15% in the EU (Eurostat 2020). The quota of Not in Education, Employment or Training (NEET) in Italy was 27.8% against an average of 16.5% in the EU. These statistics reflect adverse socio-economic conditions for young Italians related not only to macroeconomic shocks but also, especially, to structural factors, such as unsatisfactory education and training systems; labour market barriers and segmentation; limited public employment services that are able to engage young people and, especially, the most exposed segments of the labour force (European Commission 2016). The COVID-19 pandemic is likely to augment challenges further for this most vulnerable cluster of the population (Schleicher 2020).

The EU national statistics provide aggregated data at a regional level on a range of domains and indicators for various socio-demographic clusters as follows: educational expenditure, formal education, lifelong learning, spending to students' cognitive skills, and, therefore, to the effects on the labour market, levels of competence and cultural participation. However, aggregate data fail to reveal the core factors that are likely to influence school dropout rates and students' achievement. The causes underlying this phenomenon are varied and involve both internal and external factors. Previous studies tend to focus on macro issues (Di Giacomo and Pennisi 2015) or separate topics such as students' motivations and expectations (Alivernini and Lucidi 2011), different

cognitive skills (Hanushek and Woessmann 2008), teachers' role (Jackson et al. 2014; Van Uden et al. 2014) and students' socio-economic background (Thomson 2018).

Previous research focused on "non-cognitive skills" and students' performance. Non-cognitive skills refer to *emotional* (e.g. empathy, managing emotions and stress) and *socio-relational area* (e.g. interpersonal skills, self-awareness, good communication; see WHO 1999; Bussu et al. 2018). Non-cognitive skills are more relevant predictors of observed individual differences in life outcomes than innate intellectual ability (Almlund et al. 2011; Lindqvist and Vestman 2011). Recent studies show the relationship between non-cognitive and cognitive skills and students' performance (Mendez, 2015). Vittadini et al. (2021) provide a comprehensive analysis of the role of cognitive and non-cognitive skills on efficiency of twenty-five schools in the Autonomous Province of Trento (Italy).

Yet, the literature has neglected young people's opinions, feelings and perceptions about their secondary school attitudes and choice (Pastore 2019; Ripamonti and Barberis 2018). Dropout is the quota of people aged between 18 and 24 who have left their education without attaining a lower secondary school education and are not engaged in education and training (European Commission 2016).

This paper investigates and explores the root causes that influence young people's choice of secondary school and, indirectly, possible risk factors that may lead to early school dropout. This study adopts a multidimensional approach, where several dimensions or factors that influence school performance are considered, such as socio-demographic indicators, economic motivations, personal commitment, teachers' role, learning methods, role of technology, non-cognitive skills and perceived cognitive skills. Hence, this expanded methodological framework can provide a more comprehensive perspective in this regard.

For this study, a survey was conducted in one of the peripheral European regions, Sardinia (Italy). Based on a Heckman empirical approach (1979), given the choice of a comprehensive secondary school in the first stage, characterised by a relatively high dropout rate, the empirical analysis explores the factors that influence higher schooling achievement in the second stage. Based on insightful and informative data, this quantitative analysis provides directions for evaluating the already-adopted policies that seek to promote school attendance and, ultimately, increase human capital's quality, wealth and well-being.

## 2 Literature Review

There is a growing consensus in the literature that perceived cognitive and non-cognitive skills such as conscientiousness, grit and emotional stability are essential determinants of education and employment (Almlund et al. 2011; Zamarro et al. 2018). However, research on the relationship between high school choice and student performance in secondary school amongst young people (aged 14–24) is still limited. Previous literature analysed dropout rates and school achievement highlights specific dimensional factors (Cunha et al. 2006; Ripamonti and Barberis 2018). The present paper integrates several dimensions, such as socio-demographic background,

motivations, teachers' role, learning methods, technology, perceived cognitive and non-cognitive skills.

Amongst others, Robert (2010) analysed the relationships between social origin, school choice and student performance in 23 OECD countries by employing the PISA 2006 survey. The study showed that high-status families prefer more selective schools, as such schools have better student performance. Another relevant dimension comprised students' and family's expectations and life satisfaction (Sattin-Bajaj 2015). In this respect, Oyserman (2013) and Kim et al. (2013) showed that parental expectations and student's self-perception are critical factors in student achievement and school performance. School choice decisions are strongly related to class, ethnicity and family background (Fjellman 2019; Raitano and Vona 2015).

Several studies assessed the impact of cognitive skills such as *reading performance* (Retelsdor et al. 2011) and *listening* and *writing* (Cheong et al. 2018; Sawaki et al. 2013) on student motivation. Cheong et al. (2018) found that *cognitive reading skills* contribute to performance more than cognitive *listening*. The study showed that three cognitive skills, *elaborating*, *evaluating* and *creating*, significantly correlated with integrated writing. Notably, the literature highlighted the importance of developing emotional and interpersonal skills in all grades from school to university (Denham et al. 2012; Wurdinger and Quereschi 2015).

An emerging body of research assessed the importance of non-cognitive skills, such as personality, social and emotional traits (Kajonius and Carlander 2017). These skills are associated with an individual's personality, temperament and attitudes. Cognitive skills are measured by using achievement test scores while non-cognitive skills are measured by using absences, suspensions, grades and grade progression (Heckman et al. 2006; Jackson 2018). Such skills are also measured by considering risky and reckless behaviours (e.g. stealing or property damage) during adolescence (Kautz et al. 2014).

Teachers have a significant role in students' attainments as they facilitate the development of new skills (Frenzel et al. 2009) and support their well-being (Selimović et al. 2018). Positive perceptions about teachers' role, social context, self-perception and self-regulation positively correlated with school performance and a student's self-determination (Alivernini and Lucidi 2011).

Some studies showed the impact of teachers' role on students' learning test scores and their later life outcomes (Chetty et al. 2014; Hanushek 2013; Hanushek and Woessmann, 2008). The relationship between students and teachers is a protective factor during the school path (Jennings and Greenberg 2008). Students who experience positive relationships with teachers and classmates have a lower risk of early dropout (Lee and Burkam 2003; Bussu and Pulina 2020). Cheng and Zamarro (2018) showed that teachers' effort, conscientiousness and non-cognitive skills drive outcomes (Bastian et al. 2017).

Other works highlighted that non-cognitive skills indirectly and positively affect student performance (Jennings and DiPrete 2010; DeAngelis 2019a). In this field of research, a recent study examined the effects of private schooling on non-cognitive skills. Private education substantially increased Programme for International Student Assessment (PISA) test scores and non-cognitive skills were associated with higher PISA scores (DeAngelis 2019b). These results are coherent to Zamarro et al. (2019),

who highlighted that international test scores, such as PISA, reflect, more than student learning, the character traits and non-cognitive skills of students taking the tests.

Other non-cognitive dimensions, such as culture and value, are relevant to evaluate students' choice and performance. Mendez and Zamarro (2018) contributed to understanding the origin and development of non-cognitive skills by analysing the existence of a cultural component on its formation process and testing its effects on education and employment outcomes in adulthood. The authors remarked that people with a higher inherited social capital tend to achieve higher educational levels and present a higher probability of completing college after finishing high school.

Besides, school facilities, including Information and Communications Technology (ICT) and school outcomes (e.g. attendance, performance evaluation, participation in social activities and sports), can influence schooling success (Akinoso 2018; Erdogu and Erdogu 2015). Indeed, technology has a crucial role in mitigating the adverse effects of COVID-19 pandemic (Schleicher 2020). Hence, assessing the impact of this domain in pre-pandemic provides a more detailed perspective about ICT usage in schools and at home by young individuals within a novel multidimensional framework.

### 3 Aims and Methods

The aim of this study is to explore young people's perceptions about their experiences during secondary school to identify key critical issues and possible school improvements. This aim is pursued through a quantitative approach that offers an informative framework through the following research questions (RQs):

RQ1. What are the domains and indicators valuable to elicit students' choice and ultimately the risk of early school dropout?

