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REVIEW OF THE LITERATURE

Determinants of academic achievement from the middle to secondary school education: A systematic review

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Abstract

Because it is crucial for psychosocial adjustment and lifelong learning, education is the most relevant tool for ensuring inclusion and reducing inequalities. Due to its relationship with positive outcomes, such as life satisfaction, mental health, job performance or SES, academic achievement is a significant phenomenon that impacts students, families, and educational institutions. The present study sought to contribute to the field by reviewing the literature on the determinants that influence the objective achievements of a typical population of middle- to high-school students. Based on the PRISMA statement, a search for related studies was performed in the WoS, EBSCO, and PubMed databases, and 771 studies published between 1930 and 2022 were identified. After screening based on the analysis of abstracts, 35 studies met the selection criteria. The Bronfenbrenner ecological model served as the theoretical rationale for organizing the studies' findings. The results of this review highlight the following determinants of school achievement: (i) Personal factors—gender, personality traits, cognitive abilities and academic background, motivation and self-constructs, stress and problem-solving strategies, and substance use; (ii) Contextual microsystem factors—(a) Family—parental educational background; parenting practices and interactions; parental involvement and support; (b) School—school location; school conditions, responsiveness, and practices; (c) Peers—peer-group disagreement management. This systematic review updates the existing

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empirical evidence on this topic and highlights the complexity of the phenomenon of academic achievement.

Keywords Academic achievement · Personal factors · Contextual factors · Middle school · High school

1 Introduction

Researchers worldwide have been interested in assessing academic achievement because of its immediate influence on decisions about schooling and work as well as its long-term impact on different aspects of an individual's life (Kelly & Donaldson, 2016). The importance of academic achievement can be observed in the growing global phenomenon of additional instruction to complement obligatory school hours (e.g., Zhang & Bray, 2017) and even to complete higher education (OECD, 2022). Private tutoring and after-school programs seem to deepen students' understanding of certain subjects and promote academic performance, motivation, and socioemotional outcomes (Korpershoek et al., 2016; Kuger et al., 2016).

The literature provides both theoretical and empirical support for the idea that academic success is a multidimensional construct, with both objective and subjective dimensions contributing to its explanation (Araújo, 2017). While the subjective/experiential aspects include students' academic satisfaction with different domains at the individual and school group levels and their sense of personal development and engagement, the objective indicators of academic success correspond to academic achievement and are assessed by objective and quantifiable indicators, including general indicators such as procedural and declarative knowledge acquired by school systems, curricular grades or performance in educational tests, and progression to school academic levels, academic degrees and certificates (Araújo, 2017; Steinmayr et al., 2014). Although the complexity of the factors influencing academic success has been recognized, over time, the literature has paid particular attention to the more limited area of objective indicators, i.e., academic achievement (Cachia et al., 2018). Academic achievement tends to represent intellectual endeavour and therefore reflects, to a greater or lesser extent, an individual's intellectual capacity (Steinmayr et al., 2014).

This prevailing perspective has led to academic achievement being valued academically, professionally and socially (Cachia et al., 2018). Indeed, academic achievement (measured by GPA or standardized educational assessments) is a determinant of students' educational trajectories and, depending on the degrees and levels of achievement attained, can influence higher-education choices and career paths (Steinmayr et al., 2014), which can impact societal development in the long run. In addition, different reviews have supported the link between academic achievement and other positive life outcomes, such as life satisfaction and well-being (e.g., Bücker et al., 2018; Crede et al., 2015; Ng et al., 2015), mental health (e.g., Agnafors et al., 2021; Eisenberg et al., 2009) and/or career potential, job performance (Kuncel et al., 2004) and SES (Liu et al., 2022; Selvitopu & Kaya, 2023).

Nonetheless, students' academic achievement is influenced by a multitude of diverse factors (Dings & Spinath, 2021) that may be closely associated with each other. Identifying these factors can be a particularly complex task (Gilar-Corbi et al., 2019). Therefore, this study aims to extend the understanding of the determinants of academic achievement from middle school to secondary school since it is crucial to produce tailored prevention and intervention efforts to address the associated risks and promote the engagement and accomplishments of these students.

1.1 Factors linked to academic achievement

Many studies conducted in recent years have proposed models that aim to identify the variables that influence students' academic achievement. In general, the extensive variables investigated in various independent studies can be divided into four major groups: students' personal factors, family, school, and broader social variables (Gilar-Corbi et al., 2019).

Regarding students' personal factors, studies have focused on features such as gender and age (Pennington et al., 2021; Tsaousis & Alghamdi, 2022) or lifestyle-related factors such as health, diet, exercise, sleep, and drug use (Bugbee et al., 2019; Bugueño et al., 2017; Burrows et al., 2017; Zhang et al., 2022). The literature in the field also encompasses vast research on the psychological and motivational aspects that affect achievement, such as students' self-esteem, self-concept (Cheng, 2023; Steinmayr et al., 2019; Van der Beek et al., 2017), self-control, self-regulation, attributional style (Duckworth et al., 2019; Sahranavard et al., 2018), and orientation toward excellence (Martin et al., 2016). Moreover, emotional variables that can influence students' performance, such as anxiety and humor (Camacho-Morles et al., 2021; Ford et al., 2012; Horn et al., 2021) or school-related feelings, have also been addressed. In addition, cognitive-related skills and intelligence (Finn et al., 2014; Lozano-Blasco et al., 2022), previous academic performance (Cordero & Manchón, 2014; Marks, 2023; Nath, 2012; Piñero et al., 2019), and study habits (Nath, 2012; Piñero et al., 2019) have been investigated.

The second type of factor related to academic attainment is family-related. Family-related factors encompass the family's socioeconomic condition (Broer et al., 2019; Nath, 2012; Selvitopuhttps & Kaya, 2021), parents' educational level and professional situation (Nath, 2012; Nunes et al., 2023; Shoukat et al., 2013), and family structure and dynamics (Chiu & Xihua, 2008; Shoukat et al., 2013). Support, supervision, and involvement from parents (Brajša-Žganec et al., 2019; Lara & Saraccostti, 2019) as well as the value assigned to studying (Nath, 2012; Nunes et al., 2023; Sahranavard et al., 2018) were the most addressed family factors of students' academic outcomes.

The third group of academic achievement indicators is school-related. The literature on these factors is somewhat inconclusive, with certain studies having found effects of these dimensions on academic achievement (Moreira et al., 2018; Spreitzer & Hafner, 2023), whereas others have argued that their influence is negligible or nonexistent (Hojo, 2012; Nath, 2012). Within this broader group, specific variables

related to teaching practices (Gess-Newsome et al., 2019; Nath, 2012; Tomaszewski et al., 2022) have been identified in the literature. Moreover, the curriculum and learning opportunities provided by the school (Sahranavard et al., 2018) as well as school size and the teacher-to-student ratio (Cunningham et al., 2019; Nath, 2012) have also been shown to influence students' achievement. Another important variable considered in research is the school environment and climate (Cardoso et al., 2011; Maxwell et al., 2017), which, if positive and secure, seems to positively impact academic achievement (Zysberg et al., 2021), while negative attitudes tend to hinder student engagement, causing poorer academic achievement (Forsberg et al., 2021).

Finally, there is less specificity regarding the broader social factors that influence academic achievement in the literature, possibly because they are associated with other groups of factors. Nonetheless, research has identified the school's context and connection to the neighborhood (Ruiz et al., 2018; Xuan et al., 2019), the student's area of residence (Nath, 2012), or even the school's identity and culture (Hansen et al., 2022; Karvonen et al., 2018; Nath, 2012) as relevant correlates of academic achievement.

Researchers have tried to identify different possible predictors of achievement, and recent reviews and meta-analyses have explored the best predictors of high school achievement (Nunes et al., 2022) and tested the effect of interventions directed toward underachieving students (Snyder et al., 2019).

