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Determinants of academic performance in secondary school students: A systematic review of the scientific evidence

Determinantes del rendimiento académico en estudiantes de secundaria: revisión sistemática de la evidencia científica

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Abstract

Low academic performance among secondary school students is a major concern in contexts with educational and social inequalities, such as Metropolitan Lima, where the environment directly impacts learning. This study seeks to understand the factors that determine academic performance through a systematic review of recent literature. A systematic review of articles published between 2017 and 2024 was conducted, following the PRISMA 2020 guidelines. The search was carried out in databases such as Scopus, Web of Science, PubMed, ERIC, and SciELO, as well as in specialized repositories. Nineteen studies that directly analyzed the performance of secondary school students, using mixed methodologies, were included. The results reveal that performance is influenced by personal factors (such as self-esteem and stress), family factors (parental education and support), school factors (infrastructure and institutional environment), and technological factors (use of digital platforms or distractions). The impact of the pandemic context is also highlighted. Most of the studies are Peruvian, with cross-sectional designs and correlational approaches. In conclusion, improving performance requires a comprehensive view of the student environment. Therefore, educational strategies must adapt to diverse realities and foster optimal learning conditions, particularly in complex urban environments like Metropolitan Lima.

Keywords: academic achievement, school performance, information technologies.

Resumen

El bajo rendimiento académico en estudiantes de secundaria representa una preocupación central en contextos con desigualdades educativas y sociales, como Lima Metropolitana, donde el entorno incide directamente en el aprendizaje. Este estudio busca comprender los factores que determinan el rendimiento académico mediante una revisión sistemática de la literatura reciente. Se realizó una revisión sistemática de artículos publicados entre 2017 y 2024, siguiendo las directrices PRISMA 2020. La búsqueda se llevó a cabo en bases de datos como Scopus, Web of Science, PubMed, ERIC y SciELO, así como en repositorios especializados. Se incluyeron 19 estudios que analizaban directamente el rendimiento en escolares de secundaria, utilizando metodologías mixtas. Los resultados revelan que el rendimiento se ve influido por factores personales (como autoestima y estrés), familiares (educación parental y acompañamiento), escolares (infraestructura e ambiente institucional) y tecnológicos (uso de plataformas digitales o distracciones). Además, se destaca el impacto del contexto pandémico. La mayoría de

las investigaciones son peruanas, con diseños transversales y enfoques correlacionales. En conclusión, mejorar el rendimiento exige una visión integral del entorno estudiantil. Por ello, las estrategias educativas deben adaptarse a realidades diversas y fomentar condiciones óptimas para el aprendizaje, particularmente en entornos urbanos complejos como Lima Metropolitana.

Palabras clave: logro académico, rendimiento escolar, tecnologías de la información.

Introduction

Academic performance in secondary education continues to raise concerns among educators, researchers, and policymakers. Recent years have clearly illustrated how pressure to achieve favorable outcomes, resource shortages, and social inequalities impact the learning of thousands of students. As explained by Nunes et al. (2023), these factors operate in conjunction, often limiting the full development of adolescent potential. Furthermore, the advent of new technologies and cultural shifts driven by globalization have transformed the ways in which young people learn and engage with educational institutions, presenting unprecedented challenges for both teachers and families.

Theoretically, academic performance is recognized as a complex phenomenon that cannot be reduced to a single dimension. For instance, Yu et al. (2023) emphasize that peer relationships exert a more significant impact than even connections with parents or teachers. Although there is a wealth of studies on this issue from various perspectives, the information remains fragmented, lacking a systematic integration that would provide a clear and comparative view.

Internationally, data from the Programme for International Student Assessment (PISA) reveal that a family's socioeconomic status and parental education are robust predictors of academic performance (OECD, 2020). Accordingly, Sirin (2023) underscores the crucial role of family support in educational success. At the national level, research from the Instituto de Estudios Peruanos (2021) demonstrates that access to well-equipped schools and trained teachers significantly influences outcomes.

In recent years, there has been a growing interest in unraveling the factors influencing the academic performance of secondary school students, particularly in inequitable contexts such as various areas in Peru. Tacca et al. (2022) highlight that the gaps between urban and rural schools, combined with a lack of adequate infrastructure and materials, perpetuate learning disruptions and generate persistent disparities among regions and social groups. In Metropolitan Lima, the academic performance of students is dependent on multiple elements, including familial and economic conditions, school climate, mental health, teacher support, personal motivation, and access to technology. Within this framework, the present study analyzes these factors holistically, aiming to examine the influence of parental education and economic status, assess school quality and teacher preparation, explore the role of family support and student motivation, understand the social environment's impact, and review how technology serves as either a support or distraction in learning.