RQ2. Given the school of choice, what are the key factors that influence achievement of students while schooling?

RQ3. Does a multidimensional framework assess students' choice of school, schooling attainment and ultimately risk of early dropout as an outcome of a sequential decision-making path?

#### 3.1 Measures and Sampling

The aim of this study is to define multidimensional domains and indicators that can provide a more comprehensive perspective for investigating students' choice, schooling attainment and, indirectly, risk of early dropout as an outcome of a sequential decision-making path (Fig. 1).

The decision about choosing a secondary school can be influenced by a number of socio-demographic factors, such as gender, family background, family wealth, future expectations about education, labour market expectations and individuals' characteristics. In the first stage, the agent decided their educational path as driven by their *socio-demographic background* (Cunha et al. 2006; Ripamonti and Barberis 2018; Vitadini et al. 2021), *economic motivation* (Van Uden et al. 2014; Kearney and Levine 2014), as well as their *perceived cognitive skills* (Retelsdor et al. 2011; Cheong et al.

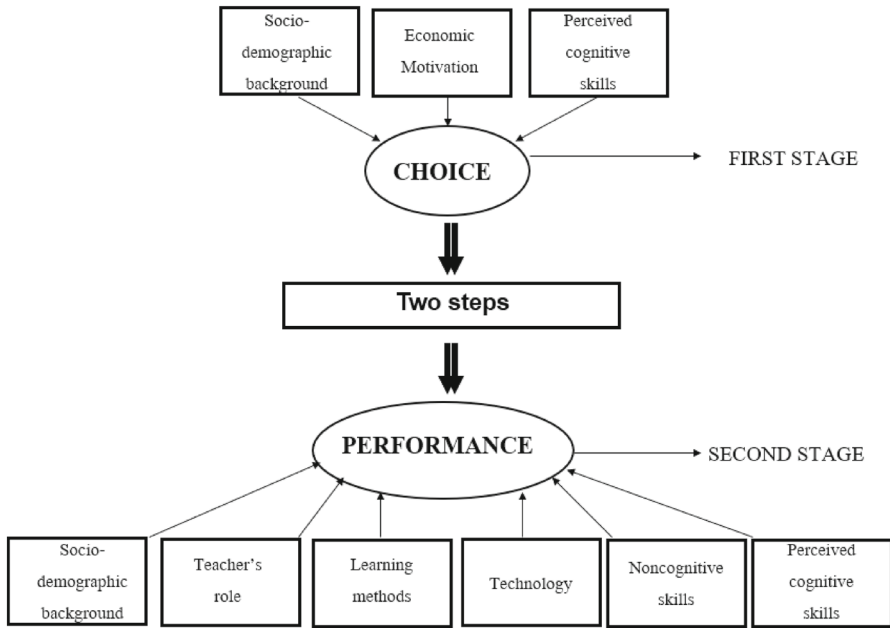


Fig. 1 Methodological framework. Authors' own elaboration

2018; Sawaki et al. 2013). Several studies have found that non-cognitive skills, perceived cognitive skills, personal commitment and student engagement are precursors of learning, and they significantly impact students' school performance (Denham et al. 2012; Van Uden et al. 2014; Wurdinger and Qureschi 2015).

In the second stage, the schooling performance is assumed to be influenced not only by the standard *socio-demographic background* (Cunha et al. 2006; Ripamonti and Barberis 2018) but also by other dimensions such as: *perceived cognitive skills* (Retelsdor et al. 2011; Cheong et al. 2018; Sawaki et al. 2013), *non-cognitive skills* (Kajonius and Carlander 2017; Vittadini et al. 2021), *teachers' role and learning methods* (Frenzel et al. 2009; Selimović et al. 2018), *technology* endowment (Akinoso 2018; Erdogu and Erdogu 2015) and *birth order* that is a proxy of economic status (Aina 2013; Ghignoni 2017). Given the school choice, those who experienced favourable economic conditions could attain higher performance. Hence, to estimate the effects of the socio-economic variables on students' achievement in the first stage, the factor of school choice had been considered by keeping all the other factors constant (Kearney and Levine 2014). Besides, perceived cognitive skills are assumed to drive both the *choice* (first stage) and *performance* (second stage).

This methodological framework provides inferences about the relationship between high school choice and students' overall performance in a secondary school for a sample population aged 14–24, as a sequential decision path. Based on the methodological framework developed by Heckman (1979) and Cameron and Heckman (1998), this study considered the selective nature of secondary school students. The Heckman

selection model is a flexible tool based on two equations within a sequential path: the ‘choice equation’ and the ‘achievement equation’ (Cameron and Heckman 2001). Specifically, the two latent variables are  $c_i^*$  and  $m_i^*$ , which are assumed to be linearly dependent on observable independent variables  $x_i$  and  $z_i$ , respectively. The choice equation is defined as follows:

$$c_i^* = \mathbf{x}_i' \boldsymbol{\alpha} + \varepsilon_i \quad (1)$$

where  $c_i$  is a dummy variable. It takes the value “1” if the student  $i$  attends (or has attended) a comprehensive school, characterised by relatively higher dropout rates than grammar school. It equals “0” if the student attends (or has attended) a grammar school, characterised by a lower dropout rate. This duality was based on the data provided by Ministry of Scientific Research and Education (MIUR) (2019). In Italy, grammar schools experience a lower dropout rate (1.8%) than comprehensive schools (6.0%). In Eq. (1),  $\boldsymbol{\alpha}$  is a vector of parameters,  $\mathbf{x}_i$  are the observed variables and controls relating to the  $i$ 'th student and  $\varepsilon_i$  is the error term.

The achievement equation is defined as follows:

$$m_i^* = \mathbf{z}_i' \boldsymbol{\beta} + v_i \quad (2)$$

where  $m$  takes the value “1” if the student  $i$ , in the previous year or the final year of their studies, had a mark higher or equal to the median (i.e. accounting for at least a pass to the next level of education) and “0” otherwise. In Eq. (2),  $\boldsymbol{\beta}$  is a vector of parameters,  $\mathbf{z}_i$  are the observed variables and controls relating to the  $i$ 'th student and  $v_i$  is the error term.

The error terms  $\varepsilon_i$  and  $v_i$  are assumed to be independent across observations and jointly normally distributed with covariance  $\rho\sigma_\varepsilon$ . The latent variables included in Eqs. (1) and (2), respectively, can only be observed as indicators when the following assumptions hold:

$$c_i = \begin{cases} 1 & \text{if } c_i^* > 0 \\ 0 & \text{otherwise} \end{cases} \quad (3)$$

$$m_i = \begin{cases} m_i^* & \text{if } c_i = 1 \\ \text{n.a.} & \text{otherwise} \end{cases} \quad (4)$$

The expected value of the variable in the second equation ( $m_i$ ) is the conditional expectation of  $m_i^*$  conditioned on being observed ( $c_i = 1$ ), as defined by the following expression:

$$E(m_i | z_i, x_i) = E(m_i^* | c_i = 1, z_i, x_i) = \mathbf{z}'\boldsymbol{\beta} + \rho\sigma_\varepsilon\lambda(x_i\boldsymbol{\alpha}) \quad (5)$$

where the inverse Mills ratio  $\lambda$ , which provides consistent estimates, is defined as follows:

$$\lambda = \frac{\varphi(x_i\boldsymbol{\alpha})}{\psi(x_i\boldsymbol{\alpha})} \quad (6)$$

If the error terms (i.e.  $\varepsilon_i$  and  $v_i$ ) are not correlated, then  $\rho = 0$ , and the expected value of  $m_i$ , given  $z_i$  and  $x_i$ , is  $z_i'\beta$ , that is:

$$E(m_i | z_i, x_i) = E(m_i^* | c_i = 1, z_i, x_i) = z_i'\beta \quad (7)$$

## 4 The Case Study

### 4.1 Motivation and Survey

This paper refers to a lagging socio-economic setting, where early school dropout and youth unemployment are highest in the EU. In Sardinia, in 2018, the dropout rate amongst individuals aged 18–24 was remarkably high (23.5%; EU approximately 10%). This region ranked 205 out of 211 EU regions for which the data was available. A gender gap was also highlighted: 28.9% men versus 16.5% women prematurely abandoned their studies. The segment of youth aged 15–24 who are NEET was 21.4% (EU approximately 10%). Sardinia ranked 218 out of 228 EU regions for which the data was available. Remarkable differences related to gender have been found out; NEET females were 17.7% against 24.6% of males (CRENoS 2019). In this respect, Sardinia offers a relevant socio-economic setting into the root causes of poor performance within a disadvantaged and peripheral area in the EU.