Based on the assumption that for any individual development to occur, interactions between personal characteristics and the environment over time are necessary (Bronfenbrenner, 1989), Bronfenbrenner's bioecological systems theory provides a comprehensive understanding of the various levels of influence on academic achievement. This model advocates that individuals are both influenced by and influencers of environmental contingences. According to Bronfenbrenner and Morris (1998), environmental contingencies are structured into 5 systems—the micro-, meso-, exo-, macro-, and chronosystems—as follows. The microsystem is a set of interpersonal relationships experienced in face-to-face environments. The mesosystem is a set of two or more settings that involve the person in development and together influence his or her development. The exosystem includes settings that do not directly involve the person but whose events affect or are affected by the person. The macrosystem includes cultural beliefs, political forces and lifestyles that interact with the individual. Finally, the chronosystem involves the passage of time through life and history. While interrelationships among various environments may have indirect effects on developing people, interactions at the microsystem level may have direct effects (Bronfenbrenner, 1979).

In particular, bioecological systems theory has proven to be a useful means for discussing findings on independent topics related to academic achievement, such as family involvement and the home environment (e.g., Kocayörük, 2016; McBride et al., 2013; Mimrot, 2016), family-school relationships (e.g., Blandin, 2017; Hampden-Thompson & Galindo, 2017), school climate, neighborhood context and sense of belonging (Ruiz et al., 2018; Zaatari & Maalouf, 2022). Thus, this theory

provides a relevant framework for studying academic achievement from a comprehensive and ecological perspective by acknowledging the dynamics of change in academic achievement, the active role of the individual in his or her development and the interactions between person and context. However, to the best of our knowledge, no study has systematically reviewed the determinants of academic achievement from middle to high school considering bioecological systems theory. To address this need, the present study intends to contribute to the field by integrating the diverse literature and systematizing the research on the determinants of academic objective achievement in a typical student population attending middle to high school. In addition to contributing to early detection, practical preventive measures can be implemented at an early stage of the underachievement pathway (Snyder et al., 2021), considering the lower efficacy in high school and postsecondary education (Snyder et al., 2019). Therefore, this systematic review aimed to answer the following research question: what are the determinants of the academic objective achievement of typical students from middle to high school?

2 Method

2.1 Search strategy

Studies were identified through a search of EBSCO, PubMed, and Web of Science. The reference lists of the selected studies were also reviewed to identify other relevant studies. The search equation in EBSCO was as follows: TI ("school failure" OR "academic failure" OR "school underachievement" OR "educational underachievement" OR "academic underachievement" OR "academic achievement" OR "academic success" OR "school success") AND TI (predictor* OR indicator* OR factor* OR determinant* OR correlation*). In PubMed, the search equation was ("school failure"[Title] OR "academic failure"[Title] OR "school underachievement"[Title] OR "educational underachievement"[Title] OR "academic underachievement"[Title] OR "academic achievement"[Title] OR "academic success"[Title] OR "school success"[Title]) AND (predictor*[Title] OR indicator*[Title] OR factor*[Title] OR determinant*[Title] OR correlation*[Title]). In Web of Science, the search equation was TI = ("school failure" OR "academic failure" OR "school underachievement" OR "educational underachievement" OR "academic underachievement" OR "academic achievement" OR "academic success" OR "school success") AND TI = (predictor* OR indicator* OR factor* OR determinant* OR correlation*).

2.2 Study selection

Studies were considered for analysis if they met the following inclusion criteria: (a) the participants were aged 10–18 years (the general population attending middle to high school); (b) they were empirical studies; and (c) they included objective outcomes of students' achievement (e.g., GPA, grades, test scores). The exclusion

criteria were (1) wrong publication type—case studies, single-case designs, qualitative studies, book chapters, theoretical essays, and systematic reviews with or without meta-analysis; (2) wrong population—preschool, primary school, higher education, vocational training, or specific populations (e.g., gifted students, students with disabilities, refugees, Latinos); and (3) wrong outcome—studies that did not mention the outcome variable of interest (e.g., studies that did not cover objective indicators of achievement, e.g., GPA, grades, test scores). The search was restricted by linguistic factors (e.g., Portuguese, English, Spanish, or French). Duplicate articles were excluded.

The studies were selected by two independent reviewers (DM and JC) based on titles and abstracts, according to recommendations from the PRISMA guidelines (Moher et al., 2010; Shamseer et al., 2015) and the established criteria.

The agreement index in the study selection process was assessed with Cohen's kappa, which revealed almost perfect agreement: $K = 0.94$, $p < 0.001$ (Landis & Koch, 1977). Disagreements among the reviewers were discussed and resolved by consensus.

2.3 Identification and screening

Through the database searches, a total of 771 studies published between 1930 and 2022 were identified. Of the 771 studies, 693 were excluded, and 78 were considered for full-text analysis. Of the latter, 43 articles were eliminated for the following reasons: wrong outcome ($n = 37$) and wrong population ($n = 6$). After full-text analysis, 35 articles were retained for this review (Fig. 1). In total, 35 articles were included. The objectives, sample (N, age, % male, academic grade, and country), and main findings were extracted from each study. The Bronfenbrenner model served as the theoretical rationale for organizing the studies' findings.

3 Results

The review identified 36 studies examining determinants of academic achievement. A summary of the studies' characteristics is presented in Table 1. Based on the Bronfenbrenner model, the studies' results were organized according to personal factors and contextual factors. The contextual factors covered only the microsystem, i.e., the family, school and peer group levels. Table 2 presents the main factors and findings of the studies on academic achievement at the system level.

3.1 Personal factors

One of the most studied spheres of influence on academic achievement is at the individual level. Consistent with the literature, the present study found that the majority of the research was focused on determining the degree of influence of

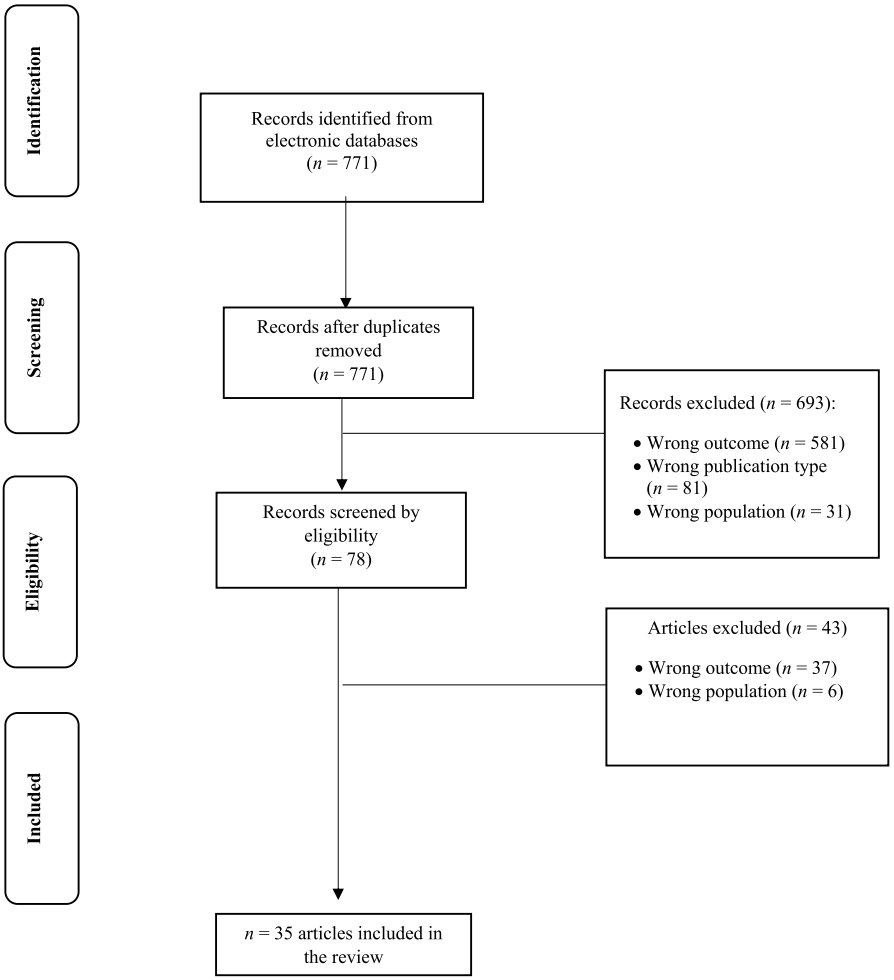

Fig. 1 Flowchart of literature review process

different students' personal factors, whether biological, cognitive, personality-related, psychological or academic, on academic achievement.