This study proposes a review that compiles, organizes, and critically analyzes the most recent evidence, both national and international, to identify common patterns, contextual differences, and areas requiring further investigation. Consequently, the primary objective of this research is to conduct a systematic review of studies published between 2017 and 2024, with a view to understanding which factors affect the academic performance of secondary-level students.

Methodology

A systematic review of recent literature was conducted to rigorously identify the factors influencing the academic performance of secondary school students. The methodology adhered to PRISMA 2020 guidelines, facilitating a clear organization of the stages of search, selection, and analysis, thereby ensuring the acquisition of reliable and relevant empirical evidence to detect patterns and approaches applicable in real educational contexts. Data collection took place between January and March 2025, utilizing widely recognized databases in the educational, psychological, and social fields, such as Scopus, Web of Science, PubMed, ERIC, and SciELO.

The search strategy combined keywords in both Spanish and English—such as “academic performance,” “secondary education,” “motivation,” and “family factors”—utilizing Boolean operators to refine results with precision. Specific filters limited the selection to scientific articles published between 2017 and 2024, in either Spanish or English.

Subsequently, only quantitative studies involving adolescents in secondary education that assessed academic performance through standardized tests and examined correlations with explanatory variables were

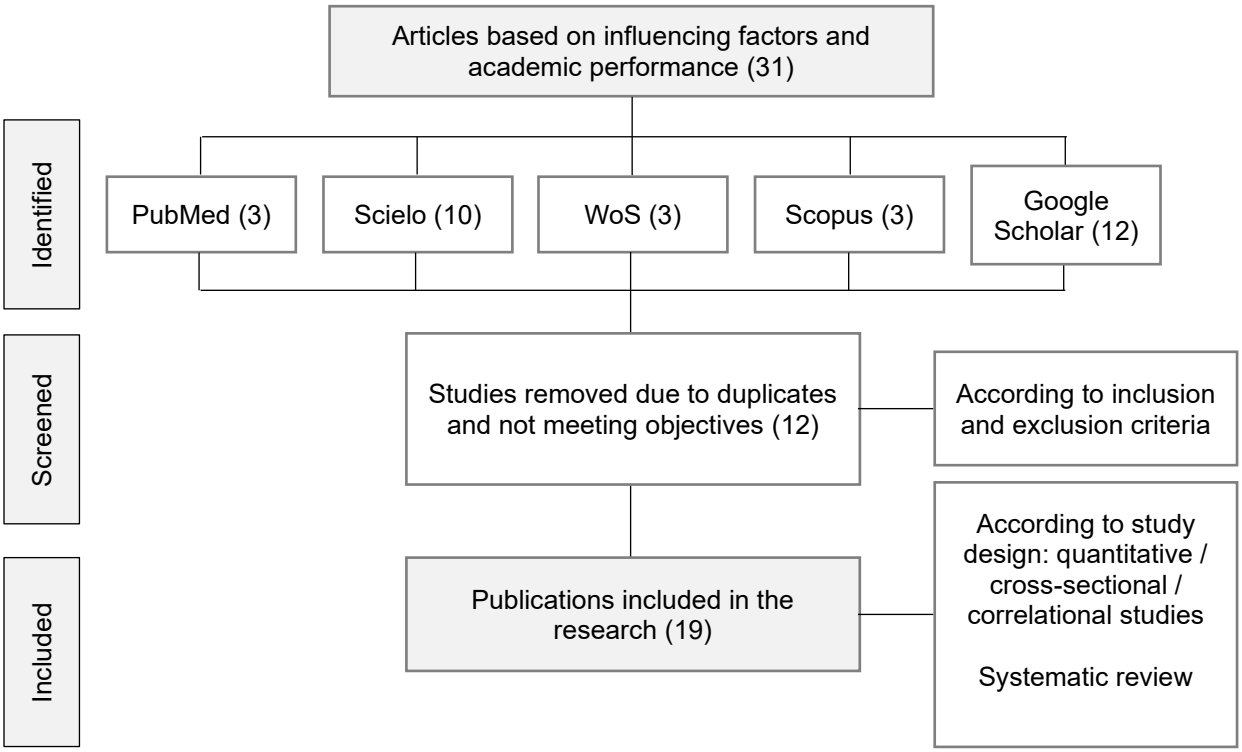
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included; studies focused on clinical populations, other education levels, or lacking clear quantitative results were excluded. The selection process progressed in three phases: title and abstract review, full-text analysis, and validation by two independent reviewers, and was documented in a PRISMA diagram. Of the 31 studies identified, 19 met the established criteria.