Survey data collected via face-to-face semi-structured interviews provide rich information at a micro level. A questionnaire was designed after following an in-depth literature review and studying especially Caprara (2014), Freeman and Simonsen (2015) and De Witte and L pez-Torres (2017). The authors provided a detailed account of relevant items and the impact of policy and practice interventions on secondary school dropout and school completion rates. The questionnaire was divided into eight main sections as follows:

1. *Socio-demographic background*: (a) gender, age, citizenship, spoken languages, civil and job market status; and (b) parents' age and place of birth, parents' education and occupation, number of family members and number of trips in Italy and abroad.
2. *Economic motivation*: (a) information on the high school attended, including grades obtained (in previous year and diploma, if attained), number of debts (in specific subjects, a lower mark than six, as a pass threshold, can be recovered before the start of the following secondary school year by passing remedial exams), number of times the student repeated a school year (because of complete failure), whether brothers/sisters of the student have repeated a year, preferred subjects and subjects considered more difficult; (b) expectations and motivations for high school attendance, based on a five-point Likert scale (1 = not at all important; 5 = very important), including fourteen propositions on the evaluation of expectations and motivations that led the student to attend that specific high school.
3. *School experience*: Based on a five-point Likert scale (1 = definitely no; 5 = definitely yes), this section included eleven propositions for assessing the degree of satisfaction during the student's high school path.



4. *Teachers' role, learning methods and non-cognitive skills*: Based on a five-point Likert scale (1 = definitely no; 5 = definitely yes), this section included nineteen propositions regarding teaching and learning methods at school and home. It also included students' emotions during the lessons, their interactions amongst peers, their participation in social activities (e.g. voluntary work, cultural association) and sports and a ranking of the place to which they deemed to belong the most (own place of residence, region, country, Europe, world). A question about the means of transport and commuting time was also included in the questionnaire.
5. *Technology*: Based on a five-point Likert scale (1 = definitely no; 5 = definitely yes), this section comprised a set of questions related to using the internet and technology during the student's learning process, either at school or at home.
6. *Perceived cognitive skills*: A set of discrete variables (1 = no; 2 = sometimes; 3 = yes) were included regarding the student's perceptions of their potential difficulties related to various areas, such as, reading, writing, calculus, speaking and mnemonic skills (e.g. right/left; remembering time/dates). As already stated, it is possible in this manner to reveal hidden difficulties that were never clinically diagnosed, and that may subtly affect a student's performance and well-being.
7. *Open questions*: A set of open questions were included to gather qualitative information on the overall perceptions of students about teachers, school organisations, staff and infrastructure.
8. *Interviewer details* and general comments.

This semi-structured interview was built and based on a trial targeting the same age range (14–24). The trial highlighted various critical issues that were amended. The questionnaire was conducted by trained interviewers who targeted a representative sample stratified by gender and age, including individuals belonging to the age group, from 14 years old, at least enrolled in secondary school, to 24 years old. This sampling technique elicited relevant information from two segments of young people. The first segment included students attending secondary school (typically aged 14–18). The second segment included young individuals (aged 19–24) who had already attended a secondary school and were likely to have greater awareness and detachment about their past secondary school experience. The latter age segment represented different education stages and NEET (see Strack et al. 2007; Basit 2009). Altogether, seven clusters of young individuals emerged: (1) the first year of secondary school, (2) the second year of secondary school, (3) the third year of secondary school, (4) the fourth year of secondary school, (5) the fifth year of secondary school, (6) university students and (7) other occupations or NEET.

Based on ISTAT (2017) demographic data of the Sardinian population aged 14–24, a minimum of 383 interviews had been conducted with a 95% confidence level and a 5% interval error. As this information was gathered in the pre-COVID-19 pandemic, possible bias related to a status of overall emergency for the school management and young people reduced and provided a more precise overview of the structural issues that affect the educational system. Two groups of trained interviewers collected the empirical data. The first group comprised psychologists and sociologists who obtained the approval of school board and parents to run the survey within all the secondary schools in the capital province. The second group included trained university students

who voluntarily interviewed secondary school students, university peers, employed, unemployed and potential NEET and municipality stratification as a part of their more advanced training. Particular focus was devoted to the Centre and North of Sardinia, as more disadvantaged areas exist in the island. A snowball technique also minimised response bias and attained a higher level of individual heterogeneity for a representative sample of young individuals with different attitudes, socio-economic backgrounds, motivations and achievements (Morgan 2008). Each interview lasted, on average, 35 min. The researchers obtained 484 face-to-face and detailed questionnaires.

## 4.2 Characteristics of the Representative Sample

Under the experts' supervision, approximately 40% of the sample was from the schools. Overall, the team conducted about 56% of the interviews in the provincial capital city. The remainder were conducted in municipalities that were primarily located in the Centre and North of Sardinia—a more socio-economically disadvantaged area than the South. The research team collected the sample during the autumn of 2017. The researchers inserted the information obtained on paper into an electronic database to minimise imputation errors. Also, the empirical data were promptly available in the relevant software (STATA15). Notably, this sample statistically represented a Sardinian population, aged 14–24, with a level of significance of 95% and a confidence interval of approximately 4%. Table 1 lists the main descriptive statistics to provide an overview of the sample characteristics.

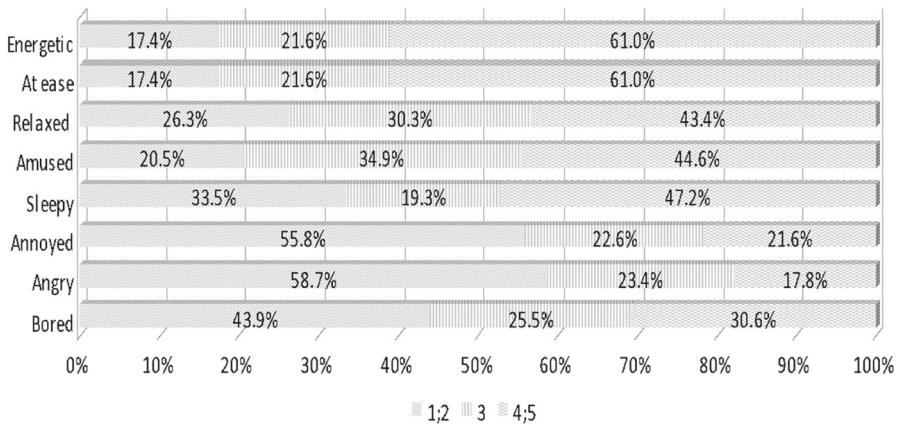
Respondents were balanced (male 50.1%) and the median age was 19 years old. Mothers tended to be relatively younger than fathers (median 50 versus 53 years old) and more educated (66.9% held a high school degree versus 56.6% of their partners).

Notably, these characteristics are in line with those of CRENoS (2017) for Sardinia. More than half the sample attends (or has attended) a grammar school rather than a comprehensive school (54.8%), and almost one-third of the sample had to repeat at least one school year. As many as 23.4% of the sample do not participate in education (mainly within the range of 20–24 years), and 6.4% declared themselves to be in the job market (mostly unskilled workers). Almost 60% of the sample still attends a secondary school, while 19.1% attends university.

