



Deciding to drop out of school during compulsory education: Testing developmental and contextual models in students from low-income families

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ABSTRACT

We investigated School Dropout Intention (SDI) and the role that educational-context and psychological factors play in shaping it during compulsory education in a cohort of 247 students (57.5% male; $M_{age} = 12.11$, $SD_{age} = 1.92$) officially recognized as living below the poverty threshold. Data were analyzed by means of latent growth as well as Autoregressive Latent Trajectory (ALT) models. Results showed a gradual increase in SDI across compulsory schooling, which predicted students' subsequent school absences; however, no acceleration emerged as they approached the legal dropout age. Teacher and parental autonomy support reduced SDI over time. Regarding peer relationships at school, victimization predicted higher SDI, whereas peer friendship showed no significant association. Among psychological variables, self-esteem emerged as a stronger protective factor than self-efficacy, and identified motivation was more effective than intrinsic motivation in counteracting the development of SDI. Overall, the findings highlight key contextual and individual processes shaping dropout intention among low-income students.

1. Introduction

The detrimental effects of school dropout have been extensively documented and they have far-reaching implications, since young people who leave the educational system prematurely often have limited job prospects due to insufficient qualifications, typically leading to lower earnings and a greater risk of poverty (OECD, 2023a). They are also more likely to misuse alcohol and drugs, to suffer from poor health, with a greater prevalence of mental health issues and a reduced life expectancy (Montez & Friedman, 2015). Early school leavers are also more liable to be involved in criminal activities, with the consequent risk of legal trouble and imprisonment (Lansford et al., 2016). The adverse effects of school dropout clearly affect both the individual and society.

Students from low-income families, especially those facing more extreme poverty, are highly vulnerable to school dropout (Gubbels et al., 2019; Pong & Ju, 2000). However, largely due to difficulties in accessing these students, there is a lack of longitudinal research on the underlying processes that might lead them to leave school prematurely. In this study, we provide some evidence about the development of school dropout intention (SDI) and its consequences among students who were officially certified as living below the poverty threshold. Conducted

during the period of compulsory schooling, when leaving school is not a legal option, the present research used official student absence records to assess the outcomes of SDI development. We also explored the role of the educational context and of various psychological factors. In this introduction, we aim to clarify the study's rationale, to identify gaps in current knowledge, and to outline our own contribution toward addressing some of these shortcomings in the literature.

1.1. School dropout as a long-term process

A limitation of the current literature on school dropout is the lack of data on its development over the course of obligatory schooling. There is a broad consensus that school dropout should not be considered as an isolated event but rather as the outcome of a long-term process (Alexander et al., 1997, 2001; Christenson & Thurlow, 2004; Dupéré et al., 2015; Jimerson et al., 2000; Samuel & Burger, 2020). During the course of compulsory education, students are legally obliged to attend school, but, according to many theories of behavior, the early development of the intention to leave the formal education system, plays an essential role in shaping subsequent dropout behavior (e.g. Ajzen, 2020; Sheeran et al., 2016). There is solid evidence for the causal impact of

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intention on behavior (Webb & Sheeran, 2006) and various studies have investigated SDI (Alivernini & Lucidi, 2011; Bianchi, Cavicchiolo, Lucidi, et al., 2021; Hardre & Reeve, 2003; Tvedt et al., 2021; Vallerand et al., 1997). However, none of them has investigated its ongoing development during compulsory education. We therefore do not have information on the patterns of low-income students' intentions to leave school: whether these intentions stay the same, have a constant rate of increase over time, or accelerate as students near the legal age for leaving school.

1.2. Educational context, psychological factors, and the school dropout process

Although no longitudinal research has hitherto investigated the relationship between educational context, psychological factors and the risk of school dropout in a population of low-income students, some studies have examined this phenomenon in the general population, and we provide an overview of them below.

1.2.1. Educational context and risk of school dropout

In the educational context, the key agents that play a role in process of school dropout are parents, teachers, and peers (Gubbels et al., 2019).

1.2.1.1. Parents and teachers. The primary providers of education are parents and teachers, and prospective studies conducted in high school suggest that their support for students' autonomy may reduce or hinder the intention to leave school prematurely (Alivernini & Lucidi, 2011; Ricard & Pelletier, 2016; Vallerand et al., 1997). According to Self-Determination Theory (SDT), autonomy-support increases students' levels of academic engagement, due to the satisfaction of their basic psychological needs for autonomy, competence and relatedness (Cheon et al., 2018; Ryan & Deci, 2017, 2020). When students' autonomy is supported, they feel understood and respected, and they are motivated to learn and study (Reeve, 2009). Encouraging autonomy at home and at school entails giving students the opportunity to make their own decisions whenever suitable, trying to see things from their viewpoints, and providing clear and meaningful explanations for tasks that might seem unrewarding or uninteresting (Grolnick, 2016; Reeve, 2002, 2006). While some studies have highlighted the association between student dropout and autonomy support from parents and teachers (Alivernini & Lucidi, 2011; Vallerand et al., 1997), even in the general population there is no data on the joint longitudinal effects of these factors on the development of the intention to drop out during compulsory schooling and the role of students' economic background in this process.

1.2.1.2. Peers. Research suggests that various types of peer relations at school might be associated with the intention to discontinue formal education during compulsory education. Friendship is characterized by a strong bond between one or more students, involving regular interactions and engagement in shared activities, also outside the context of school (Cavicchiolo et al., 2022; Hall, 2019; Parks, 2007). Ricard and Pelletier (Ricard & Pelletier, 2016) showed that among grade 10 students a lack of friendships with classmates predicted a higher rate of school dropout two years later. Unlike friendship, peer acceptance pertains to inclusion within a group and in the school context it is measured by the extent of a student's social interactions with other students (Alivernini, Cavicchiolo, Girelli, et al., 2019; Cavicchiolo et al., 2022, 2023; Ladd et al., 1997). In a study covering a one-year period starting in grade 11, Tvedt et al. (2021) found an association between the perception of non-acceptance by peers and SDI.

While peer non-acceptance is often based on implicit social processes such as being ignored and not included in the social activities of a group, victimization at school is an explicit form of social exclusion (Plenty & Jonsson, 2017), involving actions with harmful intentions, which may

manifest as verbal or physical abuse, or through various other means (Alivernini, Manganelli, Cavicchiolo, & Lucidi, 2019; Bianchi, Cavicchiolo, Manganelli, et al., 2021). As in the case of lack of friendships and peer non-acceptance, also victimization at school has been linked to a higher probability of dropping out of school (Finkelhor, 2008; Peguero, 2011; Peguero et al., 2021; Popp et al., 2014).

To date, no studies have been published that identify the unique contribution of these three different forms of peer relations at school to the development of SDI during compulsory education.

1.2.2. Psychological factors and risk of school dropout

Students' self-evaluation and academic motivation are two kinds of psychological factors that studies in the general population have consistently found to be associated with the decision to drop out of school.

1.2.2.1. Students' self-evaluation. Students' self-evaluation is based on their perception and appraisal of themselves, with self-efficacy and self-esteem appearing to be the most relevant predictors of students' dropout from school (Gubbels et al., 2019). According to Social Cognitive Theory, self-efficacy is the belief in one's own competence in performing the necessary actions to attain specific goals (Bandura, 2011), and it plays a crucial role in shaping students' behavior. In the academic domain, students' confidence that they can regulate their own learning (i.e. perception of efficacy for self-regulatory learning) has been shown to predict lower levels of SDI (Alivernini & Lucidi, 2011; Bianchi et al., 2022) and greater probability of remaining in high school (Caprara et al., 2008).

Self-esteem refers to students' positive or negative evaluation of themselves in general, and there is evidence that it is correlated with early school leaving (Gubbels et al., 2019; Korhonen et al., 2014; Lawrence & Adebowale, 2023). Self-efficacy and self-esteem are both aspects of self-evaluation, but they are conceptually distinct and have different foci. While self-efficacy involves beliefs that are specific to domains such as academics or social relationships, self-esteem is based on a much more comprehensive positive or negative evaluation of oneself. At present, it is unclear which of these two different self-evaluations is more relevant in relation to school dropout and studies hitherto have been limited to high school.

1.2.2.2. Academic motivation. According to Self-Determination Theory, autonomous motivation at school makes students less likely to discontinue their education, and the existing evidence on the general population tends to support this claim (Alivernini & Lucidi, 2011; Hardre & Reeve, 2003; Otis et al., 2005; Vallerand et al., 1997). Autonomous motivation can be based on two distinct forms of regulation (Ryan & Deci, 2017). Intrinsic regulation is considered the prototype of autonomous motivation: students study due to their own curiosity, and they enjoy this activity for its own sake. On the other hand, identified regulation entails that students recognize learning as being personally meaningful and significant, even though they might not particularly enjoy it. There is evidence showing that these two forms of regulation lead to different outcomes, with intrinsic regulation being more related to students' well-being and with identified regulation predicting academic results (Burton et al., 2006). At present, even in the general student population, it is still unclear which form of regulation is more important in predicting students' decisions to drop out of school (Abar et al., 2012).

1.3. The potential confounding effect of students' economic background

The studies on the general population that we have just reviewed suggest various malleable factors within educational contexts and students' psychological resources that could be targeted in interventions to mitigate dropout risks among low-income students. Nevertheless, a

major limitation of these studies is that they either neglect to account for students' economic deprivation (e.g., [Hardre & Reeve, 2003](#); [Ricard & Pelletier, 2016](#); [Vallerand et al., 1997](#)), or they rely solely on self-reported data (e.g., [Caprara et al., 2008](#); [OECD, 2023a](#)), which is often insufficient to reflect true economic hardship ([Menyhért et al., 2021](#)).