The quality assessment of the studies was conducted using checklists such as STROBE and PEDro, considering the clarity of variables, quality of instruments, and statistical coherence. Overall, the articles exhibited acceptable to good methodological quality, although variations in detail and control of biases were noted.

Finally, essential information was extracted from each study—including authors, year, country, design, sample, instruments, and main findings—and organized into four categories: personal, family, school, and psychoeducational factors. This classification facilitated an understanding of how various elements of the environment and individual development interrelate with academic performance in adolescents.

Figure 1
PRISMA diagram: study selection process



The following table summarizes the methodological evaluation of the 19 studies included in the review, taking into account the employed design, instrument validity, type of sampling, clarity of variables, and reported bias control.

Table 1
Methodological assessment and overall quality of the studies included in the systematic review (2017-2024)

No.	Study	Study design	Validated instruments	Probability sampling	Clarity of variables	Declared bias control	Overall quality
01	Alarcón et al. (2022)	Quantitative, correlational	Yes	No	Yes	No	Acceptable

02	Armenta & Siari (2022)	Mixed, cross-sectional	Partially	No	Yes	No	Acceptable
03	Formento et al. (2023)	Systematic review and meta-analysis	Yes	Yes	Yes	Yes	High
04	Mardones (2023)	Systematic review	N/A	N/A	Yes	Yes	Good
05	Nunes et al. (2023)	Quantitative, structural (PLS-SEM)	Yes	No	Yes	No	Acceptable
06	Párraga & Muñoz (2024)	Quantitative, descriptive	Partially	No	Yes	No	Moderate
07	Taype et al. (2023)	Narrative review	N/A	N/A	Yes	No	Moderate
08	Burbano et al. (2021)	Quantitative, correlational	Yes	No	Yes	No	Acceptable
09	Cavero & Vásquez (2018)	Quantitative, correlational	Partially	No	Yes	No	Moderate
10	Chen & Hesketh (2021)	Quantitative, cross-sectional	Yes	Yes	Yes	Yes	Good
11	Fernández et al. (2021)	Systematic review	Yes	N/A	Yes	Yes	High
12	García-Martín & Cantón-Mayo (2020)	Quantitative, instrument validation	Yes	Yes	Yes	Yes	Good
13	Linares & Mescua (2022)	Quantitative, correlational	Partially	No	Yes	No	Acceptable
14	Rodríguez & Guzmán (2019)	Systematic theoretical review	No	N/A	Yes	No	Moderate
15	Selçuk & Pecado (2023)	Meta-analysis	Yes	Yes	Yes	Yes	High
16	Tacca et al. (2022)	Mixed, sequential explanatory	Partially	No	Yes	No	Acceptable
17	Yu et al. (2022)	Quantitative, comparative	Yes	Yes	Yes	Yes	Good
18	Zheng & Mustappha (2022)	Narrative review	No	N/A	Yes	No	Moderate
19	Huamani (2020)	Systematic review	Yes	N/A	Yes	Yes	High

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Results

Table 2
Methodological characteristics and outcomes of studies included in the systematic review

Authors / year and country	Design	Population and sample / instruments	Main objective	Key findings
Alarcón et al. (2022) Argentina	Quantitative, descriptive, and correlational	261 students entering the Faculty of Humanities and Social Sciences in 2020 (completed secondary education in 2019). SISCO SV-21 Inventory (stress); Coping Strategies Inventory	To identify the relationship between academic stress and coping strategies at the end of secondary education	Academic stress was reported by 78.2% of students. Non–action-oriented coping strategies were associated with higher stress levels, whereas action-oriented strategies significantly reduced stress, particularly among female students.
Armenta & Siari (2022) Mexico	Mixed-methods (sequential exploratory—DEXPLOS), descriptive, cross-sectional	60 secondary school students (12–16 years), convenience sample. Likert-scale questionnaire; teacher interviews	To determine anxiety-related factors affecting mathematics achievement	Medium to high levels of mathematics anxiety were observed in 88.3% of students, mainly associated with teachers' attitudes, teaching methods, and the use of instructional tools. Female students reported higher anxiety levels than males.
Burbano et al. (2021) Colombia	Quantitative, descriptive-correlational, cross-sectional	56 sixth-grade students (28 males and 28 females; 10–12 years). Sociodemographic form; WISC-IV subscales; mathematics grades	To examine the relationship between perceptual reasoning and mathematics achievement by sex	Perceptual reasoning explained 21% of overall mathematics achievement and 39% among boys. Although it was not a significant predictor for girls, the "Block Design" subscale showed the strongest association.
Cavero & Vásquez (2018) Peru	Quantitative, descriptive-correlational, cross-sectional	115 students in 2nd and 4th grades of primary school from three private schools in Trujillo. Multiple Intelligences Test (Gardner); teacher-assigned grades	To examine the relationship between multiple intelligences and primary-level academic achievement	A significant correlation was found between multiple intelligences and academic achievement. Sixty percent of students reached expected performance levels, with interpersonal intelligence being the most developed and no sex differences observed.