More than 60% of the sample declared having their own space to study at home. Furthermore, less than 20% of the sample would be very willing to suggest their high school to others and are/were very highly satisfied with their school. Notably, less than 10% felt that teachers motivated their students or raised students' interest in the subject. Figure 2 presents a set of non-cognitive skills in terms of emotions related to the school experience. Less than two-thirds felt 'energetic' and 'at ease' at school. Less than half felt 'relaxed' and 'amused'. Almost half the students declared that they felt 'sleepy'.

**Table 1** Sample profile, perceptions and future intention

Profile	%	Median (mean)
Male	50.1	
Female	49.9	
Student's age		19.1 (19.0)
Mother's age		50 (50.2)
Father's age		53 (53.4)
Mother with a high school degree	66.9	
Father with a high school degree	56.6	
Enrolled in a grammar school (versus a comprehensive school)	54.8	
Students who had to repeat at least one year	25.9	
Not in education	23.4	
Attending a secondary school	57.5	
At university	19.1	
Motivation/experience (Likert score 5)		
Students who have their own space to study at home	60.7	
Students who are willing to suggest the school to others	17.1	
Students who are overall satisfied with their high school	18.1	
Students who feel that teachers motivate their students	4.6	
Teachers who can elicit students, interest in the subject	6.2	



**Fig. 2** Non-cognitive skills, emotions at school. Authors' own elaboration

## 5 Empirical Results

### 5.1 Model Specification and Goodness of Fit

The empirical estimation reflects the theoretical framework presented in Sect. 3. The relevant variables included in the ‘choice/achievement’ model are described in detail in the Appendix (Table 3). To avoid collinearity issues, especially in small samples, the model holds the restriction  $x_i \neq z_i$ . Yet, socio-demographic controls (i.e. *gender*, *children\_birth\_order* and *age/education of father and mother*) are included in both stages of the decision path (Cameron and Trivedi 2009). In the ‘choice’ model, following variables are used: having a place to study during secondary school studies (i.e. *own\_place\_to\_study*), as a proxy of overall economic and cultural status, and having had to repeat a school year before secondary school attendance (i.e. *repeat\_years*). Regarding students’ expectations, the model includes students’ will/wish to carry on with a university path soon after secondary school (i.e. *university*) and students’ willingness to enter the job market soon after graduating (i.e. *job\_market*).

As an innovation to this thread of the literature, a set of perceived cognitive skills or indicators (Retelsdor et al. 2011; Sawaki et al. 2013) are also included in the first step of the regression as further controls. These indicators are as follows: difficulties in writing, such as dysgraphia and/or the inability to read their writing (namely *writing*); difficulties in calculus (namely *calculus*); difficulties in reading loudly, speaking, or using lengthy words (i.e. *speaking*) and also, having problems in getting around, remembering dates or times (i.e. *mnemonics*). These perceived cognitive skills are pivotal for active and effective participation in educational settings and social and interprofessional contexts. Low performance in reading and writing ability is amongst the leading causes of dropping out in secondary schools. Students can feel humiliated and stressed because they cannot appropriately understand what is going on at school because of their reading and writing difficulties (Fischbein IV and Folkander 2000). Arguably, this aspect can have an impact on their personal commitment, motivation and achievement.

In Table 2, the full Heckman results include a ‘no sample selection correction’ (Model 1) and a ‘sample selection correction’ (Model 2). The Wald test indicated that the models were well-specified at the level of significance of 1%. However, to discriminate between these two specifications, the null hypothesis ‘independence of the two error terms’ failed to be rejected in the likelihood ratio (LR) test. The inverse Mills ratio further supports this finding and suggests linearity in the sample (Fig. 3) as well as the *t*-ratio test on the coefficient of the inverse Mills ratio (Mills lambda), which was not statistically significant (see Table 2). Hence, there is no statistical evidence of a selection bias.

Yet, the two estimations present homogeneous results in terms of signs and magnitude of the coefficients.

### 5.2 Heckman Approach: Main Findings

The main drivers influencing secondary school choice were related to the family background (i.e. *age\_education\_father*, father older than 40 years and without a secondary school degree). Gender differences also played a significant role in the choice as

**Table 2** Heckman modelling: choice/achievement

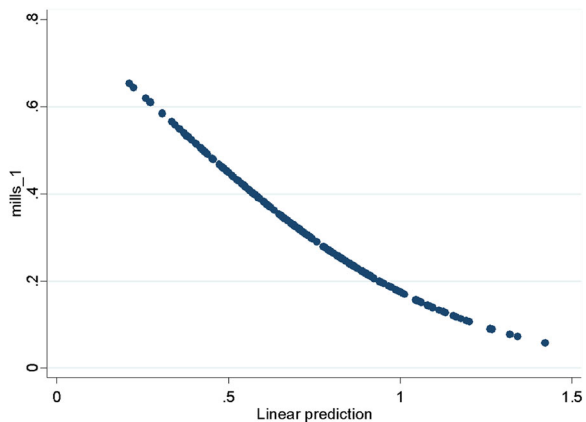
Dependent/explanatory-controls	Model 1	Model 2
First stage		
Choice (1 = comprehensive; 0 = grammar)		
Socio-demographic background		
Gender (ref. male)	– <b>0.176*</b> (0.0596)	– <b>0.171*</b> (0.0635)
Birth_order	0.0280 (0.0394)	0.0480 (0.0517)
Age_education_mother	0.107 (0.0716)	0.124 (0.0796)
Age_education_father	<b>0.166</b> <sup>†</sup> (0.0661)	<b>0.166</b> <sup>†</sup> (0.0706)
Motivations–economics–expectations		
Repeat_Years	0.117 (0.165)	0.115 (0.163)
Own_place_to_study	– 0.123 (0.0730)	– 0.133 <sup>‡</sup> (0.0749)
University	– <b>0.173*</b> (0.0616)	– <b>0.180*</b> (0.0624)
Job_market	<b>0.141</b> <sup>†</sup> (0.0606)	<b>0.147</b> <sup>†</sup> (0.0608)
Perceived cognitive skills		
Writing	0.0470 (0.0826)	0.0129 (0.103)
Calculus	0.0346 (0.159)	0.0783 (0.178)
Speaking	0.0447 (0.145)	– 0.00391 (0.174)
Mnemonics	0.166 (0.155)	0.211 (0.175)
Constant	<b>0.592*</b> ( <b>0.114</b> )	<b>0.648*</b> ( <b>0.145</b> )
Second stage		
Achievement (1 = higher/equal median; 0 = below median)		
Socio-demographic background		
Gender (ref. male)	– 0.0178 (0.144)	– 0.0240 (0.143)
Birth_order	– <b>0.260*</b> (0.0888)	– <b>0.231*</b> (0.0866)
Age_education_mother	– 0.154 (0.168)	– 0.133 (0.167)
Age_education_father	– 0.0939 (0.160)	– 0.0954 (0.158)
Teacher role		
Teachers_raise_interest	– 0.0814 (0.0787)	– 0.0697 (0.0823)
Subjects_are_interesting	<b>0.142</b> <sup>‡</sup> (0.0787)	<b>0.141</b> <sup>‡</sup> (0.0816)
Learning methods		
Study_time	<b>0.113</b> <sup>‡</sup> (0.0599)	0.0727 (0.0593)
Concept_maps	0.0667 (0.155)	0.121 (0.155) <sup>‡</sup>

**Table 2** (continued)

Dependent/explanatory-controls	Model 1	Model 2
Study_no_help	0.203 (0.196)	0.196 (0.206)
Technology		
PC_at_school	0.0212 (0.216)	- 0.0795 (0.219)
Internet_connection_home	<b>0.365<sup>†</sup></b> (0.153)	<b>0.342<sup>†</sup></b> (0.157)
Non-cognitive skills		
New_friends	- 0.202 (0.199)	- 0.207 (0.204)
Sport	- 0.0640 (0.140)	- 0.0642 (0.145)
Perceived cognitive skills		
Writing	<b>0.523<sup>†</sup></b> (0.231)	<b>0.517<sup>†</sup></b> (0.230)
Calculus	- <b>0.609<sup>‡</sup></b> (0.319)	- <b>0.546<sup>‡</sup></b> (0.320)
Speaking	<b>0.893<sup>†</sup></b> (0.442)	<b>0.806<sup>‡</sup></b> (0.442)
Mnemonics	- <b>0.582<sup>†</sup></b> (0.294)	- <b>0.538<sup>‡</sup></b> (0.296)
Constant	0.203 (0.160)	1.312 (0.613)
Atrho constant	0.584 <sup>‡</sup> (0.183)	0.271 (0.467)
Lnsigma constant	0.480* (0.0366)	390
Mills lambda		- 1.380
N	390	390
Wald test	(d.f.12) = 55.15*	(d.f.12) = 49.64*
Aic	848.4	
Bic	979.2	