3.1.1 Gender and gender stereotyping

The literature has highlighted the significance of gender differences in academic achievement. Heyder and Kessels (2013), who investigated both gender and gender stereotyping effects in school, found that boys presented relatively lower academic achievement than girls. The authors argued that a certain "feminization" of

Table 1 Summary of studies' characteristics and main findings

Study ID	Objectives	Sample					Main findings
		N/Country	Age	% male	School/Academic year	Country	
Abad and López (2016)	To present a statistical procedure used to detect factors linked to academic achievement in large-scale assessments	18,935	11–15 years		First, second, and third grade of secondary education	Mexico	Data mining techniques (decision trees and J48 algorithm) solid to detect factors related to academic performance Most significant factors related to student: self-esteem, learning strategies, home conditions, reading habits, general health (health and diet), drug use
Börkan and Bakis (2016)	To discuss student and school factors, including cross level interaction, that cause inequalities in seven and eighth grade students' achievement in Turkish context by using national achievement test scores with a multi-level statistical approach	185,487	Mage 7th grade = 12.18 (*SD* = .64) Mage 8th grade = 13.16 (*SD* = .64)	51.9% and 52.5% (7th and 8th grade)	7th–8th grades	Turkey	The results show that approximately 17% of the variation in student test scores is explained by differences between schools, while the remainder of the variation is accounted for by within-school factors. The results highlight that student-level variables alone explain nearly 73% of the between-school variance and approximately 19% of the within-school variance in student achievement scores. Our school-level variables explain a relatively small amount of the variation, approximately 5%. This has demonstrated that between- and within-school differences in student achievement are largely accounted for by the socio-demographic background of students
Bilge et al. (2014)	To evaluate if high school students' perceptions of burnout and school engagement show significant differences according to their study habits, self-efficacy beliefs, and academic success	605	*M* = 16.33 (*SD* = 1.11)	43.1%	High school, 9th–12th grade	Turkey	Students with adequate study skills and high self-efficacy beliefs had high school engagement levels. Students with higher levels of self-efficacy present better academic performance. Students that present lower self-efficacy beliefs had higher levels of burnout, higher risk of losing their beliefs. Students with inadequate study skills and low self-efficacy beliefs were found to have high self-efficacy

Table 1 (continued)

Study ID	Objectives	Sample					Main findings
		N/Country	Age	% male	School/Academic year	Country	
Choe (2020)	To examine the inconsistencies in parents' and adolescents' reports of parental support, and how each report influences on adolescents' academics achievement and self-regulated learning	6,370	13 years	49%	7th grade	Korea	Reports of parents and adolescents diverged when it came to perceived parental support. Academic support as reported by parents was the strongest predictor of academic achievement in adolescents. Parental support as reported by adolescents had a greater association with better academic performance when compared to parental reporting
Dickhäuser et al. (2016)	To investigate achievement goals as mediating constructs linking students' distal motivational dispositions to their intrinsic motivation and academic achievement	288	17–19 years ($M = 17.7$; $SD = 0.58$)	42.7%	High school	Germany	Structural equation modeling revealed significant indirect effects of students' motivational dispositions on their intrinsic motivation and achievement via achievement goals. Fear of failure and perceived competence accounted for achievement via performance-approach goals. These effects held stable after controlling for prior achievement. There is evidence for multiplicative effects among motivational dispositions in predicting achievement goals: fear of failure moderated the effects of hope of success on mastery goals
Gangolu (2019)	To investigate the personal adjustment and parental involvement	480	13–19 years	50%	High school	India	Good parental involvement and personal adjustment have a significant positive impact on academic performance. Other factors are correlated with Academic achievement, such as teacher quality and the alignment of curriculum

Table 1 (continued)

Study ID	Objectives	Sample					Main findings
		N/Country	Age	% male	School/Academic year	Country	
Ghazarian and Buehler (2010)	To examine direct and indirect associations between interparental conflict and youth academic achievement	2,297	($M = 11.92$; $SD = 0.73$)	48%	6th grade	USA	Family interactions present a significant impact on young people performance. Interparental conflict was a risk factor for poorer academic performance. Youth self-blame acted as a significant mediator, providing some explanation for how interparental conflict affects academic achievement. Maternal acceptance and monitoring knowledge partially buffered the association between interparental conflict and youth self-blame The positive association between interparental conflict and perceived threat was stronger for youth who perceived relationships with mothers as more supportive, connected, and involved
Ginsburg and Bronstein (1993)	To examine three parental/family factors (parental surveillance of homework, parental reactions to both good and bad grades, and styles of family interaction) in relation to fifth graders' intrinsic/extrinsic motivational orientation in the classroom and academic performance	93	9–12 years ($M = 10.70$)	45.2%	5th grade	USA	Higher parental surveillance of homework, parental reactions to grades that included negative control, uninvolvement, or extrinsic reward, and over- and undercontrolling family styles were found to be related to an extrinsic motivational orientation and to lower academic performance. On the other hand, parental encouragement in response to grades children received was associated with an intrinsic motivational orientation, and autonomy-supporting family styles were associated with intrinsic motivation and higher academic performance. In addition, socioeconomic level was a significant predictor of motivational orientation and academic performance

Table 1 (continued)

Study ID	Objectives	Sample					Main findings
		N/Country	Age	% male	School/Academic year	Country	
Hansen and Gustafsson (2015)	To identify determinants and mechanisms that can explain the substantial variation found in the relationship between parental education and school achievement across the 37 countries in the previous study of Gustafsson et al. (2011)	–	–	–	4th grade	37 countries	We found different patterns of relations with the direct and the indirect effects of parental education, and the direct and indirect effects therefore tended to cancel, so that small or no total effects were found. We also found opposite results when we investigated bivariate correlations and when we investigated partial correlation with HDI and Gini
Hamlen (2014)	To investigate relationships between strategies students, use to overcome challenges in both video games and homework assignments, and whether these are predictors of academic performance in school	113	12–44 years	59%	Middle and high school	USA	Video game strategies and GPA was significant with five individual strategies being significantly related to GPA Homework strategies and GPA was not significant, with no individual strategies being significantly related to GPA
Heyder and Kessels (2013)	To test for implicit gender stereotyping of school and its impact on boys' achievement	122	$M = 14.34$ ($SD = 0.54$)	46.7%	9th grade	Germany	Students associated school more strongly with female than with male, and that this association of school with female was related to boys' academic achievement. The more strongly boys associated school with female and the more they ascribed negative masculine traits to themselves, the lower their grades in German were. Boys' academic achievement in math was unrelated to the extent to which they perceived school as feminine and themselves as masculine. Girls' grades in both German and math were unrelated to their gender stereotyping of school

Table 1 (continued)