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Chen & Hesketh (2021) China	Quantitative, cross-sectional	606 adolescents (14–16 years) from two rural schools in Hubei. Questionnaires (Rosenberg Self-Esteem Scale, CDI-S, SAAS-R, FAS-II)	To examine aspiration–expectation discrepancies and their relationship with mental health and academic achievement	Aspiration–expectation discrepancies were identified in 59.2% of adolescents and were associated with parental absence, low academic achievement, and externally driven aspirations. These students reported lower self-esteem, more depressive symptoms, and poorer self-regulation.
Fernández et al. (2021) United States	Systematic review (PRISMA)	Primary and secondary school students (8–18 years). GPA; scales of emotional regulation, well-being, and attention	To analyze the effects of school-based yoga on academic achievement	School-based yoga interventions improved academic performance (higher GPA), reduced stress, and enhanced attention and emotional self-regulation.
Formento et al. (2023) Spain	Systematic review and meta-analysis (48 studies, 2012–2021)	144,012 adolescents (mean age = 14.65 years) across four continents. PRISMA/Cochrane criteria; standardized tests and school records	To analyze the relationship between academic motivation and academic achievement in adolescents	A positive, moderate association was found between academic motivation and academic achievement, with no significant moderating effects of age or sex.
García-Martín & Cantón-Mayo (2020) Spain	Quantitative, descriptive-correlational; instrument validation	1,488 students in compulsory secondary education (León and Zamora). HEGECO questionnaire (40 items, five factors)	To validate a questionnaire assessing ICT use, knowledge management, and academic achievement	The use of technologies, such as blogs and wikis, was associated with improved academic achievement. The validated questionnaire enables analysis of ICT–achievement relationships across subjects.
Huamani (2020) Peru	Systematic review (2010–2019; 40 studies)	Secondary school students (12–17 years). Review matrix (title, author, variables, etc.)	To review the relationship between family social climate and secondary school academic achievement	Most studies were conducted in Colombia, Spain, and Mexico and adopted predominantly quantitative approaches. A positive relationship was identified between family social climate and academic achievement, largely driven by family involvement.

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Linares & Mescua (2022) Peru	Quantitative, non-experimental, simple correlational	223 secondary school students (112 females and 111 males; 12–17 years) from a private school in North Lima. SISCO (Barraza/Alania); Frydenberg & Lewis Coping Scale (Canessa)	To examine the relationship between academic stress and coping strategies	Students with higher academic stress primarily relied on nonproductive coping strategies, such as self-blame and lack of coping. Inverse correlations were found with positive strategies, including positive reframing and seeking professional help.
Mardones (2023) Chile	Empirical systematic review (PRISMA; 22 of 679 studies included)	Predominantly samples larger than 100 students (77.2%). Documentary review matrix	To identify school climate factors influencing learning	Socioemotional relationships, school violence, motivation, and self-esteem emerged as key school climate factors. A positive school climate significantly enhances academic achievement and students' sense of belonging.
Nunes et al. (2023) Portugal	Quantitative, explanatory (PLS-SEM)	220 public secondary school students (16–23 years; grades 10–12). Questionnaires (Day et al.; Johnson & Johnson; Veas et al.)	To model academic achievement considering student, family, and teacher-related factors	Prior academic achievement was the strongest predictor of performance. In mathematics, grade retention and recreational ICT use had negative effects, while teacher involvement had a positive impact. In Portuguese language achievement, parental expectations and educational level were particularly influential.
Párraga & Muñoz (2024) Ecuador	Quantitative, descriptive, cross-sectional	100 upper-secondary students (adolescent mothers) and five teachers. Survey on pregnancy, family support, and sex education	To identify negative factors affecting the academic achievement of pregnant adolescents and propose alternatives	Adolescent pregnancy negatively affected academic achievement, mainly due to low motivation (49%) and lack of emotional support (60%). Additionally, 64% of students identified family-related factors as the main cause of school dropout.