Statistically significant coefficients are in bold  
 Standard errors are given in parentheses \* $p < 0.01$ , <sup>†</sup> $p < 0.05$ , <sup>‡</sup> $p < 0.09$ ; LR test of independent equations ( $\rho = 0$ ):  $\chi^2(1) = 1.96 - \text{Prob} > \chi^2 = 0.1620$

**Fig. 3** Inverse Mills ratio.  
 Authors' own elaboration



males attend comprehensive schools more frequently than females. These findings reinforce the gender differences and dropout gaps encountered by MIUR (2019, see also CRENOS 2018), as previously remarked. Besides, the expectation of entering the job market immediately upon graduation is a further key factor that drives the choice and is more common in the male segment. As expected, those who wanted to study at a university were highly motivated to enroll in a grammar school. There is no statistical evidence that individual characteristics and self-perception of cognitive skills influenced the students' choice.

The second 'achievement' equation revealed that motivation and attitude towards the subjects (i.e. '*study\_time*' and '*subjects\_are\_interesting*') drive students' performance. In addition, an internet connection at home seemed to drive schooling achievement, implying that technology supports their studies as a complementary tool. This outcome is consistent with the fact that a family with a higher income and a higher education level can direct their children to explore new forms of knowledge. It is also compatible with the findings highlighted in the literature that family, socio-cultural and economic factors influence the performance and choices of young students (Ballarino and Checchi 2006).

The literature highlighted that school facilities and access to information technology positively impact student performance (Erdogu and Erdogu 2015; Akinoso 2018). Yet, the present results suggest that having a personal computer at school did not significantly affect schooling performance. Hence, teacher technological skills may still be limited to efficient usage of ICT tools at school.

As a proxy of the economic conditions, the number of children in the family had a statistically strong and negative role in student performance. Thus, large families are likely to be a poorer cluster of the population and/or less able to allocate time and compensative tools (e.g. private lessons) to support their children during their studies. This outcome is also in line with Ghignoni (2017), who found that the economic crisis in Italy has increased the quota of early school dropouts.

Overall, perceived cognitive skills in writing and speaking positively impacted achievement, given the school choice. Students who experienced such difficulties may be more motivated at school and were more likely to perform effectively. Yet, perceived problems in calculus and mnemonics (i.e. difficulties in getting around and/or remembering dates and times) negatively influence students' performance and self-perception (Fischbein IV and Folkander 2000).

### 5.3 Perceived Cognitive Skills, Non-cognitive Skills and Performance: an ANOVA Investigation

A deeper investigation explores the relationship between perceived cognitive skills, non-cognitive skills and achievement, and ultimately the risk of early dropout. To this aim, an Analysis of Variance (ANOVA) is employed. This statistical tool assesses the interactions of fixed factors, that is, perceived cognitive skills and non-cognitive skills. Mean differences between groups are tested by analyzing the levels of variance within the sample clusters that relate to previously defined perceived cognitive skills: reading, writing, speaking, calculus and mnemonics, respectively. The most numerous sample had *writing issues* (17%; see Table 3 in the Appendix). The school attainment, treated

as the dependent variable, is defined as the average mark in the past year obtained by the two groups (i.e. no perceived cognitive issues and perceived cognitive issues). Five separate ANOVA employed each perceived cognitive skill as the dependent variable. Pairwise comparisons on equal variances assessment, as the null hypothesis, rely on Tukey and Bonferroni adjustment (Williams et al. 1999). The first non-cognitive domain includes the emotional components *feeling bored* and *feeling anger* at school. The second non-cognitive domain comprises *practicing sports* and regularly *studying with own peers*. All these factors are dichotomous variables (the 5-point Likert scale was defined as no = 0 if Likert scale is 1, 2, 3; yes = 1 if Likert scale is 4, 5).

Students who felt that they were struggling in different cognitive spheres tended to perform worse than those who did not perceive such learning issues (although *equal variance* is not always rejected as the null hypothesis). This outcome also occurs within the variable interactions when students are studying without peer support. On the contrary, students who study with peers show better performance (at least a pass, a minimum of six) and even higher marks than those who did not state as having any cognitive issues. This result is consistent with previous literature on *peer education* (Ryan 2000) and *collaborative learning* (Chandra 2015) that emphasised the effectiveness of peer support on educational achievement and learning. Study with peers helps students practically and psychologically to face learning challenges.

Besides, previous studies showed that emotions impact students' performance (Pekrun et al. 2002; Pekrun and Linnenbrink-Garcia 2012) and substantially influence cognitive skills and processes (perception, attention, learning, memory; Loon and Bell 2018). In this regard, the analysis shows that negative emotions (being bored and angry) negatively impact students' performance. Students, who perceived having *reading* difficulties and felt bored, on average, obtained worse marks than students who did not perceive having these issues. The same result occurs for speaking and mnemonics issues. When these cognitive spheres are compromised, the average marks tend to be lower than the pass threshold, and hence, the risk of early dropout from school is higher.

Furthermore, students who perceived having *speaking and mnemonic* difficulties and studied with their peers performed better than the other groups. As Wentzel (2009) remarked: "*Peers are of central importance to children throughout childhood and adolescence. They provide companionship and entertainment, help in solving problems, personal validation and emotional support and a foundation for identity development*" (p. 531).

## 6 Discussion and Conclusions

This paper explored the root causes that influence secondary school choice, performance and possibly early dropout of school. While most previous studies focused on a specific issue, this paper adopted a multidimensional approach by including a set of domains and indicators, such as, socio-demographic variables, economic motivations, self-commitment, teachers' role and learning methods, the role of technology and non-cognitive and perceived cognitive skills. In this respect, a choice/achievement framework proved to be helpful to synthesise the role of multidimensional domains and indicators within a sequential decision path (RQ3).



The researchers involved in the study collected detailed information through face-to-face interviews of a representative sample of individuals aged 14–24. Such an age segment, comprising different groups of young people (i.e. secondary school students, university students, already employed and NEET) and different levels of awareness, enabled eliciting information about school choice and individual performance during the secondary school path. The Italian region of Sardinia presents an insightful setting, given the remarkable early school dropout and NEET rate, well above the EU threshold and most of the EU regions' averages.

The first stage of the quantitative analysis responded to *RQ1* about the domains and indicators that are likely to directly drive school choice and, indirectly, early school dropout. Comprehensive secondary schools, characterised by high dropout rates, tended to be chosen by male students whose fathers were older than 40 and did not attain a secondary school degree. This outcome mirrors the official statistical data that detected remarkable gender heterogeneity and better performance for Sardinian young women. Besides, it is consistent with the literature. While men were more likely to leave their educational path earlier, women tended to have better schooling performance and higher academic aspirations. It is also consistent with previous research for Italy that shows a lack of intergenerational occupational and earnings mobility (Raitano and Vona 2015).

Motivations about the future path of studies greatly influence school choice. Students were more prone to enroll in a comprehensive school if they wished to get a job soon after graduation, while they tended to enroll in a grammar school if they wanted to follow a university path. Hence, students attending a comprehensive school are also likely to belong to the most vulnerable cluster of society. As expected, young people (predominantly female) and their families continue to appreciate grammar schools as more formative for an ex-post university path (MIUR 2018). Interestingly, perceived cognitive skills do not seem to play a role in school choice. Hence, there is additional empirical evidence that family background and expectations are the most significant drivers in school selection (*RQ1*). These outcomes suggest the need to strengthen the collaboration between schools and families through specific orientation programs.