Study ID	Objectives	Sample					Main findings
		N/Country	Age	% male	School/Academic year	Country	
Hortaçsu and Üner (1993)	To show the relationships between contextual variables, individual variables, and academic achievement in a sample of Turkish primary school children	417	$M = 11.37$ ($SD = 0.67$)	53.0%	5th grade	Turkey	The analyses indicated that sociometric measures explained a substantial amount of variation in academic achievement. Perceptions of control emerged as significant predictors of popularity, but not of rejection measures. Parental educational background emerged as a significant predictor of perceptions of control. Both parental educational background and perceptions of control seemed to exert direct and indirect effects on children's grade point averages. The results partially support contextual explanations of academic achievement
Karbach et al. (2013)	To examine perceived parental involvement, according to four distinct dimensions: emotional responsivity, autonomy supporting behavior, structure, and achievement-oriented control	334	10-14 years ($M = 12.4$; $SD = 0.90$)	49.4%	High school	Germany	Autonomy supporting behavior and emotional responsivity were predictors of general cognitive ability, and that high levels of achievement-oriented control and structure were unfavorable to academic success

Table 1 (continued)

Study ID	Objectives	Sample					Main findings
		N/Country	Age	% male	School/Academic year	Country	
Laidra et al. (2007)	To document how intelligence and personality relate to academic achievement in Estonian schools, from elementary to secondary level	2,746	11–19 years ($M = 14.90$; $SD = 2.00$)	46.6%	6th,8th,10th and 12th	Estonia	Intelligence was found to be the best predictor of students' GPA in all grades. Among personality traits, Openness, Agreeableness, and Conscientiousness correlated positively and Neuroticism correlated negatively with GPA in almost every grade. When all measured variables were entered together into a regression model, intelligence was still the strongest predictor of GPA, being followed by Conscientiousness in Grades 6 to 12. Interactions between predictor variables and age accounted for only a small percentage of variance in GPA, suggesting that academic achievement relies basically on the same mechanisms through the school years
Licht and Dweck (1984)	To understand individual differences in different academic subjects, by simulating the differences between these subjects (e.g., mathematics vs. verbal subjects)	94	–	60.6%	5th grade	USA	When more confusing material was presented in the beginning, students with an attributional style toward "mastery" exhibited better performance than students with a "helpless" style. Nonetheless, if a similar learning task was presented without the confusing material, both students groups revealed equal levels of ease in learning the material Differences in achievement may be due to the fit between achievement orientations and the demands of certain skill areas

Table 1 (continued)

Study ID	Objectives	Sample					Main findings
		N/Country	Age	% male	School/Academic year	Country	
Loeb et al. (2019)	To examine adolescent autonomy and relatedness during disagreements with friends as factors likely to predict academic achievement during the transition to high school and academic attainment into early adulthood	184	–	46.7%	8th grades	USA	The results showed that autonomy and relatedness at age 13 predicted relative GPA increases, from ages 13 to 15, and greater academic attainment by age 29. These findings persisted after accounting for peer acceptance, social competence, scholastic competence, externalizing and depressive symptoms, which suggests an essential role for autonomy, and relatedness in helping adolescents navigate challenges and obstacles in the transition to high school and into adulthood
Lucio et al. (2011)	To develop a comprehensive index of school related factors which could predict academic achievement among high school students	217	($M = 17$; $SD = 1.22$)	20.3%	High school	USA	The three factors of attendance, grade retention, and school behaviors present as risk only factors. Two factors, academic self-efficacy and academic expectations had both risk and protective components, and music instruction was found to be protective only. Having been exposed to music, either by playing an instrument or having music classes can serve to buffer these risks. Other factors, such as believing in one's capability to complete schoolwork and thinking that one will progress far in their education can have a positive or negative impact on achievement
Lucio et al. (2012)	To identify the point at which individuals become at risk for academic failure	14,796	($M = 16.48$; $SD = 0.48$)	49.8%	–	USA	Student's GPA is related to academic engagement, academic expectations, academic self-efficacy, homework completion, school relevance, school safety, teacher relationships (positive relationship), grade retention, school mobility, and school misbehaviors (negative relationship)

Table 1 (continued)

Study ID	Objectives	Sample					Main findings
		N/Country	Age	% male	School/Academic year	Country	
Martínez-Vicente et al., (2019)	To analyze associations between daily childhood stress, learning strategies and academic motivation, by analyzing how they differ across 3 achievement groups (low, medium, and high), and the predictive ability of these groupings	535	9–12 ($M = 10.72$; $SD = 0.67$)		Primary school		Positive, significant relationships between all the variables pertaining to learning and academic achievement; each of these variables, in turn, had negative, significant relationships with global daily stress (as well as with health, school and family stress). The multivariate discriminant analysis explained the predictive role of complementary strategies, school stress, attitude toward study and self-concept, in different levels of general academic achievement
Mahimuang, (2005)	To demonstrate an approach to measuring the value-added contribution to academic achievement made by education, and to identify the direct and indirect effects of a school's practices and its contexts	1,971	–	–	6th grade	Thailand	The examination of the effect of the individual level variables (including the pupils' background characteristics and the prior achievement), indicated that prior achievement significantly affected its relevant post achievement and at notably higher level compared with other variables. The analysis implies that only the prior achievement of both subjects were the suitable predictors of their relevant post achievement
Maturano and Pizato (2015)	To test a model to predict academic performance, considering academic skills, social skills, behavior problems and perceived school hassles, early childhood education and the socioeconomic background	248	7–9 years ($M = 8.43$; $SD = 0.34$)	50.4%	5th year of elementary school		Academic skills in the 3rd year were the best predictor of outcomes in the 5th year, both in the objective assessment of school contents and in the teacher's appreciation. Social skills predicted academic performance and competence in the 5th grade, reiterating previous findings of positive effects of social skills on school progress during elementary school Social and academic skills assessed in Grade 3 account for 41% and 40% of the variance in academic achievement and academic competence results, respectively. These results contrast with the small predictive power of indicators of adaptive difficulties

Table 1 (continued)

Study ID	Objectives	Sample					Main findings
		N/Country	Age	% male	School/Academic year	Country	
Morosanova et al. (2015)	To examine the impact of intelligence, conscious self-regulation, and cognitive characteristics on academic achievement	406	14–16 years ($M = 15.1$)		8th–11th grades	Russia	Three variables were significant predictors of academic achievement: self-regulation and other regulatory features significantly predicted mathematical performance, conscious self-regulation and intelligence were predictors of academic performance in fields such as humanities, mathematics, and natural sciences
Patte et al. (2017)	To examine the relationship between substance use (marijuana and alcohol) and academic achievement	26,475	13–18 years ($M = 15$; $SD = 1.0$)	47%	9th-12th grade	Canada	Students who used these substances were less likely to have regular attendance in class or finish their homework, and were less prone to achieving high grades, compared to students who did not use these substances. The impact on academic goals varied according to substance and frequency of use
Porfeli et al. (2012)	To study the connections between the work valences of parents, of children and valence perceptions, as well as how these related to the academic interest and performance of the children	326	11 years old ($SD = 1.34$)	48%	4th–8th grades	Italy	Children's perceptions of parents mediate the relationship between parents' and children's self-reported work valences and children's work valences are, in turn, associated with academic interest and achievement. Exist moderating role of gender, with an indication of parental Socialization to work occurring within same-sex parent–child dyads that is not reflected in cross-sex dyads
Romero et al. (2012)	To examine the effects of contextual variables, goals, and self-regulation on academic achievement in a resilience group vs. non-resilience group	120	($M = 16.6$ $SD = 1.81$)	55.8%	High school students	México	Negative contextual variables had a significant impact on academic performance in the non-resilience group, but not in the resilience group because, in this latter group, individual variables (e.g., self-regulation) mitigated these effects
Sen and Hagtvet (1993)	To examine the relationship among creativity, intelligence, personality, and academic achievement	300	15–16 years ($M = 15.8$)		11th grade	–	Positive relations of creativity and certain personality dimensions (extraversion, theoretical, and aesthetic value pattern), as well as academic achievement