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Rodríguez & Guzmán (2019) Spain	Qualitative-theoretical systematic review (46 studies)	N/A (Web of Science and Scopus). Systematic database search	To assess sociofamily risk factors, academic achievement, and the moderating role of personal variables	Low socioeconomic status and family conflict negatively affected academic achievement. However, personal factors such as motivation and self-efficacy significantly moderated and counteracted these adverse effects.
Selçuk & Pecado (2023) Turkey	Meta-analysis (54 studies, 79 samples)	89,827 immigrant students (mean age = 13.26 years). Secondary data (generation, language, scales)	To examine the relationship between acculturation and academic achievement and evaluate the “immigrant paradigm”	A small but significant positive effect of acculturation on academic achievement was found ($r = 0.04$, $p < 0.001$), contradicting the immigrant paradigm. The effect was stronger for standardized test scores than for grades and was more evident among children and adolescents.
Tacca et al. (2022) Peru	Mixed-methods, sequential explanatory	78 secondary school students in Lima (3rd and 5th grades), convenience sample. SISCO; interview guides; grade point average	To analyze academic stress/stressors and academic achievement during COVID-19	High academic stress was reported by 35% of students, particularly among females and fifth-grade students, mainly due to task overload and difficulties with virtual classes. A negative relationship was identified between academic stress and academic achievement.
Taype et al. (2023) Peru	Narrative review (12 articles)	N/A (academic databases). Secondary sources	To analyze school academic achievement in Peru during the COVID-19 pandemic	Academic achievement was negatively influenced by limited family support, unequal access to information and communication technologies, and the emotional impact of confinement.

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Yu et al. (2022) China	Quantitative, correlational-comparative (two cross-sectional studies)	58,037 (4th and 8th grades; 28,168+29,869). PRAS; mathematics and science tests	To compare the associations between relationships with parents, teachers, peers, and academic achievement	A positive correlation was found between the quality of interpersonal relationships and achievement in mathematics and science, with peer relationships showing the strongest associations (r = 0.256 in mathematics; r = 0.221 in science). The association was stronger in 4th grade than in 8th grade, reflecting developmental influences.
Zheng & Mustappha (2022) Malaysia	Qualitative literature review	Prior university-level studies (China and international). Secondary sources (Astin's I-E-O model, NSSE, PISA)	To analyze factors influencing university academic achievement and their limitations	University academic achievement depends on both internal and external factors, including motivation, family environment, and teacher support. The study highlights the need for broader assessment approaches that go beyond grades to achieve a comprehensive understanding of academic performance.

The review analyzed nineteen studies published between 2017 and 2024, aiming to understand the factors influencing the academic performance of secondary school students. This critical examination of national and international research identified common patterns, contextual differences, and persistent gaps, providing a broader and integrated view of the phenomenon.

The results were grouped into five recurring themes: personal and emotional factors, family dynamics, school conditions, the use of educational technologies, and extraordinary events, particularly the impact of the COVID-19 pandemic on teaching and learning processes. Moreover, the review incorporated studies from multiple countries, with Peru being the most represented, followed by Spain and China, along with contributions from America, Europe, and Asia. This geographical diversity facilitated a better contextualization of the findings. Methodologically, the quantitative approach predominated—particularly cross-sectional and correlational designs—complemented by systematic and narrative reviews, mixed-method studies, meta-analyses, and theoretical reviews, thus broadening the analysis from complementary perspectives.

The selection adhered to strict criteria of timeliness, relevance, and quality, documented via a PRISMA diagram to ensure transparency. This geographical and methodological breadth allowed for comparisons of educational realities and observations on how the same factors operate differently across contexts, enriching the comprehensive understanding of secondary performance.

Emerging thematic categories

Personal and emotional factors

Internal aspects of the student, such as motivation, self-esteem, self-efficacy, stress, and anxiety, emerged recurrently in the analyzed studies. For instance, Alarcón et al. (2022) in Argentina and Linares and Mescua (2022) in Peru revealed high levels of academic stress among adolescents, particularly in females, directly linked to ineffective coping strategies. Additionally, Armenta and Siari (2022) highlighted that anxiety towards mathematics was associated with teacher attitude and teaching methods.

Family environment and parental support

The family environment plays a crucial role in academic performance. Huamani (2020) and Sirin (2023) emphasized how the family social climate and parents' educational level predict school success, particularly through active involvement in the educational process.