As we mentioned previously, economic deprivation is a key predictor of school dropout (e.g., [Bradley & Lenton, 2007](#); [De Witte et al., 2013](#); [Echeverría et al., 2014](#); [Gubbels et al., 2019](#); [OECD, 2018a](#); [Rosenthal, 1998](#)), and it also appears to influence variables within educational contexts, as well as students' psychological resources. For example, with regard to educational contexts, there is a tendency for teachers to undervalue the abilities and motivation of pupils from households with limited financial resources, a bias which subsequently influences their teaching style ([Brandmiller et al., 2020](#); [Van den Broeck et al., 2020](#)). Students' economic status also seems to have a significant effect on peer dynamics, with students from lower-income families facing a greater degree of social exclusion at school than their more affluent peers ([Cavicchiolo et al., 2022, 2023](#)). Furthermore, authoritarian parenting strategies are more prevalent in families with lower incomes, in contrast to those favored by parents in higher-income brackets (e.g., [Dodge et al., 1994](#); [Gurland & Grolnick, 2005](#); [Hanson & Chen, 2007](#)). As regards psychological variables, for example, studies indicate that low-income students have unique academic motivation profiles ([Alivernini et al., 2023](#); [Manganelli et al., 2021](#)), with lower levels of self-efficacy ([Bianchi, Cavicchiolo, Lucidi, et al., 2021](#); [Boardman & Robert, 2000](#)), and less self-esteem ([Bianchi, Cavicchiolo, Lucidi, et al., 2021](#); [Twenge & Campbell, 2002](#)).

These examples illustrate that the economic background of students, in addition to being a key predictor of school dropout, also affects the educational and psychological variables that interventions target, thereby confounding their effects. Studies that focus specifically on students from low-income families control for this confounding effect and can help in identifying the most effective strategies for this at-risk population.

2. Aims and hypotheses

The present study investigates the development of the intention to drop out of school during compulsory education among students recognized by the Italian government as living below the poverty threshold. This research focuses on the population of students most at risk of early school leaving and, by design, controls for the confounding effects of objective economic deprivation. Official data on school absenteeism - a behavior recognized as a precursor to school dropout during compulsory education ([Gubbels et al., 2019](#)) - was collected at the study's conclusion and used to assess the consequences of the school dropout intention developmental model. There is evidence that even short-term absenteeism ([Kearney, 2008a, 2008b](#)), when it reaches high levels, often deteriorates over time and may ultimately culminate in permanent disengagement in the form of school dropout.

The study aimed to achieve two primary objectives: firstly, to track the developmental trajectory of SDI among low-income students throughout the period of compulsory education, and secondly, to examine the influence of the educational context (i.e. support for autonomy from parents and teachers, and peer relations at school), and of psychological factors (i.e. self-evaluations and academic motivations) upon this trajectory. Alongside our research objectives, we developed five hypotheses on the basis of an extensive review of the literature and a careful examination of the relevant theories. These hypotheses are as follows:

Hypothesis 1 (H1). It is anticipated that the intention to drop out among low-income students will increase over the course of compulsory education and will accelerate as students approach the legal school-leaving age, reflecting not only a linear trend, but also a positive quadratic trend. This hypothesis is specifically concerned with

identifying the form of the developmental trajectory of dropout intention. It is based on the assumption, originally proposed by [Vallerand et al. \(1997\)](#), that as students grow older and near the age at which they can legally act on their intention to leave school, the rate of increase in dropout intention may become steeper. However, other studies (e.g. [Casanova et al., 2021](#); [Janosz et al., 2008](#); [Lau et al., 2023](#)) describe dropout as a gradual process, suggesting a linear developmental trajectory.

Hypothesis 2 (H2). During compulsory education, the perceived benefits of parental autonomy support will decrease, while the advantages of teacher support will increase. This hypothesis originates from the high levels of conflict that have been observed between parents and adolescents in low-income households, which may lead to emotional distancing from parents and a preference for teachers instead ([Dashiff et al., 2009](#); [Kim et al., 2018](#)).

Hypothesis 3 (H3). (H3a) Implicit and explicit forms of social exclusion (i.e. peer non-acceptance and victimization) will play a more relevant role in predicting SDI than peer friendship. This hypothesis is grounded on evidence indicating that social exclusion by peers predicts a higher intention of school dropout among students from low socio-economic backgrounds ([Bianchi, Cavicchiolo, Lucidi, et al., 2021](#)). Additionally, regarding the role of friendships, findings have been mixed or contradictory. While friendships can enhance academic attainment ([Carbonaro & Workman, 2013](#); [Li et al., 2011](#); [Vaquera & Kao, 2008](#)), they may also reduce the time students spend on academic pursuits and interests ([Alivernini et al., 2023](#); [Guiffreda et al., 2013](#)). We also hypothesized (H3b) that the detrimental effects of social exclusion would increase over time, because the importance of peer groups tends to increase during adolescence ([Plenty & Jonsson, 2017](#)).

Hypothesis 4 (H4). Identified motivation will have a greater relevance to SDI than intrinsic motivation. This hypothesis is based on the finding that identified motivation (but not intrinsic motivation) tends to decline among low-income students during adolescence ([Alivernini et al., 2023](#)).

Hypothesis 5 (H5). We hypothesized that educational context variables, psychological factors, and SDI are structurally related over time. Specifically, we anticipated that educational context variables and psychological factors would serve as temporal antecedents of school dropout intention. This hypothesis is grounded in many theories of behavior, which identify intentions as the most proximal predictor of behavior (e.g. [Ajzen, 2020](#); [Sheeran et al., 2016](#)). Accordingly, the reverse directional pathway (from dropout intentions to contextual variables and psychological factors) was not hypothesized.

3. Method

3.1. Participants and procedure

The present study was conducted with a sample of students enrolled in social centers that provide free recreational opportunities (e.g., sports and physical activities) for young people from families living in poverty, as defined by the Equivalent Economic Status Index (ISEE), the official Italian indicator of household income and assets ([Council of Ministers, 2013](#)). These centers are attended by young people of different ages and from various schools. A total of nine centers voluntarily agreed to participate in the study. The participating centers were in urban and suburban areas of different cities in northern, central, and southern Italy. These macro-areas capture and reflect the well-documented differences in economy, education, and cultural capital that characterize the Italian regions (e.g., [Agasisti et al., 2017](#); [Ripamonti & Barberis, 2018](#); [Ruiu, 2023](#)).

Written informed consent was obtained by students' parents who received a letter explaining the objectives of the study. Inclusion criteria were: a) being 9 to 15 years old (in the present sample, students of each

age from 9 to 15 were represented across the compulsory education period); b) living in a family officially certified as below the poverty threshold; c) attending after-school social centers; d) being able to speak and read in Italian. Exclusion criteria were: a) having a learning disability or cognitive impairment that would make the young participant unable to complete the questionnaires; b) failing to provide written permission from the parents. Data were collected through an online survey administered under the supervision of trained researchers during ordinary afternoons at the social centers. The study was conducted in accordance with the Italian ethical guidelines for research in psychology (National Board of Italian Psychologists, 1989). All procedures performed in this study were carried out in accordance with the guidelines of the Declaration of Helsinki and its later amendments for research involving human participants and were approved by the Institutional Review Board at the institution of the last author (approval number: 1226).

Data were gathered at four different time points over a period of two consecutive school years, with a six-month interval between each wave. On the whole, 252 adolescents who attended the social centers were invited to fill in an online questionnaire investigating the following measures: SDI, parental autonomy support, teachers' autonomy support, peer acceptance and peer friendship, victimization, academic self-efficacy, negative self-esteem, identified and intrinsic academic motivations. All these measures were assessed at four time points. Background information was also collected at time 1 (T1), while the number of absences during the month subsequent to the end of the observation period was provided by schools to the social centers, on the basis of school official records. Five parents did not give their written consent, consequently 247 children and adolescents (57.5% males; $M_{age} = 12.11$; $SD_{age} = 1.92$; age range: 9–15; school grade: from 4th to the 9th grade) participated in the online administration at T1. Of the 247 participants, 8.5% were first-generation immigrants who had spent at least eight months in the Italian school system, and 8.5% were second-generation immigrants. These proportions are consistent with national data (Foundation for Initiatives and Studies on Multi-Ethnicity, 2020; Ministry of Education, Universities and Research, 2020), considering that students with an immigrant background are also more likely to be socioeconomically disadvantaged (OECD, 2023b). To safeguard the privacy of minors, information on ethnic origin and home languages was not collected directly. According to national data (Ministry of Education, Universities and Research, 2020), the majority of immigrant students in Italian schools come from other European countries (46.3%), followed by Africa (25.7%) and Asia (20.1%). The most represented countries of origin are Romania, Albania, and Morocco, which together account for approximately 45% of immigrant students in Italian schools. At time 2 (T2), 232 adolescents took part in the second data collection, as 15 participants did not anymore attend the social centers (93.9% retention). At time 3 (T3), 213 adolescents were involved in the third data collection (19 participants could not be contacted, 91.8% retention). At time 4 (T4), 207 adolescents completed the survey (6 participants could not be contacted, 97.2% retention). After the end of the observation period, school absences were collected for the sample of 207 adolescents. Overall, the high response rates were in line with previous studies (e.g. Alivernini et al., 2023; Bianchi et al., 2022; Bianchi, Cavicchiolo, Lucidi, et al., 2021) and probably depended on the high attractiveness of the social centers that offered several services for indigent families free of charge. Attrition analyses revealed no significant differences in sociodemographic characteristics (biological sex, immigrant backgrounds, and age) between participants at T1 and those retained at T4 (all tests, $p > 0.05$). Similarly, participants who completed all four measurement waves did not differ significantly on the study variables from those who dropped out of the study (all t -tests, $p > 0.05$).