Table 1 (continued)

Study ID	Objectives	Sample					Main findings
		N/Country	Age	% male	School/Academic year	Country	
Smrtnik-Vitulic & Zupancic (2011)	To examine the personality traits of students, rated by distinct informants, and how these traits related to academic performance	209	14–16 years ($M = 14.7$)	39%	8th grade	Slovenia	Variables, conscientiousness, and low extraversion were consistent predictors of GPA
Stankov et al. (2012)	To explore the predictive power of confidence and other self-beliefs on achievement (Maths and English) scores	1,940 (Maths group); 1,786 (English group)	15-year old students (86%)	54.3%	9th grade	Singapore	The results indicated that confidence was a) the best predictor of achievement in both mathematics and English; b) is related to both cognitive and self-belief measures; and c) it captures much of the predictive variance of other self-beliefs that are, in turn, among the best known predictors of achievement
Stankov et al. (2014)	To identify non-cognitive predictors of academic achievement, focusing mainly on self-efficacy, self-concept, and anxiety, in a specific subject: mathematics	598	($M = 15.35$; $SD = 0.46$)	49.5%	Secondary	Malaysia	Confidence explains the majority of the variance in achievement captured by the other self-constructs combined, with psychological adjustment variables not adding much to this equation
Steinmayr et al. (2018)	To investigate whether perceived school climate predicts school grades and Subjective well-being above and beyond other and academic achievement	767	($M = 14.07$; $SD = 0.92$)		8th–9th grade	Germany	Results indicated that a positive school climate as well as self-efficacy and the worry component of test anxiety predicted subjective well-being and/or GPA after all other variables were controlled

Table 1 (continued)

Study ID	Objectives	Sample					Main findings
		N/Country	Age	% male	School/Academic year	Country	
Steinmayr and Spinath, (2009)	To examine to which extent different motivational concepts contribute to the prediction of school achievement among adolescent students independently from intelligence	342	16–19 years ($M = 16.94$; $SD = .71$)	40.4%	11th–12th grade	Germany	Beyond intelligence, different motivational constructs incrementally contributed to the prediction of school achievement. Domain-specific ability self-perceptions and values showed the highest increments whereas achievement motives and goal orientations explained less additional variance. Even when prior achievement was controlled, some motivational concepts still proved to contribute to the prediction of subsequent performance
Theis et al., (2019)	To investigate the relationship between indicators of students' perceived fulfilment of needs and their graded performance to determine whether the connection is indirect via mastery goals	2,105	($M = 10.4$; $SD = 0.61$)		5th grades	Germany	Mastery goals predicted graded performance. However, when perceived fulfilment of needs and mastery goals were analyzed simultaneously, the correlation between mastery goals and graded performance was no longer significant. There was no indirect association between perceived fulfilment of needs and graded performance via mastery goals
Valiente-Barroso et al. (2020)	To test a structural model that includes predictor variables and explanations of academic performance such as learning strategies and academic motivation	210	10–13 ($M = 11.05$; $SD = 0.68$)		5th–6th grade	Spain	Direct relationships between learning and learning strategies academic motivation with delivery, as inverses between childhood stress and academic achievement in Castellano language and Mathematics. Mediator role of learning strategies and academic motivation on child stress, reducing its effects on academic performance
Vrdoljak and Velki (2012)	To examine the possibility to predict academic success based on the level of cognitive and metacognitive development	172	12–14 years ($M = 13.11$; $SD = 0.67$)	50%	7th–8th grade primary school	Croatia	The results have shown that metacognition, apart from intelligence, is a significant predictor of academic success

Table 1 (continued)

Study ID	Objectives	Sample					Main findings
		N/Country	Age	% male	School/Academic year	Country	
Zhu and Mok (2020)	To understand students' participation in ICTPAAI and its relation to academic achievement	6,425	($M = 15.72$)	51.1%	–	China	Use of information and communication technology (ICT) to complete schoolwork, whether in school or outside of school, was positively associated with students' participation in ICTPAAI; however, students' ICT interest, ICT self-efficacy and CT autonomy were not. Students' participation in ICTPAAI was negatively associated with their academic achievement at the end of the school year; much variance was explained at the school level

Table 2 Summary of the main factors and findings of the studies on academic achievement by system level

Level	Systems levels	Study ID	Main factors and findings
Personal factors	Gender	Heyder and Kessels (2013)	Gender and gender stereotyping (female +)
	Personality traits	Sen and Hagtvet (1993)	Creativity (+) Extraversion (+) Aesthetic value (+)
		Smrtnik-Vitulic & Zupancic (2011)	Conscientiousness (+) Extraversion (−)
		Laidra et al. (2007)	Openness (+) Agreeableness (+) Conscientiousness (+) Neuroticism (−)
	Cognitive ability and academic background	Morosanova et al. (2015)	Intelligence (+) Cognitive characteristics (+)
		Laidra et al. (2007)	Intelligence (+)
		Vrdoljak and Velki, (2012)	Metacognition (+)
		Marturano and Pizato (2015)	Previous academic skills (3rd grade) (+ 5th grade)
		Mahimuang (2005)	Prior achievement (at grade 4) (+ grade 6)
		Lucio et al. (2011)	Academic attendance (+) Grade retention (−)
	Motivation and self-constructs	Dickhauser et al. (2016)	Motivational dispositions (+)
		Licht and Dweck (1984)	"Mastery" attributional style (+)
		Steinmayr and Spinath (2009)	Ability self-perception (+) Values (+) achievement motives (+) Goals (+)
		Bilge et al. (2014)	Self-efficacy (+)

Table 2 (continued)

Level	Systems levels	Study ID	Main factors and findings
		Lucio et al. (2011)	Self-efficacy (+) Academic expectations (+)
		Abad and López (2016)	Self-esteem (+)
		Stankov et al. (2012)	Confidence (+)
		Stankov et al. (2014)	Confidence (+)
		Romero et al. (2012)	Goals (+) Self-regulation (+)
	Stress and problem solving strategies	Martínez-Vicente et al. (2019)	Day-to-day stress (−)
		Valiente-Barroso et al. (2020)	Perceived childhood stress (−)
		Marturano and Pizato, (2015)	School stressors in the 3rd grade (- 5th grade)
		Steinmayr et al. (2018)	Worry (anxiety test) (−)
		Hamlen (2014)	Video games problem solving strategies (+)
	Substance use	Patte et al., 2017	Marijuana and alcohol use (−)
		Abad and López (2016)	Drug use (−)
Contextual Microsystem factors	Family	Hortcsu and Ünder (1993)	Parental educational background (+) Parental perceptions of control (+)
		Hansen and Gustafsson (2015)	Parental education (+)
		Ginsburg and Bronstein (1993)	Controlling, critical or punitive, or uninvolved Parental behaviors and family styles (−)

Table 2 (continued)

Level	Systems levels	Study ID	Main factors and findings
		Karbach et al. (2013)	Perceived parental involvement: Emotional responsivity (+) Autonomy supporting behavior (+) Achievement-oriented Control (−) Structure (−)
		Choe (2020)	Parental support (+) Academic support (+)
		Gangolu (2019)	Parental involvement (+) Personal adjustment (+)
		Porfeli et al. (2012)	Children's work valences (+)
		Ghazarian and Buehler (2010)	Interparental conflict (−) Adverse childhood experience (ACE) (-)
	School	Börkan and Bakis (2016)	School level variance (+)
		Mahimuang (2005)	School practices (+) School location (near district education office) (+)
		Lucio et al. (2012)	School safety (+) School belonging (+) School relevance (+) Positive teacher relationships (+)
		Steinmayr et al. (2018)	General school climate (+): Discipline control (ns) Stimulation/activities (+) Warmth (+) Performance orientation (ns)
		Theis et al. (2019)	Perceived fulfilment of needs (+)
		Zhu and Mok (2020)	Participation in internet or computer tutoring with a program or application for additional instruction (ICTPAAI) (−)
	Peers	Loeb et al. (2019)	Autonomy and relatedness during disagreements (+)

schools can lead to dissonance between boys' self-concept and academic engagement, resulting in implicit gender stereotyping of boys' school achievement (Heyder & Kessels, 2013). The results showed that the more intensely boys associated school with females and the more they assigned negative masculine traits to themselves, the lower their grades in the German language subject. For girls, their grades in both German and math were not related to their gender stereotyping of school (Heyder & Kessels, 2013).