The second stage of the regression responded to *RQ2* about the domains and indicators that are likely to influence higher school attainments. Self-commitment and an interest in the subjects play an important role in schooling performance rather than the teachers' role, which should be a key determinant, especially in low-achieving classes. In addition, while internet usage at home exerted a positive effect on school achievement, the presence of a personal computer at school does not have any statistically significant impact on students' performance. Hence, as expressed in delivering knowledge through technological innovation, the teachers' role appeared to be an additional critical issue (Erdogu and Erdogu 2015).

These findings, elicited in pre-pandemic times, indicate that the most vulnerable students would require adequate measures to reach their needs. On the one hand, the system should enhance teachers' ICT skills to react flexibly to sudden changes. On the other hand, the lack of accessibility to e-learning at home raises more profound inequalities in most disadvantaged contexts. This objective is even more urgent in lockdown times due to the COVID-19 pandemic (World Economic Forum 2020).

As a further outcome, students in large families were more likely to achieve a more unsatisfactory performance. Indeed, economic difficulties, fewer overall resources to allocate to education, or even less time devoted by parents reduce opportunities and attainments. This finding offers valuable information to school managers and policymakers who should provide extra support to students with such needs. There is empirical evidence that in Italian students, even from the middle classes, the dropout probability increased during the recent economic crisis (Ghignoni, 2017). The financial difficulties faced by families can explain this phenomenon. Adverse economic situations in families can increase inequality and intergenerational social mobility (Aina 2013). Furthermore, the Italian reform (MIUR decree No. 270 of 2004), while attracting more students with less academic-oriented skills, seems to have failed to reduce early dropout rates (Ghignoni 2017). These circumstances are likely to be amplified in times of pandemic and post-pandemic.

Besides, writing and speaking issues positively affected performance given school choice. Yet, calculus and mnemonics issues posed constraints in student's achievement. Yet, the perceived cognitive skills are not measured quantitatively and are not defined as objective data. Notably, individuals with specific cognitive issues tend to have natural functional compensation factors. Especially in languages with regular spelling, such as Italian, the compensation factors over time tend to reduce the extent of the performance gap with typically developed individuals. The findings showed that this mechanism is more active in reading and writing than calculus (Fischbein and Folkander 2000; Retelsdor et al. 2011; Cheong et al. 2018).

As a further investigation, the present findings highlighted a relationship between students' perceived cognitive skills and non-cognitive skills in school performance. These results are congruent with recent studies that suggest that non-cognitive skills (emotions and social capital factors) affect cognitive skills and increase school efficiency (Vittadini et al. 2021). This study assessed that this outcome is particularly true with students who perceive that they have learning difficulties. The empirical evidence showed that study with peers significantly mitigates dropout risk because of low schooling attainments.

Although the present study is devoted to a specific peripheral region, the critical educational issues and relevant outcomes can be traced in other socio-economic disadvantaged settings. Furthermore, a multidimensional framework based on detailed face-to-face surveys can deepen the research and further generalise the findings, especially in times of socio-economic turmoil.

**Acknowledgements** This study contributes to the developmental project of the Department of Economics and Business - University of Sassari ("Dipartimenti di Eccellenza 2018-2022") financed by the Italian Minister of Education. Manuela Pulina and Dimitri Paolini acknowledge the finding provided by "Fondo di Ateneo per la ricerca 2020". The authors acknowledge the funding by Fondazione di Sardegna "Determinants of human capital accumulation". They would like to thank the anonymous reviewers, Laura Dessantis (for the data collection), Marta Meleddu and Marco Calaresu for their valuable insight.

## Appendix A

See Table 3.

**Table 3** Variable description

Dependent variable	Explanatory variables/controls	Description	Details
First stage Choice = dependent variable (1 = comprehensive school; 0 = grammar school)	Socio-demographic background Gender	Gender of the respondent	Discrete variable that takes the value 1 if female and 0 otherwise
	Birth_order	Order of birth	Discrete variable
	Age_education_mother	Age and education level of mother	Discrete variable that takes the value 1 if the respondent's mother is above 40 years old and does not hold a high school degree and 0 otherwise
	Age_education_father	Age and education level of father	Discrete variable that takes the value 1 if the respondent's father is above 40 years old and does not hold a high school degree and 0 otherwise
	Economics – motivations Own_place_to_study	If he/she has their own place to study at home	Discrete variable that takes the value 1 if he/she has their own place to study at home and 0 otherwise
	Repeat_years	Number of years the respondent had to repeat during college	Count variable
	University	If he/she enrolled in a high school to be prepared for attending university	Discrete variable that takes the value 1 if YES and 0 otherwise
	Job_market	If he/she enrolled in a high school to get easily a job	Discrete variable that takes the value 1 if YES and 0 otherwise

Table 3 (continued)

Dependent variable	Explanatory variables/controls	Description	Details
Second stage Achievement = dependent variable (1 = higher/equal to the median; 0 = lower than the median)	Perceived_cognitive_skills Writing	To be dysgraphic and have difficulties in reading own writing	Discrete variable that takes the value 1 if the respondent has declared to be dysgraphic and has difficulties to read their own writing (either always or seldom) and 0 otherwise
	Calculus	If he/she has difficulties in summing up, has difficulties in dialing a number	Discrete variable that takes the value 1 if the respondent has declared to have difficulties in summing up and in dialing a number (either always or seldom) and 0 otherwise
	Speaking	If he/she has difficulties in reading loudly, speaking in public and using lengthy words	Discrete variable that takes the value 1 if the respondent has declared to have difficulties in reading aloud, speaking in public and using lengthy words (either always or seldom) and 0 otherwise
Second stage Achievement = dependent variable (1 = higher/equal to the median; 0 = lower than the median)	Transversal_perceived_cognitive_skill	If he/she has difficulties in getting around, in remembering dates and times	Discrete variable that takes the value 1 if the respondent has declared to have difficulties in getting around places, in remembering dates and times (either always or seldom) and 0 otherwise
	Socio-demographic background Gender	Gender of the respondent	Discrete variable that takes the value 1 if female and 0 otherwise
	Birth_order	Order of birth	Discrete variable

Table 3 (continued)

Dependent variable	Explanatory variables/controls	Description	Details
	Age_education_mother	Age and education level of mother	Discrete variable that takes the value 1 if the respondents' mother is above 40 years old and does not hold a high school degree and 0 otherwise
	Age_education_father	Age and education level of father	Discrete variable that takes the value 1 if the respondent's father is above 40 years old and does not hold a high school degree and 0 otherwise
Teacher role	Teachers raise interest	If the respondent feels that the teachers are able to raise their interests in the subjects	Categorical variable, Likert scale from very low (1) to very high (5)
	Subjects are interesting	If respondent feels that the subjects taught	Categorical variable, Likert scale from very low (1) to very high (5)
Technology	PC_at_school	If the respondent uses the PC/tablet at school	Discrete variable that takes the value 1 if YES and 0 otherwise
	Internet_connection_home	If the respondent has an internet connection at home	Discrete variable that takes the value 1 if YES and 0 otherwise
Learning methods	Study_time	If the respondent feels that they have to dedicate more time to their studies	Categorical variable, Likert scale from very low (1) to very high (5)
	Concept_maps	If the respondent uses concept maps for studying	Discrete variable that takes the value 1 if YES and 0 otherwise
	Study_no_help	He/she has no help to do their homeworks	Discrete variable that takes the value 1 if NO HELP and 0 otherwise

Table 3 (continued)