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School and institutional conditions

School conditions are a determining factor. Mardones (2023) demonstrated that the school climate—including socio-emotional relationships, violence, and internal motivation—significantly influences the willingness to learn. Complementarily, Nunes et al. (2023) identified that teacher involvement and prior performance are the main predictors of achievement in mathematics and Portuguese language.

Educational technology

In the past decade, information technologies have gained central significance in learning. García-Martín and Cantón-Mayo (2020) demonstrated that the educational use of tools such as blogs and wikis improves academic performance. However, Nunes et al. (2023) cautioned that recreational use of ICT negatively affects performance, especially in mathematics.

Extraordinary circumstances: The COVID-19 pandemic

The pandemic abruptly transformed learning in secondary education. Taype et al. (2023) and Tacca et al. (2022) demonstrated that excessive digital tasks, anxiety, isolation, and technological limitations negatively impacted the performance of Peruvian students, exacerbated by a lack of digital competencies, limited family support, and psychological distress.

Overall, the studies reveal that academic performance is a multifactorial phenomenon influenced by emotional, cognitive, familial, school, and contextual variables, with variations by gender, socioeconomic status, and geographic territory. Research utilizing robust methods, such as structural models or meta-analyses, better clarifies the weight and interaction of these factors. Among the most suggestive findings is the role of peer relationships as a key predictor, even surpassing connections with parents or teachers in certain age groups (Yu et al., 2022). Therefore, it is proposed to rethink school evaluation to incorporate resilience, socio-emotional skills, and critical thinking, aligning with a more holistic education (Zheng & Mustappha, 2022).

Discussion

The findings of the review confirm that academic performance in secondary education represents a multifactorial phenomenon influenced by emotional, familial, institutional, and technological aspects. A recurring element is academic stress: Alarcón (2022) highlights that its impact depends on the coping strategies employed, as students with better emotional resources maintain solid performance even in demanding contexts.

Moreover, anxiety—especially regarding mathematics—emerges as a significant barrier to learning. Armenta and Siari (2022) note that if not managed appropriately, it directly affects performance, making the integration of emotional well-being into educational strategies essential. Additionally, the family environment plays a pivotal role: Burbano et al. (2021) demonstrate that a supportive and warm environment benefits the development of key cognitive skills, such as perceptual reasoning.

On the other hand, school infrastructure and available resources remain crucial determinants of learning. Carrillo et al. (2019), along with reports from the Ministry of Education (2017), demonstrate that the physical conditions of educational institutions directly impact the school experience. In the digital realm, Cueva et al. (2023) emphasize that virtual platforms enhance learning when integrated properly, supported by teacher training and clear pedagogical strategies.

However, the review presents certain limitations. Despite consulting recognized databases, some studies may have been omitted due to lack of indexing or failure to align with the employed descriptors, and the search was restricted to publications in Spanish and English. Additionally, there was significant methodological diversity in study designs, instruments, and performance measurements, complicating direct comparisons and generalizations. In several cases, bias control was not clearly detailed, and the predominance of cross-sectional and correlational studies prevents establishing causal relationships. Finally, the absence of a meta-analysis limits the precise estimation of the statistical weight of the analyzed factors.

Despite these limitations, the review offers an updated and diverse synthesis of the factors influencing academic performance in secondary education. Its geographical breadth and methodological variety provide a more comprehensive view of the phenomenon, while the thematic categorization facilitates understanding and generates valuable inputs for future research, as well as the design of educational policies that are contextualized and sensitive to student needs.

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Conclusions

The systematic review reveals that academic performance among adolescents is a multifactorial phenomenon. The evidence emphasizes the management of stress and anxiety, family support, the conditions of the school environment, and the appropriate use of technology as key elements for understanding and enhancing student performance.

Furthermore, the findings present clear practical implications for the educational system. It is urgent to implement psychological support programs that assist students in managing stress and anxiety, alongside a decisive investment in improving school infrastructure to ensure safe, adequate, and well-equipped spaces conducive to learning.

Thus, it is essential to advance toward genuine technological integration that combines access to devices with teacher training and pedagogical resources tailored to real needs. Additionally, the active participation of families remains fundamental, as their involvement acts as a key protective factor for both the academic and personal development of students.

Consequently, these elements should be addressed in an integrated manner, recognizing the student as an individual immersed in multiple environments, with emotional, cognitive, and social needs that demand coordinated, sensitive, and committed attention from all educational stakeholders.

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