3.1.2 Personality

The literature has shown a significant positive relation between different personality features and school achievement. In particular, in Sen and Hagtvet's study (1993), creativity and certain personality dimensions, such as extraversion and theoretical and aesthetic value patterns, were related to academic achievement. Another study examined the personality traits of students rated by distinct groups of informants and how these traits related to academic achievement (measured by GPA). Specifically, self-, maternal and peer reports were collected using the Inventory of Child/Adolescent Individual Differences at two different time periods (at the end of elementary school and two years after high school), and conscientiousness and low extraversion were found to be consistent predictors of GPA (Smrtnik-Vitulic & Zupancic, 2011). Laidra et al. (2007) also reported that personality traits contribute to academic achievement in grades 6 to 12. In particular, openness, agreeableness and conscientiousness were positively correlated and neuroticism was negatively correlated with GPA in almost every grade, while conscientiousness was the strongest predictor of GPA.

3.1.3 Cognitive abilities and academic background

Another personal variable that emerged in this study was the student's cognitive ability. Specifically, Morosanova et al. (2015) conducted studies with two different samples, aiming to examine the impact of intelligence and cognitive characteristics on academic achievement. They found that cognitive characteristics were significant predictors of academic achievement in fields such as humanities, mathematics, and natural sciences (Morosanova et al., 2015). Additionally, Laidra et al. (2007) reported that, compared with students' personality traits, intelligence was the best predictor of students' GPA in all grades, with correlations of approximately 0.5.

Analyzing the influence of cognitive abilities, in general, and metacognition, in particular, Vrdoljak and Velki (2012) also found a positive effect on academic achievement, with students who scored better on metacognition tests also exhibiting higher grades. Moreover, the study of Marturano and Pizato (2015), which aimed to test a performance prediction model among 5th graders using predictors in the 3rd grade, revealed that academic skills in the 3rd grade were a predictor of achievement in the 5th grade (Marturano & Pizato, 2015).

Students' cognitive abilities are likely to influence their academic background and trajectory. Mahimuang (2005) identified at the student's individual level that

students' prior achievement (at grade 4) was the most relevant variable for predicting post achievement (grade 6) and was notably greater than other contextual factors.

Moreover, another study that examined predictors and risk factors for academic failure revealed that student attendance was positive and that grade retention was negatively associated with the cumulative grade point average (GPA; Lucio et al., 2011).

3.1.4 Motivation and self-constructs

Efforts have been made to identify noncognitive predictors of academic achievement. Regarding the impact of motivation on academic achievement, Dickhauser et al. (2016) found that the motivational dispositions of students had significant indirect effects on their intrinsic motivation and academic performance through their achievement goals. This study also revealed that fears regarding the possibility of failure had a moderating effect on the likelihood of success on mastery goals (Dickhäuser et al., 2016). Licht and Dweck (1984) performed a motivational analysis to understand individual differences in different academic subjects (e.g., mathematics vs. verbal subjects). The authors found that when more confusing material was presented in the beginning of a course, students with an attributional style toward "mastery" exhibited better achievement than did students with a "helpless" style. Nonetheless, if a similar learning task was presented without the confusing material, both student groups revealed equal levels of ease in learning the material. Thus, the results suggest that differences in achievement may be due to the fit between achievement orientations and the demands of certain skill areas (Licht & Dweck, 1984).

Steinmayr and Spinath (2009), who investigated the effects of motivation (ability self-perception, values, achievement motives and goals) on school achievement, demonstrated that most motivational constructs contribute to the prediction of school success beyond intelligence. In particular, their findings indicated that domain-specific assessed ability self-concepts and values explained most of the predicted domain-specific achievement variance. In both domains (German and math), ability self-concepts explained even more unique variance than intelligence. Moreover, the two domain-specific ability self-concepts still predicted grades when prior school achievement was controlled for. In this study, motivational constructs nearly explained as much unique variance in general school achievement as intelligence, which supports the authors' perspective that motivation is a predictor of school achievement whose relative importance is at least comparable to intelligence.

The literature has also focused on the relevance of self-constructs to supporting academic achievement. A study by Bilge et al. (2014) that investigated the effect of self-efficacy on students' achievement and burnout revealed that lower self-efficacy among students was associated with greater levels of burnout and a greater risk of losing their beliefs. Conversely, higher levels of self-efficacy were associated with increased academic achievement. Lucio et al. (2011) examined different variables that could be protective against academic failure and found that, independently, both self-efficacy and academic expectations were related to cumulative grade point average (GPA).

In a large study by Abad and López (2016), with a sample of 18,935 high school students from 99 educational institutions in Mexico, students' personal factors were the strongest predictors of academic achievement, and in particular, self-esteem emerged as one of the strongest predictors analyzed. In a study by Stankov et al. (2012), the authors found that confidence was an important psychological construct, as it proved to be a better predictor of achievement than domain-specific (i.e., mathematics, English) measures of self-efficacy, self-concept, and anxiety. In a subsequent study (Stankov et al., 2014), the authors found that students' confidence explained the majority of the variance in mathematics achievement captured by the other self-constructs (self-efficacy and self-concept combined).

Romero et al. (2012) focused on the contextual and individual risk factors that have an impact on academic achievement. Specifically, the authors examined the effects of contextual variables, goals and self-regulation on academic achievement in a resilient group (with higher grades) vs. a nonresilient group (with lower grades) of high school students. The findings indicate that the nonresilient group was more influenced by contextual variables, whereas the resilient group was more affected by individual variables (e.g., self-regulation). That is, negative contextual variables had a significant impact on academic achievement in the nonresilience group but not in the resilience group because in the latter group individual variables (e.g., self-regulation) mitigated these effects (Romero et al., 2012).

3.1.5 Stress and problem-solving strategies

Regarding the impact of affective-motivational variables related to stress, a study by Martínez-Vicente et al. (2019) revealed significant negative relationships between day-to-day stress (in health, school, and family domains) and academic achievement. More recently, a study by Valiente-Barroso et al. (2020) tested whether perceived childhood stress could be a predictor variable for academic achievement. The findings show that childhood stress has an inverse relationship with academic achievement. In addition, findings have indicated that students' learning strategies and academic motivation play a mediating role in child stress by reducing its effects on academic achievement (Valiente-Barroso et al., 2020). Similarly, a study that tested an achievement prediction model among 5th graders using different predictors revealed that the perception of school stressors in the 3rd grade was a predictor of achievement in the 5th grade while controlling for the duration of exposure to early childhood education and socioeconomic conditions (Marturano & Pizato, 2015).

The findings of Steinmayr et al. (2018) for 8th and 9th graders suggested that the worry component of test anxiety was a negative predictor of academic achievement (measured by GPA) and subjective well-being after controlling for all other variables (Steinmayr et al., 2018).

Moreover, Hamlen (2014), who investigated middle and high school students' strategies used to overcome challenges in both video games and homework assignments and whether these strategies are predictors of academic achievement in school, found that the types of strategies students used to overcome homework difficulties were not related to academic GPA, whereas video-game strategies were.