3.2. Measures

3.2.1. School Dropout Intention (SDI)

SDI was measured using three items (Hardre & Reeve, 2003; Italian version: Alivernini & Lucidi, 2011; Bianchi, Cavicchiolo, Lucidi, et al., 2021), including “I sometimes consider dropping out of school”, with responses on a 5-point scale ranging from 1 (never) to 5 (very often). The omega coefficient for this scale was 0.90 at T1, 0.92 at T2, 0.88 at T3, and 0.91 at T4, while coefficient alpha was 0.90 at T1, 0.92 at T2, 0.88 at T3, and 0.91 at T4. The results of longitudinal confirmatory factor analyses (CFAs) support strong measurement invariance across the four time points (Chen, 2007; Cheung & Rensvold, 2002): $\Delta CFI_{\text{configural-weak SDI}} = 0.001$; $\Delta CFI_{\text{weak-strong SDI}} = 0.002$.

3.2.2. Educational context

3.2.2.1. Parents and teachers. The Italian version of the Perceptions of Parents Scale (POPS; Alivernini & Lucidi, 2011; Grolnick et al., 1991) was used to measure parental autonomy support. The scale includes three items (example item: “At home my parents give me explanations about why I have to behave in a certain way”) and responses were given on a 5-point scale ranging from 1 (never) to 5 (very often). The omega coefficient for this scale was 0.76 at T1, 0.76 at T2, 0.83 at T3 and 0.82 at T4, while coefficient alpha was 0.73 at T1, 0.73 at T2, 0.82 at T3 and 0.81 at T4. The results of CFAs supported strong measurement invariance across the four time points ($\Delta CFI_{\text{configural-weak parental autonomy support}} = 0.002$; $\Delta CFI_{\text{weak-strong parental autonomy support}} = 0.000$).

Teachers' autonomy support was measured by means of the Italian version of the Learning Climate Questionnaire (LCQ; Williams & Deci, 1996. Italian version: Alivernini, Cavicchiolo, Manganeli, et al., 2019). Students were asked to respond to four items (example item: “My teachers encourage me to ask questions during the lesson”) on a 5-point scale ranging from 1 (never) to 5 (very often). The omega coefficient for this scale was 0.68 at T1, 0.69 at T2, 0.72 at T3 and 0.76 at T4, while coefficient alpha was 0.68 at T1, 0.70 at T2, 0.72 at T3 and 0.77 at T4. These values are consistent with omega and alpha coefficients obtained in previous studies examining autonomy support in similar populations (e.g., Alivernini et al., 2023). The results of CFAs supported strong measurement invariance across the four time points ($\Delta CFI_{\text{configural-weak teachers' autonomy support}} = 0.003$; $\Delta CFI_{\text{weak-strong teachers' autonomy support}} = 0.005$).

3.2.2.2. Peers. Peer acceptance and peer friendship were measured by means of The Classmates Social Isolation Questionnaire for adolescents (CISQ-A; Cavicchiolo et al., 2022; Alivernini & Manganeli, 2016). The CISQ-A is a context specific scale that measures peer social relationships within classrooms, and it consists of 8 items, 4 for peer acceptance (example item: “How many of your classmates speak with you?”) and 4 for peer friendship (example item: “How many of your classmates do you meet outside school?”). For each item, students were asked to indicate the number of classmates with whom they had social relationships on a 5-point scale (None, Few, Some, Many, All). The lowest possible score thus denotes no social contacts between the respondent and any of their classmates, while the highest possible score indicates social contacts with everyone in the class. The omega coefficient for peer acceptance was 0.74 at T1, 0.77 at T2, 0.80 at T3 and 0.80 at T4, while coefficient alpha was 0.73 at T1, 0.76 at T2, 0.79 at T3 and 0.79 at T4. For peer friendship, coefficient omega was 0.79 at T1, 0.83 at T2, 0.83 at T3 and 0.83 at T4, while coefficient alpha was 0.79 at T1, 0.83 at T2, 0.83 at T3 and 0.83 at T4. The results of CFAs supported strong measurement invariance across the four time points for both peer acceptance and peer friendship: $\Delta CFI_{\text{configural-weak peer acceptance}} = 0.001$; $\Delta CFI_{\text{weak-strong peer acceptance}} = 0.007$; $\Delta CFI_{\text{configural-weak peer friendship}} = 0.003$; $\Delta CFI_{\text{weak-strong peer friendship}} = 0.000$.

Victimization was measured by means of 4 items (Roland & Idsøe,

2001; Italian version: Alivernini, Manganelli, Cavicchiolo, & Lucidi, 2019; Bianchi, Cavicchiolo, Manganelli, et al., 2021) that include different forms of victimization (verbal, physical, and relational) in the last school year (example item: “This school year how often have other students bullied/hassled you at school by teasing you?”). Participants rate their answers on a 4-point scale ranging from 1 (never) to 4 (daily), with higher scores indicating more frequent victimization at school. The omega coefficient for this scale was 0.87 at T1, 0.85 at T2, 0.88 at T3 and 0.88 at T4, while coefficient alpha was 0.86 at T1, 0.82 at T2, 0.86 at T3 and 0.86 at T4. The results of CFAs supported strong measurement invariance over time ($\Delta\text{CFI}_{\text{configural-weak}} \text{ victimization} = 0.008$; $\Delta\text{CFI}_{\text{weak-strong}} \text{ victimization} = 0.001$).

3.2.3. Psychological factors

3.2.3.1. Student's self-evaluation. Academic self-efficacy was measured by using a short version (5 items) of the Perceived Efficacy in Self-Regulated Learning dimension from the Multidimensional Scales of Perceived Self-efficacy (Bandura, 2011; Italian validation: Pastorelli & Picconi, 2001; Caprara et al., 2008; Raimondi et al., 2025). The scale was used in previous studies on low-income students (e.g. Bianchi et al., 2022) and it assesses perceived efficacy of students in self-regulating learning and school activities (example item: “How well can you finish homework assignments before the deadline?”). Students recorded their answer on a 4-point scale ranging from 1 (I cannot do it at all) to 4 (I can do it very well). The omega coefficient for this scale was 0.75 at T1, 0.74 at T2, 0.76 at T3 and 0.81 at T4, while coefficient alpha was 0.76 at T1, 0.74 at T2, 0.77 at T3 and 0.80 at T4. The results of CFAs supported strong measurement invariance across the four time points: $\Delta\text{CFI}_{\text{configural-weak}} \text{ academic self-efficacy} = 0.000$; $\Delta\text{CFI}_{\text{weak-strong}} \text{ academic self-efficacy} = 0.000$.

Self-esteem was instead evaluated by 4 items taken from the adolescent version of the Global Negative Self-Evaluation Scale (Alsaker & Olweus, 1986; Italian version: Bianchi, Cavicchiolo, Lucidi, et al., 2021. Example item: “I certainly feel useless at times”). Responses were given on a 5-point scale ranging from 1 (never) to 5 (very often), with higher scores indicating a greater degree of negative self-evaluation. The omega coefficient for this scale was 0.83 at T1, 0.87 at T2, 0.87 at T3 and 0.87 at T4, while coefficient alpha was 0.81 at T1, 0.86 at T2, 0.87 at T3 and 0.87 at T4. The results of CFAs supported time invariance across the four time points: $\Delta\text{CFI}_{\text{configural-weak}} \text{ self-esteem} = 0.003$; $\Delta\text{CFI}_{\text{weak-strong}} \text{ self-esteem} = 0.004$.

3.2.3.2. Academic motivation. Identified motivation and intrinsic motivation were measured by using a short version of the Academic Self-Regulation Questionnaire (SRQ-A: Ryan & Connell, 1989, Italian version: Alivernini et al., 2018). The use of this short version helped to overcome the logistical constraints in the social centers while ensuring good psychometric properties, already proved in previous studies (e.g. Alivernini et al., 2023). For each form of autonomous academic motivation, the scale includes three items expressing different reasons for trying to do well at school and for doing homework (example item for identified motivation: “Because it is important to me to try to do well in school”; example item for intrinsic motivation: “Because I enjoy doing my homework”). The responses of participants were given on a 4-point Likert-type scale ranging from 1 (not at all true) to 4 (very true). The omega coefficient for identified motivation was 0.77 at T1, 0.80 at T2, 0.80 at T3 and 0.80 at T4, while coefficient alpha was 0.77 at T1, 0.80 at T2, 0.79 at T3 and 0.80 at T4. For intrinsic motivation, coefficient omega was 0.84 at T1, 0.79 at T2, 0.85 at T3 and 0.86 at T4, while coefficient alpha was 0.84 at T1, 0.78 at T2, 0.84 at T3 and 0.85 at T4. The results of CFAs supported strong measurement invariance across the four time points for both identified and intrinsic motivation: $\Delta\text{CFI}_{\text{configural-weak}} \text{ identified motivation} = 0.001$; $\Delta\text{CFI}_{\text{weak-strong}} \text{ identified motivation} = 0.001$; $\Delta\text{CFI}_{\text{configural-weak}} \text{ intrinsic motivation} = 0.004$; $\Delta\text{CFI}_{\text{weak-strong}} \text{ intrinsic motivation} = 0.005$.

intrinsic motivation = 0.005.

3.2.4. Distal outcome

3.2.4.1. School absenteeism. The number of days students skipped school during the month subsequent to the end of the observation period was provided by schools to the social centers, on the basis of official records.

3.2.5. Background information

3.2.5.1. Biological sex. Biological sex assigned at birth was coded into two categories, with 0 indicating females and 1 indicating males.