Dependent variable	Explanatory variables/controls	Description	Details
Non-cognitive skills New_friends		If the respondent during the high school made new friends	Discrete variable that takes the value 1 if YES and 0 otherwise
Sport		Whether the respondent attends any sport	Discrete variable that takes the value 1 if YES and 0 otherwise
Perceived_cognitive_skills			
Writing		To be dysgraphic and have difficulties in reading own writing	Discrete variable that takes the value 1 if the respondent has declared to be dysgraphic and have difficulties to read their writing (always or seldom) and 0 otherwise
Calculus		If he/she has difficulties in summing up, has difficulties in dialing a number	Discrete variable that takes the value 1 if the respondent has stated to have difficulties in summing up and in dialing a number (either always or seldom); 0 otherwise
Speaking			
		If he/she has difficulties in speaking in public, exposition, in using lengthy words	
		Discrete variable that takes the value 1 if the respondent has declared to have difficulties in speaking in public, exposition, using lengthy words (always or seldom) and 0 otherwise	

**Table 3** (continued)

Dependent variable	Explanatory variables/controls	Description	Details
Reading	If he/she has difficulties in reading loudly and reading in public	Discrete variable that takes the value 1 if the respondent has declared to have difficulties in reading loudly and reading in public (always or seldom) and 0 otherwise	
Mnemonics		If he/she has difficulties in getting around, in remembering dates and times	Discrete variable that takes the value 1 if the respondent has declared to have difficulties in getting around places, in remembering dates and times (either always or seldom) and 0 otherwise

## References

- Aina C (2013) Parental background and university dropout in Italy. *High Educ* 65:437–456
- Akinoso O (2018) Effect of the use of multimedia on student's performance in secondary school mathematics. *Glob Media J* 16(30):1–6
- Alivermini F, Lucidi F (2011) Relationship between social context, self-efficacy, motivation, academic achievement, and intention to drop out of high school: a longitudinal study. *J Educ Res* 104(4):241–252
- Almlund M, Duckworth AL, Heckman JJ, Kautz TD (2011) Personality psychology and economics. (No. w16822). In: Hanushek EA, Machin S, Woessmann L (eds) *Handbook of the economics of education*. Elsevier, Amsterdam, pp 1–181
- Ballarino G, Checchi D (2006) *Sistema scolastico e disuguaglianza sociale: scelte individuali e vincoli strutturali*. Il Mulino, Bologna
- Basit TN (2009) White British; dual heritage; British Muslim: young Britons' conceptualisation of identity and citizenship. *Br Edu Res J* 35(5):723–743
- Bastian KC, McCord DM, Marks JT, Carpenter DA (2017) Temperament for teaching? Associations between personality traits and beginning teacher performance and retention. *AERA Open* 3(1):1–17
- Bussu A, Pulina M (2020) Exploring young people's perceptions about secondary school: critical issues and improvements to prevent dropout risk in disadvantaged contexts. *Improv Sch* 23(3):223–244
- Bussu A, Veloria CN, Boyes-Watson C (2018) Study circle: promoting a restorative student community. *Pedagogy Hum Sci* 6(1):1–20
- Cameron SV, Heckman JJ (1998) Life cycle schooling and dynamic selection bias, models and evidence for five cohorts of American males. *J Polit Econ* 106:262–333
- Cameron SV, Heckman JJ (2001) The dynamics of educational attainment for black, Hispanic, and white males. *J Polit Econ* 109(3):455–499
- Cameron AC, Trivedi PK (2009) *Microeconometrics using stata*. Stata press, College Station
- Caprara GV (2014) La valutazione dell'autoefficacia. *Interventi e contesti culturali*. Erickson, Trento
- Chandra R (2015) Collaborative learning for educational achievement. *J Res Method Educ* 5(3):04–07
- Cheng A, Zamarro G (2018) Measuring teacher non-cognitive skills and its impact on students: insight from the measures of effective teaching longitudinal database. *Econ Educ Rev* 64:251–260
- Cheong CM, Zhu X, Liao X (2018) Differences between the relationship of L1 learners' performance in integrated writing with both independent listening and independent reading cognitive skills. *Read Writ* 31(4):779–811
- Chetty R, Friedman JN, Rockoff JE (2014) Measuring the impacts of teachers ii: teacher value-added and student outcomes in adulthood. *Am Econ Rev* 104(9):2633–2679
- CRENoS (2017) *Economia della Sardegna. 24° Rapporto*. CUEC, Cagliari
- CRENoS (2018) *Economia della Sardegna. 25° Rapporto*. CUEC, Cagliari
- CRENoS (2019) *Economia della Sardegna. 26° Rapporto*. CUEC, Cagliari
- Cunha F, Heckman JJ, Lochner LJ, Masterov DV (2006) Interpreting the evidence on life cycle skill formation. In: Hanushek EA, Welch F (eds) *Handbook of the economics of education*. Elsevier, Amsterdam, pp 697–812
- De Witte K, López-Torres L (2017) Efficiency in education: a review of literature and a way forward. *J Oper Res Soc* 68(4):339–363
- DeAngelis CA (2019a) Divergences between effects on test scores and effects on non-cognitive skills. *Educ Rev*. <https://doi.org/10.2139/ssrn.3273422>
- DeAngelis CA (2019b) Does private schooling affect non-cognitive skills? international evidence based on test and survey effort on PISA. *Soc Sci Q* 100(6):2256–2276
- Denham SA, Bassett HH, Mincin M, Kalb S, Way E, Wyatt T, Segal Y (2012) Social-emotional learning profiles of preschoolers' early school success: a person-centered approach. *Learn Individ Differ* 22:178–189
- Di Giacomo G, Pennisi A (2015) Assessing primary and lower secondary school efficiency within northern, central and southern Italy. *Ital J Econ* 1:287–311
- Erdogu F, Erdogu E (2015) The impact of access to ICT, student background and school/home environment on academic success of students in Turkey: An international comparative analysis. *Comput Educ* 82:26–49
- European Commission (2016) *European semester thematic factsheet. Youth employment*. [https://ec.europa.eu/info/sites/default/files/european-semester\\_thematic-factsheet\\_youth\\_employment\\_en.pdf](https://ec.europa.eu/info/sites/default/files/european-semester_thematic-factsheet_youth_employment_en.pdf). Accessed 6 Oct 2020