3.1.6 Substance use

A large study examined the relationship between substance use (i.e., of marijuana and alcohol) and academic indices (Patte et al., 2017). The results showed that students who used these substances were less likely to attend class regularly or finish their homework and were less prone to achieve high grades than students who did not use these substances. Moreover, the impact on academic goals varied according to substance and frequency of use.

In the study by Abad and López (2016), among personal, school-related and social factors, drug use was considered to be of paramount importance for academic achievement and was related to all three life domains of students.

3.2 Contextual/social microsystem factors

3.2.1 Family

Regarding family- or parental-related factors, a study by Hortaçsu and Üner (1993) revealed that both parental educational background and perceptions of control had direct and indirect effects on the academic achievement of children.

Hansen and Gustafsson (2015) aimed to understand the variation observed in the relationship between parental education and academic achievement (specifically, reading, mathematics and science achievement) across 37 countries that participated in both the PIRLS and the TIMSS 2011. The authors used the Gini index as a measure of economic inequality levels and the human development index (HDI) as a measure of overall societal development. The results indicated a negative correlation between the Gini index and the indirect effect of parental education on reading achievement and, to a lesser degree, on mathematics achievement (Hansen & Gustafsson, 2015).

In a study by Ginsburg and Bronstein (1993), which investigated familial influence on children's motivational orientation and academic achievement, the authors found that parental behaviors and family styles that control children's independent thinking and behavior—critical or punitive or uninvolved—were associated with a more extrinsic motivational orientation and poorer academic achievement, while parental behaviors and family style that were supportive and encouraging of children's autonomous expression and individual development were related to a more intrinsic motivational orientation and better academic achievement.

Karbach et al. (2013) examined perceived parental involvement according to four distinct dimensions: emotional responsivity, autonomy-supporting behavior, structure, and achievement-oriented control. The results showed that autonomy-supporting behavior and emotional responsivity were predictors of general cognitive ability and that high levels of achievement-oriented control and structure were unfavorable to academic achievement (Karbach et al., 2013). Similarly, a study by Choe (2020) revealed that reports of parents and adolescents diverged in regard to perceived parental support. Specifically, parental support reported by adolescents was more strongly associated with better academic achievement than parental support;

however, academic support reported by parents was the strongest predictor of academic achievement in adolescents (Choe, 2020). Additionally, a study by Gangolu (2019) focused on adolescents (as adolescence is a period of high stress, social expansion and identity construction) and found that good parental involvement and personal adjustment have a significant positive impact on academic achievement.

Moreover, Porfeli et al. (2012) studied the connections between the work valences of parents and of children and valence perceptions, as well as how these relationships are related to the academic interest and achievement of the children. The findings revealed that children's perceptions of their parents are mediators of the relationship between parents' and children's self-reported work valences and that children's work valences are linked to academic interest and achievement (Porfeli et al., 2012).

The literature has also investigated the impact that interparental conflict and adverse childhood experience (ACE) can have on students' achievement. Ghazarian and Buehler (2010) found that interparental conflict was a risk factor for poorer academic achievement, with youth self-blame, maternal acceptance and monitoring knowledge acting as mediators of this relationship. These results suggest that family interactions exert a significant impact on how young people perform academically (Ghazarian & Buehler, 2010).

3.2.2 School

For researchers focusing on the aspects that could promote or hinder students' achievement, school, as one of the most important contexts of students' socialization, is particularly relevant. Börkan and Bakis (2016) examined within-school vs. between-school factors that could explain differences in students' achievement scores. The results showed that although most of the variance in students' scores between and within schools (73% and 19%, respectively) was explained by student-level variables, namely, students' sociodemographic background, school-level variables still accounted for 5% of the variance in students' achievement scores (Börkan & Bakis, 2016).

Similarly, in another study by Mahimuang (2005), which examined the value-added contribution of individual and school factor variables to student achievement, it was found that although the best predictor of postachievement was the student's prior achievement, school practices also predicted student achievement. In addition, the study highlighted the effects of school location on student achievement: schools located far from district education offices face greater challenges in improving student achievement.

Other studies, such as that of Lucio et al. (2012), focused on school conditions, such as students' perceptions of school safety, school belonging and school relevance, as well as positive teacher relationships and students' achievement and found that each variable was independently associated with students' GPA. In another study, Steinmayr et al. (2018) examined whether perceived school climate was a stronger predictor of academic achievement (measured by GPA) and subjective well-being than other variables that are relevant to both of these dimensions.

The findings suggested that a positive school climate was a predictor of students' academic achievement and well-being (Steinmayr et al., 2018). A study by Theis et al. (2019) found a significant relationship between students' perceived fulfillment of needs and their graded performance. These findings support the importance of creating an optimal learning environment based on students' basic needs since such an environment will have a positive effect on students' scholastic attainment (Theis et al., 2019).

Because in recent years it has become common to use internet or computer tutoring with a program or application for additional instruction (ICTPAAI), a recent study (Zhu & Mok, 2020) sought to investigate whether students' participation in and use of these technologies, in- or outside school, could be associated with better academic achievement. The results showed that students' participation in ICTPAAI was negatively associated with their academic achievement at the end of the school year, with a significant amount of variance explained at the school level. These findings suggest that schools play an important role in students' participation in ICTPAAI (Zhu & Mok, 2020) and could hinder the negative effect of ICTPAAI on students' achievement.

3.2.3 Peers

Students' peers and friends are relevant participants in daily experiences in school, and research has been dedicated to investigating the influence of such peers and friends on students' adaptation and adjustment to school. In this vein, a study examined early adolescent autonomy and relatedness during disagreements with friends as factors likely to predict academic achievement during the transition to high school and academic attainment into early adulthood. The results showed that autonomy and relatedness at age 13 predicted relative GPA increases from ages 13 to 15 and greater academic attainment by age 29. These findings remained valid after accounting for peer acceptance, social competence, scholastic competence, externalizing and depressive symptoms, which suggests an essential role for autonomy and relatedness in helping adolescents navigate challenges and obstacles in the transition to high school and into adulthood (Loeb et al., 2019).

4 Discussion

A multitude of factors play a role in students' academic achievement. Thus, it is not easy to identify these factors given their diverse nature (Dings & Spinath, 2021) or the complex associations among them (Gilar-Corbi et al., 2019). To better understand this phenomenon, researchers in the field have addressed it extensively using diverse models and statistical procedures (Dings & Spinath, 2021). The present systematic review is intended to update the literature on the determinants of school achievement among the general student population from middle to high school, a period during which more effort and investment are crucial to promote positive and adaptive school pathways.

In general, research has mainly examined the individual/personal level and focused on students' motivation and self-appraisal (e.g., motivation, goal valuation, self-efficacy, self-regulation, environmental perceptions, and psychosocial functioning) rather than on contextual or social factors (Steenbergen-Hu et al., 2020). The findings of the present study highlight the contribution of both personal and contextual microsystem factors to typical students' academic achievement. In fact, this review identifies a multiplicity of personal factors influencing school achievement. This result is consistent with the findings of Abad and López (2016), who studied a sample of almost two thousand high school students and found that personal factors were the strongest indicators of academic achievement, followed by school-related and social factors. Additionally, Babarović et al. (2009) reported that approximately 40% of the variance in academic achievement was explained by student characteristics such as age, gender, and cognitive abilities; thus, academic achievement was the best predictor of academic achievement.