3.2.5.2. Age. Age was measured at baseline and considered as a continuous variable.

3.2.5.3. Immigrant background. According with the definition of the Organization for Economic Co-operation and Development (OECD, 2014), foreign-born adolescents with foreign-born parents were defined as first-generation immigrants, while participants born in Italy with parents born in another country were defined as second-generation immigrants. In the analysis, immigrant background was coded as a dummy variable (0/1), with the value of 1 for first- or second-generation immigrants, and the value of 0 for native students.

3.2.5.4. Prior achievement. We considered the official school grades in Italian and mathematics obtained by the students at the end of the school year that preceded the present study. Italian and mathematics are considered the two most important subjects in the national school system, and they have proved to be highly correlated with the results of students in the national standardized tests (Cavicchiolo et al., 2020). Grade in Italian includes several aspects of language proficiency such as reading and comprehension, grammar, vocabulary, listening, oral production and interaction, while grade in mathematics comprises knowledges in arithmetic, geometry, measurement, data analysis, and forecasting. The grades range from 4 to 10 (only in whole numbers) and were provided to the social centers by the school office of the students.

3.3. Data analysis

In the present study, given that we are dealing with a homogeneous group of students (i.e. low-income students) and since we had no theoretical basis to expect distinct subgroups with different developmental patterns within this population, we opted for a variable-centered analysis instead of a person-centered one. A variable-centered approach offers the additional advantage of being more parsimonious than person-centered alternatives (Howard & Hoffman, 2018).

Specifically, we adopted two complementary analytic approaches. First, we employed latent growth models (LGM) to examine the developmental trajectory of school dropout intention throughout compulsory education and to identify which factors (contextual and psychological) were associated with SDI development and their time-specific relative importance (H1 to H4). Second, we used Autoregressive Latent Trajectory (ALT) models to test the directionality of the relationships between each of the factors identified in the previous LGM analyses and school dropout intention across measurement waves (H5). In the next sections, these two complementary analytic approaches are presented in detail.

3.3.1. Examining the developmental trajectory of school dropout intention and the time-specific importance of contextual and psychological factors

To track developmental trajectory of SDI (H1) and to identify associated contextual and psychological factors (H2-H4) we tested unconditional and conditional latent growth models (LGMs) with time invariant and time varying covariates.

3.3.1.1. Unconditional latent growth models. First, to assess changes in SDI over time and test our **H1**, we performed unconditional growth models with latent variables. We used latent variables to take into account measurement error and we tested intercept-only (i.e., no growth), as well as linear, and quadratic patterns of change. We evaluated possible significant changes over time using the following fit indices (Hu & Bentler, 1999; Schermelleh-Engel et al., 2003): the χ^2 test statistic, the Comparative Fit Index (CFI; > 0.95 for a good model fit), the Root Mean Square Error of Approximation (RMSEA; ≤ 0.05 for a good model fit), and finally the Standardized Root Mean Square Residual (SRMR; < 0.10 for an acceptable fit). The Satorra-Bentler chi-square difference test was used to compare the three models. The unstandardized estimates of the parameters of the selected models were computed.

3.3.1.2. Conditional latent growth models. Based on the results of the previous analyses, we performed conditional latent growth models with SDI considered as latent variable. We started with a conditional growth model with age as the only predictor. Age was centered at the first time point. Then, we added the following time invariant covariates: biological sex, immigrant backgrounds (first and second-generation), and prior achievement. Prior achievement was centered at its grand-mean.

Educational and psychological variables were included as time varying covariates in order to take into consideration their time-specific contribution to the latent curve process (Bollen & Curran, 2006).

Analyses were conducted using two separate models (i.e., one for educational context variables and one for psychological factors) to capture the total effects of these different sets of variables. This choice was driven by both theoretical and methodological considerations. According to Self-Determination Theory (Ryan & Deci, 2017) and various other theoretical frameworks, psychological variables act as mediators of educational contextual influences (e.g., teachers' autonomy support \rightarrow academic motivation \rightarrow SDI). Including both contextual and psychological variables in a single model, without explicitly modeling the mediational relationships, would introduce overadjustment bias by statistically controlling for mediators (Pearl, 2009). Specifically, this approach would yield only the direct effect of contextual variables (e.g., teachers' autonomy support \rightarrow SDI), while removing the indirect effect that passes through psychological variables (e.g., teachers' autonomy support \rightarrow academic motivation \rightarrow SDI). Since the aim of our study was to capture the total effects of each set of variables, we conducted two separate analyses to avoid overadjustment bias (Neuberg, 2003; Schisterman et al., 2009).

Time varying covariates were inserted as factor scores due to the complexity of our model. Compared to simple scale scores, factor scores have the advantage to preserve some of the characteristics of the underlying measurement structure (Guay et al., 2021; Skrandal & Laake, 2001). To calculate factor scores we used a multistage approach (McNeish & Wolf, 2020), where we first calculated them from longitudinally invariant measurement models (Millsap, 2010), and then we used the factor scores in the conditional latent growth models.

For the educational factors model, we considered the following variables: parental autonomy support, teachers' autonomy support, peer acceptance, peer friendship, and victimization. In order to test our **H2** and **H3b** hypotheses, we performed different models where educational factors were supposed to: 1) have equal effects over the period considered, or 2) change over time. We used the Satorra-Bentler chi-square difference test to compare the different models.

For the psychological factors model, we instead considered the following variables: academic self-efficacy, self-esteem, identified and intrinsic motivation.

3.3.1.3. School absenteeism as a distal outcome. In order to investigate the consequences of the developmental process for school dropout, we tested a model where we considered school absences as a distal outcome along with time-invariant covariates (i.e. age, biological sex, immigrant

backgrounds, and prior achievement). Therefore, in this model, school absences were predicted by the entire trajectory of SDI over two years along with time-invariant covariates. Age was centered around the covariate score at the first time point, while prior achievement at its grand-mean. As absences were measured by the occurrence of school days skipped and the variance in this variable was high, we adopted a model tailored for count outcomes with overdispersion, the negative binomial model (Loeys et al., 2012; Long & Cheng, 2004). In this model, a change in the predictor variable has a multiplicative effect on the outcome variable, unlike the additive effect seen in standard linear models. This means that a one-unit increase in the predictor increases the expected counts of school absence by a multiplicative factor of $\exp(\beta)$. This factor can be interpreted as an incident rate ratio (Cornell et al., 2013).

3.3.2. Establishing the temporal precedence of educational context variables and psychological factors over school dropout intention

To test the temporal precedence of educational context variables and psychological factors over SDI (**H5**), we employed Autoregressive Latent Trajectory (ALT) models. This approach combines features from both autoregressive models and latent growth curve models (Bollen & Curran, 2004; Curran & Hancock, 2021). We chose this approach because modeling the developmental trajectory of SDI over compulsory education was a key aim of our study. Neither traditional cross-lagged panel models (CLPMs) nor more recent Random-Intercept Cross-Lagged Panel Models (RI-CLPMs) explicitly model developmental trajectories (Usami et al., 2019). Moreover, CLPMs have been criticized for failing to adequately disentangle within-person processes from between-person differences (e.g. Hamaker et al., 2015; Lucas & Rohrer, 2024). RI-CLPMs were also inappropriate for our study because they assume that between-person variance is perfectly stable over time (Orth et al., 2021), an assumption that becomes unrealistic when studying the developmental process of SDI, where we hypothesized systematic change over compulsory education (**H1**). As our hypothesis (**H5**) emphasized both cross-lagged effects and underlying latent trajectories, we selected the ALT models' hybrid approach because it allows for the simultaneous incorporation of autoregressive processes and individual-specific latent trajectories (e.g. Bauldry & Bollen, 2018; Berry & Willoughby, 2017; Curran & Hancock, 2021).

The analytic strategy for ALT models followed a sequential model building approach, as recommended by Bollen and Curran (Bollen & Curran, 2004), and used in previous studies (e.g. Morin et al., 2011). Only variables that showed a significant relationship with SDI in the LGMs models were included in this analysis. In the final retained ALT models, covariates (i.e. biological sex, age, immigrant backgrounds, and prior achievement) were also included. A detailed description of the model building approach is provided in Supplementary materials 6.

All models were tested using the Robust Maximum Likelihood estimator (MLR). Data were analyzed using Mplus 8 version 1.6 (1) (Muthén & Muthén, 2017), with the full information maximum likelihood (FIML) to handle missing data. The materials and the analysis code for this study are available by emailing the corresponding author.

4. Results

Descriptive statistics are presented in Supplementary materials 1, correlations between the variables and SDI are displayed in Supplementary materials 2, while correlations between educational and psychological constructs are shown in Supplementary materials 3.

4.1. Developmental trajectory of school dropout intention during compulsory education

4.1.1. The form of the school dropout intention developmental trajectory

In Table 1 the fit statistics of intercept only, linear and quadratic LGM models are presented. The results showed that a linear growth model was an appropriate model of change to our data ($\chi^2(47) = 50.65$,

Table 1

Fit statistics for the intercept only, linear and quadratic growth models and results of the Satorra-Bentler Chi-square difference test.

Model	χ^2	df	p-Value	RMSEA	CFI	SRMR	χ^2 diff-test ^a	df	p-Value
Intercept only	62.264	50	0.114	0.031	0.989	0.069			
Linear	50.648	47	0.332	0.018	0.997	0.044	11.23	3	0.011
Quadratic	46.676	44	0.363	0.016	0.998	0.038	4.05	3	0.256

Note: The selected model is presented in **bold**.

^a Satorra-Bentler Chi-square difference test between intercept only and linear model and between linear and quadratic model.