- European Commission (2020) Commission launches Youth Employment Support: a bridge to jobs for the next generation. <https://ec.europa.eu/social/main.jsp?catId=89%26newsId=9719%26furtherNews=yes%26langId=en>
- Eurostat (2019) Retrieved from Early leavers from education and training. <https://ec.europa.eu/eurostat/web/products-datasets/-/tesem020>. Accessed 3 Feb 2021
- Eurostat (2020) Unemployment rate. Retrieved from <https://ec.europa.eu/eurostat/documents/2995521/11054062/3-02072020-AP-EN.pdf/ce573d1a-04a5-6762-5b56-cb322cbdc5ac>. Accessed 3 Feb 2021
- Fischbein S IV, Folkander ME (2000) Reading and writing ability and drop out in the Swedish upper secondary school. *Eur J Spec Needs Educ* 15(3):264–274
- Fjellman AM (2019) School choice, private providers and differentiated mobilities in Swedish metropolitan school markets: exploring through a counterfactual approach. *Int J Educ Res* 98:171–191
- Freeman J, Simonsen B (2015) Examining the impact of policy and practice interventions on high school dropout and school completion rates: a systematic review of the literature. *Rev Educ Res* 85(2):205–248
- Frenzel AC, Goetz T, Lüdtke O, Pekrun R, Sutton RE (2009) Emotional transmission in the classroom: Exploring the relationship between teacher and student enjoyment. *J Educ Psychol* 101:705–716
- Ghignoni E (2017) Family background and university dropouts during the crisis: the case of Italy. *High Educ* 73(1):127–151
- Hanushek E, Woessmann L (2008) The role of cognitive skills in economic development. *J Econ Lit* 46:607–668
- Heckman JJ (1979) Sample selection bias as a specification error. *Econometrica* 47(1):153–161
- Heckman JJ, Stixrud J, Urzua S (2006) The effects of cognitive and non-cognitive abilities on labor market outcomes and social behavior. *J Law Econ* 24(3):411–482
- Istat (2017) Demografia in cifre. <https://demo.istat.it/>
- ISTAT (2020) Occupati e disoccupati. [https://www.istat.it/it/files//2020/09/CS\\_Occupati-e-disoccupati\\_LUGLIO\\_2020.pdf](https://www.istat.it/it/files//2020/09/CS_Occupati-e-disoccupati_LUGLIO_2020.pdf). Accessed 12 May 2021
- Jackson CK (2018) What do test scores miss? The importance of teacher effects on non-test score outcomes. *J Polit Econ* 126(5):2072–2017
- Jackson CK, Rockoff JE, Staiger DO (2014) Teacher effects and teacher-related policies. *Ann Rev Econ* 6:801–825
- Jennings JL, DiPrete TA (2010) Teacher effects on social and behavioral skills in early elementary school. *Sociol Educ* 83(2):135–159
- Jennings PA, Greenberg MT (2008) The prosocial classroom: teacher social and emotional competence in relation to student and classroom outcomes. *Rev Educ Res* 79(1):491–525
- Kajonius PJ, Carlander A (2017) Who gets ahead in life? Personality traits and childhood background in economic success. *J Econ Psychol* 59:164–170
- Kautz T, Heckman JJ, Diris R, ter Weel B, Borghans L (2014) Fostering and measuring skills: improving cognitive and non-cognitive skills to promote lifetime success. OECD Education Working Papers 110, OECD Publishing, London
- Kearney MS, Levine PB (2014) Income inequality and early non-marital childbearing. *J Hum Resour* 49(1):1–31
- Kim Y, Sherraden M, Clancy M (2013) Do mothers' educational expectations differ by race and ethnicity, or socioeconomic status? *Econ Educ Rev* 33:82–94
- Lee V, Burkam D (2003) Dropping out of high school: the role of school organization and structure. *Am Educ Res J* 40:353–393
- Lindqvist E, Vestman R (2011) The labor market returns to cognitive and non-cognitive ability: evidence from the Swedish enlistment. *Am Econ J Appl Econ* 3:101–128
- Loon M, Bell R (2018) The moderating effects of emotions on cognitive skills. *J Furth High Educ* 42(5):694–707
- Mendez I (2015) The effect of the intergenerational transmission of non-cognitive skills on student performance. *Econ Educ Rev* 46:78–97
- Mendez I, Zamarro G (2018) The intergenerational transmission of non-cognitive skills and their effect on education and employment outcomes. *J Popul Econ* 31(2):521–560
- MIUR (2018) Retrieved from <http://www.miur.gov.it/documents/20182/0/Tabella+iscrizioni+2018-19.pdf/95bf4317-d88e-4762-a755-7cbc5dd5f480>. Accessed 18 June 2020
- MIUR (2019) La dispersione scolastica nell'a.s. 2016/2017 e nel passaggio all'a.s. 2017/2018. *Statistica e Studi*. retrieved from <https://www.miur.gov.it/documents/20182/2155736/La+dispersione+>

- scolastica+nell%27a.s.2016-17+e+nel+passaggio+all%27a.s.2017-18.pdf/1e374ddd-29ac-11e2-dede-4710d6613062?version=1.0&t=1563371652741. Accessed 18 June 2020
- Morgan D (2008) Snowball sampling. In: Given L (ed) *The SAGE encyclopedia of qualitative research methods*. SAGE Publications Inc., Thousand Oaks, pp 816–817
- OECD (2017) *Education at a glance 2017*, OECD indicators. OECD Publishing, Paris
- Oyserman D (2013) Not just any path: Implications of identity-based motivation for disparities in school outcomes. *Econ Educ Rev* 33:179–190
- Pastore F (2019) Why so slow? The school-to-work transition in Italy. *Stud High Educ* 44(8):1358–1371
- Pekrun R, Linnenbrink-Garcia L (2012) Academic emotions and student engagement. In: Christenson SL, Reschly AL, Wylie C (eds) *Handbook of research on student engagement*. Springer, New York, pp 259–282
- Pekrun R, Goetz T, Titz W, Perry RP (2002) Academic emotions in students' self-regulated learning and achievement: a program of qualitative and quantitative research. *Educ Psychol* 37(2):91–105
- Raitano M, Vona F (2015) Measuring the link between intergenerational occupational mobility and earnings: evidence from eight European countries. *J Econ Inequal* 13(1):83–102
- Retelsdor J, Koller O, Moller J (2011) On the effects of motivation on reading performance growth in secondary school. *Learn Instr* 21:550–559
- Ripamonti E, Barberis S (2018) The effect of cultural capital on high school dropout: an investigation in the Italian provinces. *Soc Indic Res* 139(3):1257–1279
- Robert P (2010) Social origin, school choice, and student performance. *Educ Res Eval* 16(2):107–129
- Ryan AM (2000) Peer groups as a context for the socialization of adolescents' motivation, engagement, and achievement in school. *Educ Psychol* 35(2):101–111
- Sattin-Bajaj C (2015) Unaccompanied minors: how children of latin american immigrants negotiate high school choice. *Am J Educ* 121(3):381–415
- Sauer P, Zagler M (2012) Economic growth and the quantity and distribution of education: a survey. *J Econ Surv* 26:966–1051
- Sauer P, Zagler M (2014) (In)equality in education and economic development. *Rev Econ Wealth* 60:353–379
- Sawaki Y, Quinlan T, Lee YW (2013) Understanding learner strengths and weaknesses: assessing performance on an integrated writing task. *Lang Assess Q* 10(1):73–95
- Schleicher A (2020) The impact of Covid-19 on education. OECD. <https://www.oecd.org/education/the-impact-of-covid-19-on-education-insights-education-at-a-glance-2020.pdf>. Accessed 13 Apr 2021
- Selimović Z, Selimović H, Opić S (2018) Development of social skills among elementary school children. *Int J Cognit Res Sci Eng Educ* 6(1):17–29
- Strack RW, Anderson KK, Graham CM, Tomoyasu N (2007) Race–gender differences in risk and protective factors among youth in residential group homes. *Child Adolesc Soc Work J* 24(3):261–283
- Thomson S (2018) Achievement at school and socio-economic background - an educational perspective. *Npj Sci Learn* 3(5):1–2
- Van Uden JM, Ritzen H, Pieters JM (2014) Engaging students: The role of teacher beliefs and interpersonal teacher behavior in fostering student engagement in comprehensive education. *Teach Teach Educ* 37:21–32
- Vittadini G, Sturaro C, Folloni G (2021) Noncognitive skills and cognitive skills to measure school efficiency. *Socio-Econ Plann Sci*. <https://doi.org/10.1016/j.seps.2021.101058>
- Wentzel KR (2009) Peers and academic functioning at school. In: Rubin KH, Bukowski WM, Laursen B (eds) *Social, emotional, and personality development in context. Handbook of peer interactions, relationships, and groups*. The Guilford Press, New York, pp 531–547
- Williams VS, Jones LV, Tukey JW (1999) Controlling error in multiple comparisons, with examples from state-to-state differences in educational achievement. *J Educ Behav Stat* 24(1):42–69
- World Economic Forum (2020) 3 ways the coronavirus pandemic could reshape education. <https://www.weforum.org/agenda/2020/03/3-ways-coronavirus-is-reshaping-education-and-what-changes-might-behere-to-stay>. Accessed 25 Mar 2021
- World Health Organization (WHO) (1999) *Partners in life skills education*. World Health Organization Department of Mental Health, Geneva
- Wurdinger S, Quereshi M (2015) Enhancing college students' life skills through project based learning. *Innov High Educ* 40(3):279–286

- Zamarro G, Cheng A, Shakeel MD, Hitt C (2018) Comparing and validating measures of non-cognitive traits: performance task measures and self-reports from a nationally representative internet panel. *J Behav Exp Econ* 72:51–60
- Zamarro G, Hitt C, Mendez I (2019) When students don't care: reexamining international differences in achievement and student effort. *J Hum Cap* 13(4):519–552

**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.