At the students' personal level, this review identified students' gender, personality and life skills as distinctive determinants of students' achievement. Gender differences in academic success have long been documented in the literature. While girls tend to outperform boys in reading literacy in many countries, boys demonstrate greater competency in math and/or science (OECD, 2009). Nonetheless, studies including different types of assessments (both grades and standardized performance measures) have shown that boys on average earn lower grades than expected from their performance on ability or achievement tests (Duckworth & Seligman, 2006). These findings support the multiplicity of noncognitive factors that can influence academic achievement, in addition to students' objective cognitive abilities. Personality traits were also demonstrated to be among the strongest factors of academic achievement in children and adolescents (Backmann et al., 2019; Israel et al., 2019), mainly because such factors are relatively stable and can potentiate and support students' academic endeavors in the long run. The literature has shown that students who are persistent, achievement-oriented, effortful, careful, responsible, and well organized tend to manage academic assignments and learning more effectively, whereas students who are curious and interested and who seek new ideas and experiences manage academic-related problems in school more successfully (Backmann et al., 2019; Israel et al., 2019).

Moreover, cognitive-related abilities and academic background were also identified in this review as determinants of student achievement. The literature has highlighted the strong correlation between general intelligence and school grades and ages (Chamorro-Premuzic & Furnham, 2005). In fact, academic performance and academic achievement are related to students' cognitive profiles, namely, thinking and learning patterns, despite the differences between learning environments (Colling et al., 2022), which will impact students' academic trajectories.

Students' motivation and self-constructs were also addressed in this systematic review. Research has shown that students with greater motivation and self-regulation attain significantly better results, adopt a positive attitude toward learning, and successfully adapt to the changing conditions of the learning process, thus highlighting the importance of these factors in students' successful school pathways (Duckworth et al., 2019; Wu et al., 2021).

Additionally, research focused on students' characteristics shows that academic achievement is positively correlated with social skills and negatively correlated with behavioral problems, whether externalized (e.g., aggressive behavior, rules violation) or internalized (e.g., anxiety, depressed mood, somatic complaints; Stack & Dever, 2020). Moreover, the school context is typically understood by students as a relevant source of stress, mainly due to performance and achievement issues (Byrne et al., 2011). Similarly, students' greater perception of stress at school is associated with weaker scholastic achievement (Ye et al., 2019). Therefore, consistent with the findings of this review, both students' subjective experience of stress in school and their lack of coping strategies to deal with daily stressors can impact their achievement.

Other determinants were identified in the contextual factors, i.e., only at the microsystem level of the family, school and peers. At the familial level, parents' educational background and their involvement in and support for students' academic work are recognized as influencing factors of academic achievement. These findings are consistent with many studies showing that parents are highly influential with respect to their children's academic achievement, mostly because parental involvement is a parental right and responsibility as well as a social need (Castro et al., 2015). Moreover, research has shown that home-based parental behavior has an impact on children's achievement. Specifically, when parents are stricter or more controlling, their children tend to perform worse in school. Other home characteristics to be considered are parents' attitudes about when to enroll children in school and how much to push them to advance through school (e.g., DeBaryshe et al., 2000; Fitzgerald et al., 1991; Ginsburg & Bronstein, 1993). These findings can have important implications for practice, e.g., in developing appropriate counseling and designing effective interventions (Rogers et al., 2009). Conversely, children's exposure to adverse childhood experiences (ACEs), mostly in familial settings, has the opposite effect on students' academic endeavors and can have long-term effects on their academic attainment. This finding is well illustrated in the literature. In fact, any type of violence that children are exposed to negatively impacts children's development (Vaillancourt & McDougall, 2013). Thus, academic achievement, as an important indicator of children's academic life, will likely decrease and can lead to grade retention in the case of ACEs (Fry et al., 2018). Thus, policy-makers should promote measures to combat these ACEs, focusing on social contexts and health as well as the relationships among them.

In particular, at the school level, characteristics and climate as well as students' relationships with teachers and peers seem to influence students' paths throughout academic cycles. In fact, schools, as a relevant context of socialization, should use all the necessary strategies to foster students' engagement, motivation, and adjustment to academic pathways. In particular, schools can propose formal and informal activities involving students, teachers and communities to promote a positive and secure school climate as well as to foster students' involvement and identification with school practices. Moreover, the literature has highlighted that teacher−student relations occupy an important place in school life: both positivity and closeness in teacher−student relations correlate with students' psychological states, involvement in school, and academic achievement, while correlating negatively with expulsion from school and dropping out of school (Quin,

2017). Moreover, educational institutions can adopt specific measures to stimulate attendance and achievement. In particular, schools can help educate parents on the relevance of school attendance or promote after-school lessons for children who are behind on subjects or who are from underprivileged contexts as a way to mitigate the effects of socioeconomic status on academic achievement.

Peers at school are also relevant actors in students' daily lives. In fact, when students share news of academic success with their friends and the friends respond with social support, this is shown to cause positive changes in school attitudes and perceived peer relationships (Wentzel et al., 2021). Conversely, a lack of support or positive feedback from friends when children share academic successes can lead to negative changes in perceived peer relationships (Wentzel et al., 2021). In fact, according to self-determination theory, the satisfaction of needs associated with autonomy and relatedness fosters intrinsic motivation and achievement (Ryan & Deci, 2017) since friendships characterized by autonomy and relatedness during a crucial period such as adolescence may have implications for academic achievement later in life.

There are limitations to this systematic review. First, the studies assessed in the review integrate different indicators of academic achievement (GPA, grades, test scores in specific domains/subjects). Thus, our interpretations should be viewed with caution. In addition, the present systematic review integrated studies with different study designs (e.g., experimental, cross-sectional, longitudinal) and/or provided limited data with which to calculate the effect sizes of the results, which limited the possibility of comparing and weighting each predictor in terms of student achievement. In addition, in view of the rapid development in the field, there is a risk of exclusion of the most recent studies, i.e., those appearing since the literature search was performed. Given these limitations, further studies could be conducted. To provide a more comprehensive analysis of academic achievement phenomena, it would be important to update this review based on a multidimensional perspective of achievement, including other relevant subjective indicators of achievement (e.g., students' or teachers' self-reports of achievement and performance) and other predictors of academic success, adjustment and/or well-being. Moreover, future reviews on the topic should also examine studies addressing the determinants of academic underachievement, allowing for further comparative analyses with the determinants of achievement. This systematic review provides evidence of a lack of studies investigating the impact of exosystem variables (e.g., parents' work-family conflict and impact on students' achievement) and macrosystem variables (e.g., political regime, economic situation of the country) on academic achievement. At the microsystem level, more studies can be developed considering other school factors (e.g., pedagogical practices, teacher support, inclusive education measures) and other peer factors (e.g., peer support, collaborative peer learning).

In this systematic review, different studies were compiled, providing an updated overview of the multiplicity of determinants contributing to typical students' achievement from middle to high school. The findings presented here highlight the complexity of the achievement phenomenon and should be evaluated from a holistic perspective. In fact, to move beyond students' particular idiosyncratic characteristics, there are preventive and collective activities that schools and communities

should promote to minimize academic underachievement risk factors (e.g., involving parents in school activities, promoting a secure climate, planning activities to foster relationships between students and teachers, promoting after-school lessons for children who are behind, and providing pedagogical actions on drug use). In fact, the findings in this review have practical implications, e.g., for the development of prevention and intervention programs in school settings. In this vein, different programs and interventions to promote students' attendance and adaptation as well as to avoid students' absenteeism and dropouts have been developed in recent years (Kearney & Graczyk, 2020). Similarly, this updated systematization of the determinants of academic achievement highlights a need for further research into specific contextual factors that could support context-sensitive practices. In particular, a broader perspective of academic success, including achievement and other processes, could be further explored. Continuing to gather empirical evidence, as offered in the present systematic review, and developing appropriate strategies to promote achievement and address underachievement will proactively minimize potential risk factors for student achievement and lifelong learning.

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Declarations

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval The authors do not have any interests that might be interpreted as influencing the research. The study was conducted according to APA ethical standards.

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