$p = 0.33$; $RMSEA = 0.018$; $CFI = 0.997$; $SRMR = 0.044$). The quadratic growth model also appeared to be an appropriate model. However, the results of the Satorra-Bentler chi-square difference test showed no statistically significant difference between the quadratic and the linear growth model ($\Delta\chi^2_{SB} = 4.05$, $\Delta df = 3$, $p = 0.26$). This indicated that the quadratic model did not provide a statistically significant improvement in fit over the linear model. Therefore, following the principle of parsimony, we retained the simpler model (i.e., the linear model). This result is only partially in line with our **H1**, as the intention to drop out significantly rises over time, but at a constant rate (linear trend). Thus, it seems that there is no acceleration in this process (i.e. no quadratic trend).

In **Table 2** the parameters of the selected model (linear growth model) are displayed: the results showed that the intercept mean and variance were statistically significant. Moreover, SDI significantly increase over the time considered (unstandardized linear slope mean = 0.06, $p < 0.05$), while there is not a significant variation between low-income adolescents in their rates of change (unstandardized linear slope variance = 0.05, *ns*). In addition, there was a significant negative association between the intercept and the linear slope (intercept-linear slope covariance = -0.12, $p < 0.05$) indicating that low-income adolescents who reported higher initial levels of intention to drop out tend to increase at a slower rate in their intention to leave school over time.

4.1.2. Student background characteristics and school dropout intention developmental trajectory

We performed a conditional latent growth model with SDI considered as latent variable and with only age as a time invariant factor. The model showed a good fit to our data $\chi^2(59) = 69.34$, $p = 0.17$; $RMSEA = 0.027$; $CFI = 0.991$; $SRMR = 0.061$. Age was found to approach the level of significance for the intercept ($B = 0.05$, $\beta = 0.13$, $p = 0.06$) while it was not statistically significant for the slope ($B = -0.003$, $\beta = -0.02$, $p = 0.86$). This indicates that older students had a higher intention to drop out of school.

We then tested a new conditional latent growth model which included biological sex, age, first- and second-generation immigrant background, and prior achievement as time invariant covariates. The fit of the model was good: $\chi^2(97) = 131.52$, $p = 0.01$; $RMSEA = 0.038$; $CFI = 0.976$; $SRMR = 0.051$. In **Table 3** all standardized paths for time invariant factors are presented. Biological sex, first- and second-generation immigrant background and prior achievement proved to be significantly associated with the initial levels of SDI: being a male, a native student and a student with a lower level of prior achievement is

Table 2

Parameters for the selected model (linear growth model).

	Unstandardized estimates	Standardized estimates
Intercept mean	2.13***	2.46
Intercept variance	0.75***	1
Linear slope mean	0.06*	0.27
Linear slope variance	0.05	1
Intercept-linear slope covariance	-0.12*	-0.61

*** $p < 0.001$.

* $p < 0.05$.

associated with higher initial levels of intention to drop out. None of the variables significantly predicted the slope of the intention to drop out, indicating that these covariates are not associate with changing in SDI over time.

4.1.3. Consequences of school dropout intention developmental trajectory: school absenteeism

In **Table 4** the results of the negative binomial model are presented as standardized coefficients (β), along with their exponentiated incident rate ratios (IRR). We also included an interpretation of their effect size, based on the percentage of change in school absence counts predicted by one standard deviation change in each independent variable, as presented in previous research (Turner et al., 2018). The results showed that both the initial levels and the growth rate of SDI significantly predicted school absences. Specifically, a one standard deviation increase in the intercept of the linear model for SDI was associated with a 27% increase in counts of school absence. Additionally, a one standard deviation increase in the slope of the linear model was associated with a 192% increase in school absence counts. This suggests that low-income students with initially higher SDI levels and greater increases in SDI over time exhibited more school absences after the end of the observation period.

We found no significant associations between time invariant covariates (i.e. biological sex, age, immigrant backgrounds, and prior achievement) and school absences.

4.2. The role of educational context variables and psychological factors in school dropout intention development: time-specific importance and temporal precedence

4.2.1. Educational context variables and school dropout intention

To test time-specific associations between educational context variables and SDI, we performed conditional latent growth models with time invariant (i.e. biological sex, age, immigrant backgrounds, and prior achievement) and time varying covariates. As regards the latter, parental autonomy support, teachers' autonomy support, peer acceptance, peer friendship, and victimization were taken into consideration. To address our **H2** and **H3b** hypotheses, we tested different models (see Supplementary Materials 4) where the variables were assumed either 1) to have equal effects over the period considered, or 2) to change over time. We first conducted an omnibus comparison test (Model 0 vs Model

Table 3

Conditional latent growth model with time-invariant factors: intercepts and slopes estimates.

Time-invariant covariates	I	S
Biological sex (male)	0.36** (0.20)	-0.02 (-0.04)
Age T1	0.02 (0.04)	0.01 (0.05)
Immigrant background (first-generation)	-0.47* (-0.15)	0.12 (0.14)
Immigrant background (second-generation)	-0.54*** (-0.17)	-0.03 (-0.04)
Prior achievement	-0.16* (-0.21)	0.05 (0.23)

Note: I = intercept; S = slope. Unstandardized estimates. Standardized estimates are displayed in parentheses.

*** $p < 0.001$.

** $p < 0.01$.

* $p < 0.05$.

Table 4

Negative binomial coefficients from the SEM model of school absences regressed on the intercept and slope of the conditional latent growth model for SDI with time invariant covariates.

Independent variable	B	β	IRR	% change per count
Intercept of the linear model	0.29*	0.24	1.27	27%
Slope of the linear model	9.16**	1.07	2.92	192%
Biological sex (male)	ns	ns		
Age T1	ns	ns		
Immigrant background (first-generation)	ns	ns		
Immigrant background (second-generation)	ns	ns		
Prior achievement	ns	ns		

Note: B = unstandardized estimates, β standardized estimates. IRR = standardized incidence rate ratio, which is the exponentiated standardized regression coefficient, or e^{β} ; % change per count = change in school absences count associated with 1 standard deviation change in independent variable, or (IRR-1) multiplied by 100. ns = nonsignificant.

** $p < 0.01$.

* $p < 0.05$.

1) followed by specific theory-driven tests (Model 2 to 6). The results of Satorra-Bentler chi-square difference tests showed that the effects of contextual variables on SDI remained stable across the two academic years. The fit of the chosen model (i.e. the model in which the effects of the educational contexts variables were constrained to be equal over time) was: $\chi^2(337) = 438.92, p < 0.001$; RMSEA = 0.035; CFI = 0.944; SRMR = 0.083. Overall, results indicated that: a) the perceived benefits of parental autonomy support did not decrease over time (H2); b) the detrimental effects of implicit and explicit forms of social exclusion did not increase over the period considered (H3b).

In Fig. 1 and Supplementary materials 5, the results of the LGM model selected are presented: parental autonomy support, teachers' autonomy support, as well as victimization showed significant relationships with SDI, while peer acceptance and peer friendship had

non-significant relationships with SDI. The results showed that higher levels of support for autonomy from parents and teachers were negatively associated to higher levels of SDI (for parents $B = -0.28$; β at T1 = $-0.13, p < 0.01$; for teachers $B = -0.12$; β at T1 = $-0.08, p < 0.05$), while being a victim of bullying appeared to be positively related to students' intention to drop out. Among significant factors, victimization played the most important role ($B = 0.31$; β at T1 = $0.20, p < 0.001$). Peer acceptance and peer friendship appeared to be unrelated to SDI. This result only partially confirmed our expectations (H3a) as only explicit forms of social exclusion (i.e. victimization) played a relevant role in predicting SDI.

To test the temporal precedence of educational context variables over SDI, we performed ALT models. The results revealed that these models provided an adequate fit to the data (see Supplementary

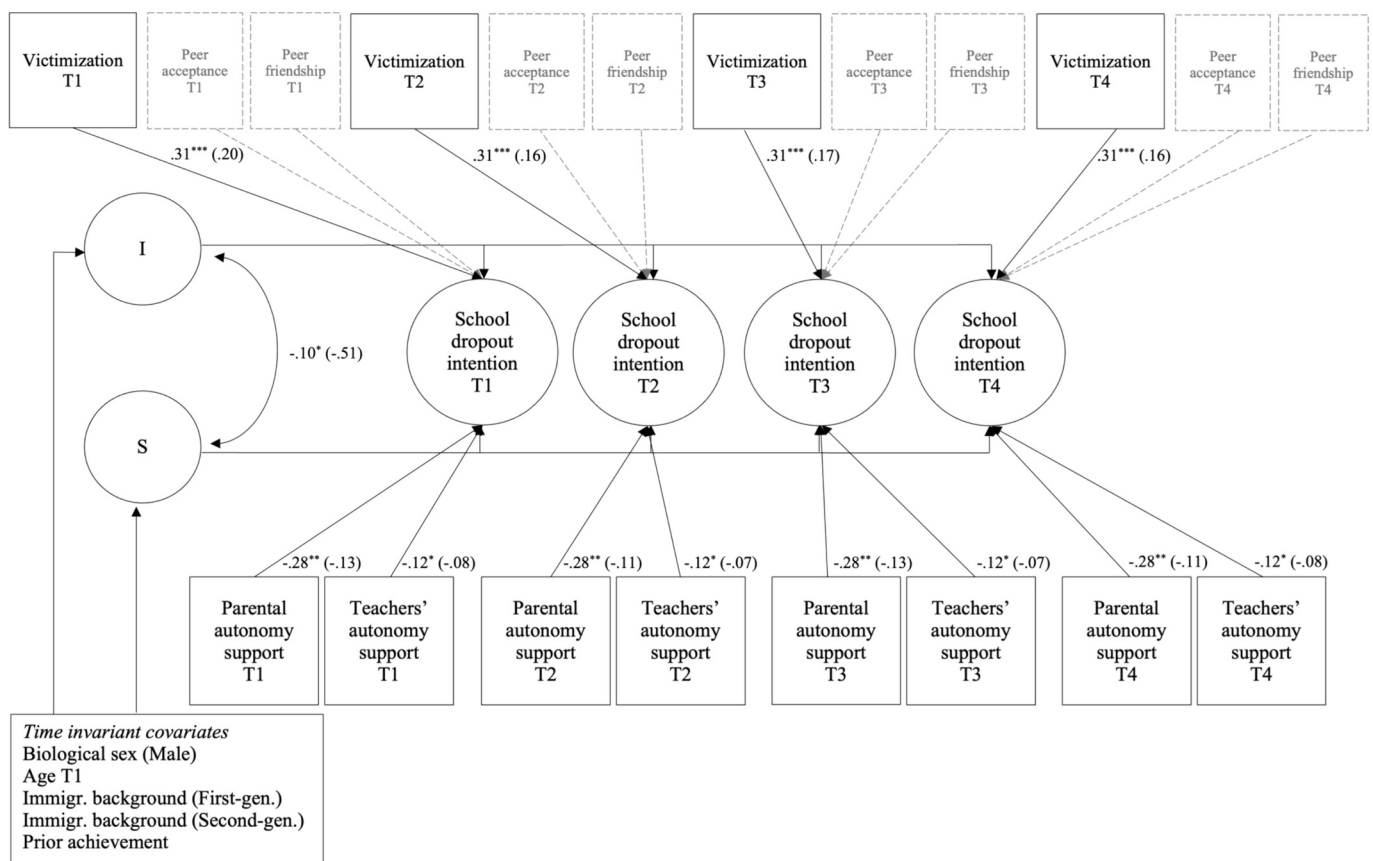


Fig. 1. Conditional latent growth model for SDI with time invariant and time varying covariates pertaining to educational context variables.

Note: I = intercept; S = slope. Unstandardized estimates. Standardized estimates are displayed in parentheses. Dashed lines indicate paths that are not statistically significant. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

Table 5
Cross-lagged paths from ALT models for educational context variables.

Bivariate ALT models - Cross-lagged paths	B (SE)	p-value
Teachers' autonomy support → SDI	-0.118 (0.05)	0.019
SDI → Teachers' autonomy support	ns	
Parental autonomy support → SDI	-0.079 (0.05)	0.081
SDI → Parental autonomy support	ns	
Victimization → SDI	0.079 (0.04)	0.054
SDI → Victimization	ns	

Note: B = unstandardized estimates; SE = standard errors; SDI = school dropout intention. ns = nonsignificant. In these models, equality constraints were imposed on the cross-lagged parameters.

materials 6). Table 5 presents the unstandardized cross-lagged path estimates, as well as standard errors and p-values, of the final ALT models for teachers' autonomy support, parental autonomy support, and victimization (see Supplementary materials 6 for complete results and model-building process). The results showed significant cross-lagged paths from educational context variables to SDI. Consistent with H5, higher levels of teachers' autonomy support at time *t* significantly predicted lower SDI at time *t* + 1, even after controlling for individual latent growth trajectories. Similarly, higher levels of parental autonomy support showed a marginally significant effect in the same direction. Conversely, victimization at time *t* predicted higher SDI at time *t* + 1. Importantly, and as hypothesized, cross-lagged paths from SDI to educational context variables were not statistically significant, indicating unidirectional rather than bidirectional effects.

4.2.2. Psychological factors and school dropout intention

To identify time-specific associations between psychological factors and SDI, we tested a separate conditional latent growth model with time varying covariates (self-efficacy, self-esteem, identified and intrinsic motivation). In the absence of theoretical reasons, these factors are assumed to have stable effects over time. The model fit was $\chi^2(285) = 407.89, p < 0.001$; RMSEA = 0.042; CFI = 0.934; SRMR = 0.063. Among the psychological factors, self-esteem, identified and intrinsic motivation showed significant relationships with SDI (see Fig. 2 and Supplementary materials 5), while academic self-efficacy appears to have a non-significant relationship with SDI. The results showed that higher levels of self-esteem and of academic motivation, both identified and intrinsic, were associated with a lower intention to drop out. Moreover, the results are in line with our H4: among significant factors, identified motivation appears to be more important than intrinsic motivation for the intention to SDI (identified motivation: $B = -0.43, \beta$ at T1 = -0.24,

Table 6
Cross-lagged paths from ALT models for psychological factors.

Bivariate ALT models - Cross-lagged paths	B (SE)	p-value
Self-esteem → SDI	-0.112 (0.05)	0.014
SDI → Self-esteem	-0.102 (0.05)	0.034
Identified motivation → SDI	-0.121 (0.06)	0.031
SDI → Identified motivation	ns	
Intrinsic motivation → SDI	-0.152 (0.06)	0.012
SDI → Intrinsic motivation	ns	

Note: B = unstandardized estimates; SE = standard errors; SDI = school dropout intention. ns = nonsignificant. In these models, equality constraints were imposed on the cross-lagged parameters.

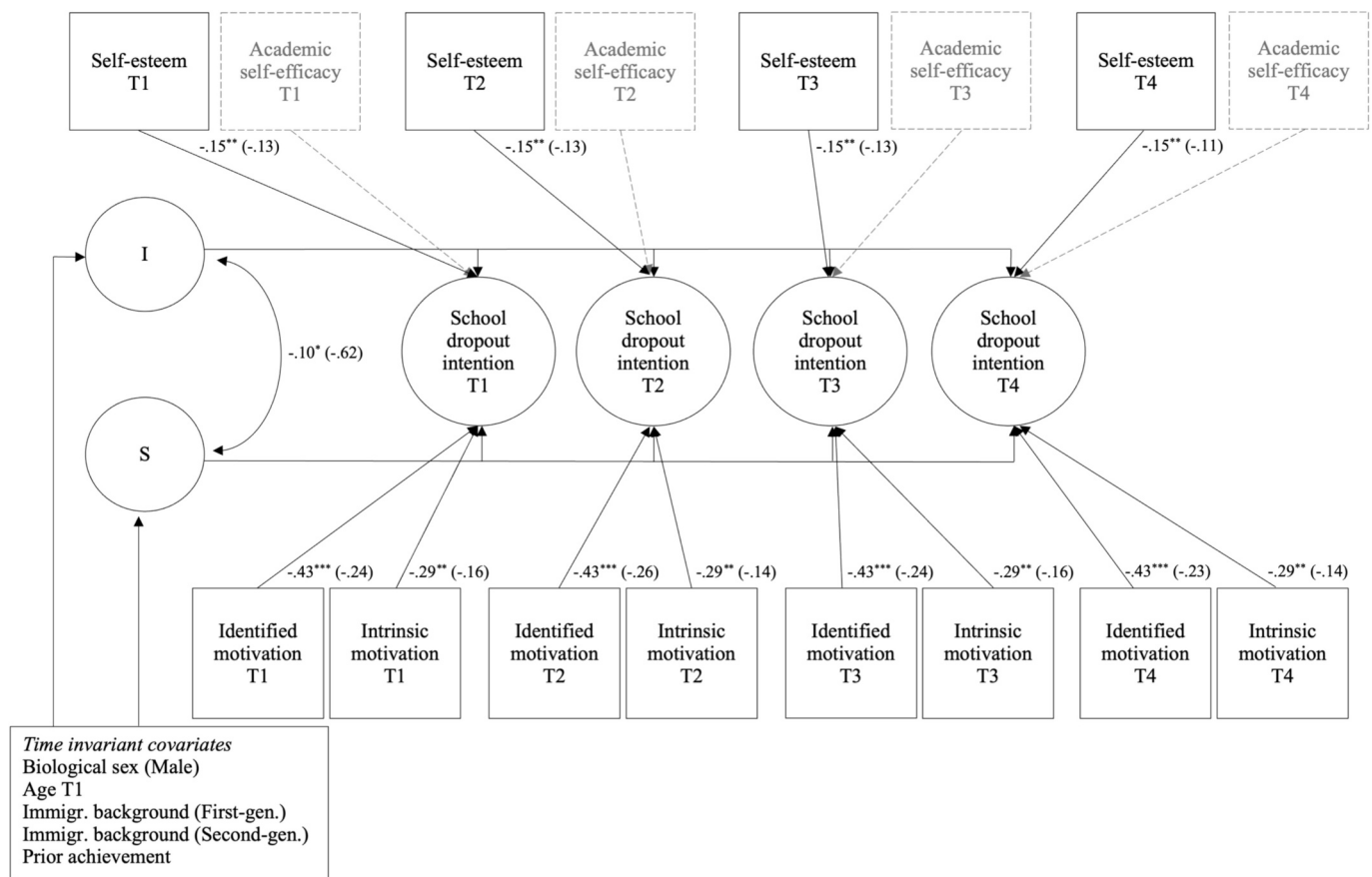


Fig. 2. Conditional latent growth model for SDI with time invariant and time varying covariates pertaining to psychological factors. Note: I = intercept; S = slope. Unstandardized estimates. Standardized estimates are displayed in parentheses. Dashed lines indicate paths that are not statistically significant. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

$p < 0.001$; intrinsic motivation $B = -0.29$; β at $T1 = -0.16$, $p < 0.01$).

To test the temporal precedence of psychological factors over SDI, we performed ALT models. The results revealed that these models provided an adequate fit to the data (see Supplementary materials 6). Table 6 presents the unstandardized cross-lagged path estimates, as well as standard errors and p -values, of the final ALT models for self-esteem, identified motivation and intrinsic motivation (see Supplementary materials 6 for complete results and model-building process). The results showed significant cross-lagged paths from psychological factors to SDI. Consistent with H5, higher levels of self-esteem, identified motivation, and intrinsic motivation at time t significantly predicted lower SDI at time $t + 1$, even after controlling for individual latent growth trajectories. Regarding reciprocal effects, the cross-lagged paths from SDI to self-esteem (SDI \rightarrow self-esteem) appeared statistically significant. However, a Wald test examining whether these reciprocal paths from SDI to self-esteem across measurement waves were jointly different from zero yielded nonsignificant results ($\chi^2_{\text{Wald}} = 6.110$, $df = 3$, $p = 0.106$), failing to support bidirectional effects. In contrast, cross-lagged paths from SDI to both identified motivation and intrinsic motivation were not statistically significant, supporting unidirectional rather than bidirectional effects for these variables.

5. Discussion

In the present study we have provided evidence on the development of school dropout intention (SDI) among low-income students during the period preceding the age at which they can legally leave school (i.e., the end of compulsory education). We have also provided some new insights into the effects of educational context and psychological factors on this development.

5.1. Trajectory of school dropout intention and its consequences among low-income students during compulsory education

Due to the high rates of early school leaving in this population, we hypothesized that SDI among low-income students would increase during the course of compulsory education (H1). Additionally, we predicted that this trend would accelerate as students approach the age when their intentions can be legally manifested by actually dropping out of school (Vallerand et al., 1997). Supporting our hypothesis, we observed a significant rise in school dropout intention over time with initial levels positively related to age, indicating that older students tended to have higher levels of SDI. However, contrary to our expectations, we found no evidence of acceleration in this process as students approached the legal age at which they can eventually leave school. This finding aligns with patterns observed in the general student population (e.g. Casanova et al., 2021; Janosz et al., 2008; Lau et al., 2023) describing dropout as a gradual, long-term process rather than one characterized by acceleration near the legal dropout age.

We also investigated the consequences of the SDI developmental process on school absences, which were collected one month after the observation period and more than two years after the first measurement. The results indicated that students experiencing a more rapid increase in SDI tend to have a higher number of absences after the end of the observation period. As previously noted, the development of SDI during compulsory education in students from low-income families appears to be a long-term process with a relatively constant rate of increase, and an observable consequence of this process is truancy during mandatory schooling. This finding is consistent with research suggesting that dropping out is not an isolated event, but rather the final stage of a dynamic and cumulative process of disengagement from school (e.g. Bowers et al., 2012; Christle et al., 2007; Finn, 1989). Furthermore, we observed non-significant variation between low-income adolescents in their rates of change in SDI (i.e. slope variance was not statistically significant), indicating no differences in growth rates between students. This result supports the notion of homogeneity in this population of low-

income students who share similar socioeconomic constraints and show uniform developmental patterns over time.

From an intervention perspective, these results suggest that school dropout prevention for low-income students should begin in childhood, being consistently maintained throughout the years of compulsory education, rather than being limited solely to the later period of high school attendance when dropout becomes legally possible.

5.2. Student background characteristics and the trajectory of school dropout intention

The variability in initial levels of school dropout intention related to students' background characteristics that we observed offers additional information that could prove valuable for both research and practical applications. Literature indicates that poor academic performance is a predictor of school dropout (e.g. De Witte et al., 2013), and our results show that this remains true even when the effect of a very low economic background is taken into account by means of objective measures. Male low-income students proved to have higher initial levels of SDI, a result which is consistent with studies in the general student population, and which indicates that boys have a higher propensity to drop out than girls (e.g. De Witte et al., 2013; Gubbels et al., 2019). However, biological sex did not predict changes in SDI, suggesting that the gender gap in dropout risk could already exist before the fourth grade and that it remains constant throughout compulsory education. Finally, students with an immigrant background exhibited lower levels of SDI compared to their native peers. Previous research on general student populations has indicated that disparities in SDI between native and immigrant students are largely attributable to socio-economic disadvantage, differences in social capital, and characteristics of the school context (Fandrem et al., 2021; Hippe & Jakubowski, 2018; Perreira et al., 2006): once they are controlled for, the differences typically disappear. The present findings extend this evidence by focusing on economically disadvantaged students, suggesting that within this subgroup, an immigrant background may initially function as a protective factor against the development of SDI. This pattern is consistent with the paradox reported in prior studies, whereby children of immigrants, despite facing cultural and linguistic challenges, often demonstrate higher academic achievement (Feliciano & Lanuza, 2017), a greater likelihood of completing tertiary education, and stronger aspirations for high-status occupations than socio-economically comparable native peers (OECD, 2018b). The positive role of immigrant background may also be understood in light of evidence that immigrant adolescents tend to seek social and cultural integration within the host community and may perceive school as a primary context for achieving such integration (Suárez-Orozco et al., 2018), more so than their native counterparts. Moreover, in immigrant families, poverty and its consequences may be more transitory, and parents tend to hold higher educational aspirations for their children compared with native families of similar socio-economic status (Archambault et al., 2017). Finally, the absence of difference we found in SDI between first- and second-generation immigrant students, suggests that previously reported variations in their motivational development (Alivernini et al., 2023) may exert limited influence on SDI during the period of compulsory education.

5.3. The role of educational context in the development of school dropout intention

The primary educators in a student's life are parents and teachers. Existing evidence suggests that their support for students' autonomy may reduce or mitigate SDI (Alivernini & Lucidi, 2011; Ricard & Pelletier, 2016; Vallerand et al., 1997). Nevertheless, these studies are limited to high schools, adopt only a prospective design and do not include objective measures of students' economic background.

Results showed that both teachers' autonomy support and parental autonomy support had significant effects in predicting dropout

intentions, even after controlling for individual growth trajectories and reciprocal effects, thereby supporting H5. The present study therefore provides longitudinal evidence of time-specific associations and cross-lagged relationships, indicating that support from parents and teachers slows the development of SDI among low-income students throughout compulsory education.

Considering the high level of parent-adolescent conflict documented in low-income families, which is presumed to result in the gradual emotional disengagement of students from their parents (Dashiff et al., 2009), we hypothesized that the benefits of parental autonomy support would diminish over time and be replaced by an increasing preference for teacher support (H2). Our findings however did not support this hypothesis. While low-income households often favor authoritarian educational approaches (e.g., Dodge et al., 1994; Gurland & Grolnick, 2005; Hanson & Chen, 2007), our results suggest that when they adopt autonomy-supportive behaviors, it helps maintain the commitment of low-income students to schooling throughout compulsory education. The positive effects of teachers' autonomy support also seem to remain consistent over time. This indicates that both parents and teachers can offer distinct and complementary contributions toward mitigating the increase of SDI among low-income students during compulsory education. These findings align with cross-sectional studies on the general population (e.g. Alivernini & Lucidi, 2011; Vallerand et al., 1997) that have highlighted the association between student dropout and support received by parents and teachers. For the first time, we provide longitudinal evidence of the protective effects of these supports specifically during the compulsory education period, examining both their time-specific associations with SDI and their temporal precedence over dropout intentions.

As regards peers, our findings were in line with the hypothesis that friendship in the school context would not be associated with a decrease in SDI (H3a). Fostering and nurturing friendships require time, which is a finite resource (Hall, 2019). Although positive peer relationships are vital for mental health and happiness (Demir et al., 2015) and have been shown in the general population to serve as a protective factor (for a review, Ripamonti, 2018), maintaining such friendships in the school context might have the unintended effect of diverting students' interests and energy away from their academic activities (Alivernini et al., 2023). The consequence appears to be that peer friendships at school have competing effects on the decision to leave school, resulting in statistically non-significant coefficients.

Low-income students have been shown to be more at risk of being socially marginalized than their more affluent peers (Cavicchiolo et al., 2022, 2023). Social exclusion can take implicit or subtle forms, such as being ignored by one's peers or not being included in the social activities of classmates (Plenty & Jonsson, 2017). While this kind of non-acceptance by the peer group poses risks to positive adjustment and well-being in adolescence (Alivernini et al., 2023; Alivernini, Cavicchiolo, Girelli, et al., 2019), our results suggest that it is not sufficient to trigger SDI during the period of compulsory education. Those peer relationships that do appear to be relevant with regard to school dropout intention are the more explicit forms of social exclusion involved in victimization at school. Being the target of bullying, harassment, physical aggression, verbal abuse, or other forms of intentional harm inflicted by one or more schoolmates predicted higher SDI throughout compulsory education. One explanation is that being victimized at school is much more severe than social marginalization due to non-acceptance by the peer group and it can therefore lead to a more extreme response, such as the decision to leave school. Our results align with findings from the general student population showing that victimization is associated with dropout (Ripamonti, 2018). Building on existing research (e.g., Finkelhor, 2008; Peguero, 2011; Peguero et al., 2021; Popp et al., 2014), and consistent with studies demonstrating that feeling bullied or harassed is associated with dropout among adolescents (Cornell et al., 2013), our longitudinal findings provide new evidence of the temporal precedence of victimization over dropout intentions during

compulsory education in low-income student populations. Specifically (in line with our H5), we found that victimization serves as an antecedent of school dropout intention. This temporal ordering strengthens the inference that victimization acts as a risk factor that contributes to the development of dropout intentions over time, rather than simply being associated with them.

Finally, we hypothesized that the negative effects of social exclusion would have risen with the age of students, due to its increasing importance throughout adolescence (H3b) (Plenty & Jonsson, 2017). However, we found no evidence for such a process: victimization appears to increase SDI starting from childhood and it acts in a constant negative way throughout compulsory education.

5.4. The role of psychological factors in the development of school dropout intention

In the literature on the general student population, the decision to drop out of school has consistently been linked to students' self-evaluation and academic motivation. In the present study, we investigated the role of psychological factors in the development of SDI during compulsory education. Our results showed a protective time-specific role of psychological resources in reducing SDI and provided evidence of the temporal precedence of these factors over SDI, thus supporting H5. School dropout, like other complex behaviors, requires a certain amount of planning. Therefore, it is plausible that a prior decision and intention precede the actual behavior. Since SDI captures dropout intention, psychological resources that shape such intentions (i.e., self-esteem and autonomous motivations) logically precede SDI in the temporal sequence, and our results support this claim.

While self-efficacy and self-esteem are both components of students' self-evaluation, prior research has not clearly established which of the two is more relevant in relation to SDI. Existing studies on self-efficacy in this context have been limited to high school samples, have not adopted longitudinal designs, and have not controlled for students' general self-evaluations (i.e., self-esteem) or for objective indicators of economic deprivation. Our study shows that when these factors are taken into account, there is no evidence of a significant association between self-efficacy and SDI during compulsory education. This finding is consistent with recent research conducted with general high school populations (Samuel & Burger, 2020) and suggests that domain-specific efficacy beliefs may have a limited role in preventing school dropout during early adolescence.

In contrast, self-esteem consistently predicted lower levels of SDI across the entire study period. This result aligns with previous evidence showing that a positive sense of general self-worth serves as a protective factor against dropout intentions (Gubbels et al., 2019; Lawrence & Adebawale, 2023; Rumberger & Lim, 2008). Importantly, this pattern appears particularly salient for students from low-income families, who often experience a marked decline in self-esteem during adolescence, likely due to perceptions of belonging to a socially disadvantaged group (Rhodes et al., 2004). Overall, the results indicate that students' global evaluations of self-worth may play a more substantial role in preventing school dropout than their beliefs in specific academic competencies. One possible explanation is that low-income students frequently encounter structural barriers, reduced access to academic resources, and limited opportunities to influence school outcomes (Jensen, 2009). Under such conditions, they may rely more strongly on global self-evaluations, such as self-esteem, rather than on domain-specific competence beliefs (Crocker & Knight, 2005; Evans & Kim, 2013).

As regards academic motivation, previous research indicates that low-income students experience a specific form of motivational decline during adolescence, pertaining to goal-directed regulation in the academic domain (Alivernini et al., 2023). We therefore hypothesized that identified motivation would have a more important role in countering the intention to drop out of school than intrinsic motivation (H4). Our results were fully in line with this hypothesis, suggesting that identified

regulation rather than intrinsic motivation is a safeguard against developing SDI in the course of compulsory education. In fact, during this period many learning activities, such as memorizing facts before an exam or doing repetitive exercises in order to interiorize a mathematical procedure or grammar rule, are increasingly necessary aspects of studying, although they lack intrinsic attractiveness for most students. According to Self-Determination Theory, identified motivation in the school context often consists in recognizing such activities as necessary for achieving one's personal goals in the future (Alivernini et al., 2023; de Bilde et al., 2011) and previous studies have shown that identified motivation is particularly important for school performance and adjustment (e.g. Burton et al., 2006). Success at school requires deliberate behaviors (such as studying and doing homework), commitment, and persistence, which depend on students' ability to internalize academic activities as personally meaningful and aligned with valued goals. Our results highlighted the protective role of this form of motivation for students from low-income families. For these students, whose families often face immediate financial pressure and competing demands, the instrumental value of studying may be more salient than intrinsic enjoyment of learning. The findings of our research have extended those of previous studies highlighting the significance of this form of regulation not only for academic achievement (Burton et al., 2006; Koestner & Losier, 2002), but also for reducing the risk of school dropout from a developmental perspective.

6. Strengths and limitations

Our study has some strengths: it is focused on low-income students, a population that is often neglected in longitudinal studies. The inclusion criteria were rigorously based on an objective measure of economic status. We utilized advanced yet parsimonious variable-centered analyses that were guided by theory to address our research questions and test our hypotheses.

In addition to using self-report measures, which are essential for assessing the inherently subjective construct of intention rooted in an individual's internal decision-making process (e.g., Sheeran, 2002), this study also incorporated official records of student absences collected after the end of the observation period and more than two years after the first measurement, when students were still legally required to attend school.

Nevertheless, this study has some limitations that should be considered when interpreting the findings. First, although we employed a longitudinal design to model school dropout intention trajectories, and examine temporal precedence among SDI, educational context variables and psychological factors considering various confounding factors, our study adopted a developmental approach in a real-life context where the usual constraints of observational research apply.

Second, our focus on compulsory education (ages 9–15) among a hard-to-reach population addresses a critical gap by examining dropout intention formation before dropout becomes legally possible. However, findings may not generalize to later developmental periods when students can act on these intentions. Future research should examine whether these patterns persist during upper secondary education (ages 16–19), and explore the role of educational contexts and psychological factors during late adolescence and early adulthood.

Third, our sample was recruited through social centers serving officially recognized low-income families. While this recruitment strategy enabled us to access a vulnerable population otherwise very difficult to identify and follow longitudinally, it raises some questions. Students whose families access these centers may benefit from greater social support and community connections compared to the most isolated low-income families. However, these centers primarily provided recreational opportunities such as sports and physical activities rather than educational support, meaning they did not directly influence the school-related variables examined in our study. Future research could extend data collection to include families not connected to social service

networks, though we acknowledge this presents significant practical and ethical challenges in terms of recruitment and retention. Moreover, to achieve a more comprehensive understanding of the observed motivational patterns and their relationship with dropout intentions, future research could examine additional contextual factors not included in the present study, such as family structure (e.g., single-parent families) and community environment characteristics (e.g., crime rates).

Fourth, in our study we conducted separate analyses for educational context variables and psychological factors. This approach was necessary to capture the total effects of each set of variables, as including both types as simultaneous predictors in a single model, without explicitly modeling mediational relationships, would have introduced over-adjustment bias (Pearl, 2009; Schisterman et al., 2009). Future research with larger samples could develop more comprehensive models that formally test the mediational pathways through which contextual factors influence dropout intentions via psychological processes. However, formally testing these mediational pathways in our longitudinal design would have required substantially larger sample sizes to obtain reliable solutions, given the considerable model complexity from estimating direct and indirect effects across multiple measurement waves. This would be particularly challenging given the hard-to-reach nature of this vulnerable population. Finally, our study relied on objective measures to define the population of interest and assess the distal outcome, while internationally validated scales were used to capture psychological factors, educational context, and SDI. These scales were selected because self-report instruments are essential for capturing constructs that are inherently subjective and best understood from the individual's perspective. However, they cannot be considered entirely immune to social desirability or self-presentation effects. Future research could therefore benefit from complementing self-report measures with observational or behavioral data, such as classroom behavior, engagement indicators, or teacher-reported measures, to provide a more comprehensive and multi-informant understanding of the processes underlying school dropout intention.

7. Conclusions

Students from economically deprived families face a particularly high risk of school dropout. However, longitudinal research on this phenomenon is lacking, likely due to difficulties in reaching the target population. Through a complementary analytic approach combining latent growth modeling (LGM) and Autoregressive Latent Trajectory (ALT) models, we examined both the developmental patterns and the directional relationships between educational context variables, psychological factors, and school dropout intention throughout compulsory education. Our findings reveal that school dropout intention increases over time. Surprisingly, contrary to expectations, this increase does not become more pronounced as students approach the legal age for potential dropout; instead, the growth in dropout intentions remains consistent throughout mandatory schooling.

Psychological resources such as students' identified motivation and self-esteem appear to play crucial roles. Furthermore, our findings underscore the significant impact of teacher and parental autonomy support on weakening school dropout intention throughout compulsory schooling. The peer relationships that seem to be particularly relevant as regards strategic interventions are those that involve the forms of overt social exclusion associated with victimization at school.

Overall, the study's findings suggest that dropout-prevention efforts for low-income students should begin early and continue throughout compulsory schooling, rather than focusing solely on the high school years. School-based interventions should prioritize strengthening autonomy-supportive teaching, a practice consistently shown to enhance students' engagement and well-being (Reeve, 2009, 2016; Reeve & Cheon, 2014, 2021). Autonomy-supportive teaching involves a range of practices, such as taking students' perspectives, offering meaningful choices, encouraging personal interests, and providing

explanatory rationales while avoiding pressuring language, which serve as illustrative examples of teachers' motivational behaviors (see Ahmadi et al., 2023, for a detailed description).

Previous evidence suggests that these practices not only foster identified and intrinsic motivation, but can also reduce peer victimization (Roth et al., 2011) and improve students' self-esteem (Tan et al., 2024). A major advantage of autonomy support is that it can be strengthened through teacher professional development alone, without requiring additional structural and economic resources, an important consideration for schools serving disadvantaged communities (Alivernini et al., 2016).

Educational relevance and implications statement

School Dropout Intention (SDI) increased gradually throughout compulsory education among low-income students, without accelerating as they approached the legal dropout age. Psychological resources such as identified motivation and self-esteem served as crucial protective factors. The educational context (i.e. teacher and parental autonomy support) also played a significant role in reducing SDI over time. These findings suggest that prevention efforts for this population should begin early and be sustained consistently, rather than focusing solely on the high school years.

CRediT authorship contribution statement

Elisa Cavicchiolo: Writing – review & editing, Writing – original draft, Visualization, Supervision, Methodology, Investigation, Formal analysis, Conceptualization. **Sara Manganelli:** Writing – review & editing, Investigation, Data curation. **Fabio Lucidi:** Writing – review & editing, Validation, Investigation. **Fabio Alivernini:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Investigation, Conceptualization.

Compliance with ethical standards

All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional research committee of the last author and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Declaration of competing interest

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.lindif.2026.102887>.

Data availability

Materials and analysis code for this study are available from the corresponding author upon reasonable request.

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