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Identifying Key Variables of Student Dropout in Preschool, Primary, Secondary, and High School Education: An Umbrella Review Approach

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Abstract: This umbrella review aimed to synthesize variables that explain dropout among students in preschool, primary, secondary, and high school education. The study focused on peer-reviewed articles indexed in SCOPUS, Web of Science, and ERIC, identifying five systematic reviews that provided comprehensive insights. Key findings revealed individual factors, such as insufficient parental support, emotional and behavioral challenges, and substance use, play significant roles in influencing student dropout. Socioeconomic factors, including poverty, financial constraints, and social inequalities, were also identified as critical contributors. Additionally, institutional elements such as inadequate school infrastructure, insufficient teacher training, and a lack of culturally relevant resources emerged as barriers to student retention. This review highlights research gaps in political-legislative, sociocultural, and family determinants, longitudinal analyses, dropout interventions' long-term effectiveness, and marginalized populations' representation, limiting a comprehensive understanding of student dropout and effective policy development. Recommendations include targeted policies and interventions that foster inclusive and supportive educational environments, reduce inequities, and improve access to resources to minimize dropout rates among students in preschool, primary, secondary, and high school education.

Keywords: *Bibliometrics, cause and effect, explanatory variable, school dropouts, systematic review.*

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Introduction

Education, as the cornerstone of social construction, lays the foundation for the human, social, political, and economic development of nations (Guzmán Rincón et al., 2021). In this regard, schooling serves as one of the primary means of socialization, providing children and adolescents with access to knowledge and cultural integration. During this formative stage, they are guided and supported as their personalities develop (Flegl et al., 2023; Woldehanna et al., 2021). Given its significance, educational services, as a matter of national interest, are organized, regulated, and implemented by states and the communities they encompass. States are responsible for ensuring the promotion, exercise, and enjoyment of fundamental rights (Guzmán Rincón et al., 2023), while communities provide the necessary engagement, assistance, and support to encourage school retention.

Despite the vital role of education in national development and the efforts of states and communities, it was estimated that in 2023, 10% of primary school children, 14% of secondary school students, and 30% of high school students worldwide did not attend school (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2024). In the group of least developed countries (LDC) (countries with a Gross Domestic Product (GDP) of USD 1136 per year or less), the rate is almost double, with 23% in primary, 38% in secondary, and 55% in high school (United Nations, 2023). Conversely, in less developed countries (GDP between USD 1136 and USD 13845 per year), the figures dropped to one-fifth of the global average for primary education (2%) and secondary education (7%). They remained like high school (21%). Finally, in highly developed countries with high-income levels (GDP greater than USD 13846 per year), the figures

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decreased to one-tenth of the global average for primary (2%) and secondary education (2%), and to one-third of the values for high school (9%) (UNESCO,2024). All these factors hinder the realization of previously mentioned educational benefits, which are the foundation for public policy development in this area.

While the situation already presents a challenge, it is further exacerbated by school dropout rates, which stem from multiple factors, including violence, poverty, and parents' low academic level attainment. School dropouts affect approximately 30% of the global population aged 0 to 17 years (Gapminder, 2024). Its consequences extend beyond the individual, their family, the institution to which they were affiliated (Barragán-Moreno & Lozano-Galindo, 2022; Guzmán Rincón et al., 2023), and society at large (López Gil et al., 2022). Among the effects that dropout brings are greater difficulty in improving the economic levels of the population (Guzmán Rincón et al., 2022) and deterioration in health, nutrition, well-being, and safety, which ultimately fuels further dropout (World Bank Group, 2024). In general, dropout creates a vicious cycle, particularly in countries with greater economic needs.

From this perspective, early school leaving is a critical issue affecting all nations, as it directly impacts both students who drop out and the societies in which they live. Figure 1 shows how the tendency to leave primary school increases over time in low- and middle-income countries such as Colombia, Cambodia, and Mexico. By contrast, in high-income countries like Finland, Spain, or South Korea, dropout rates have declined.

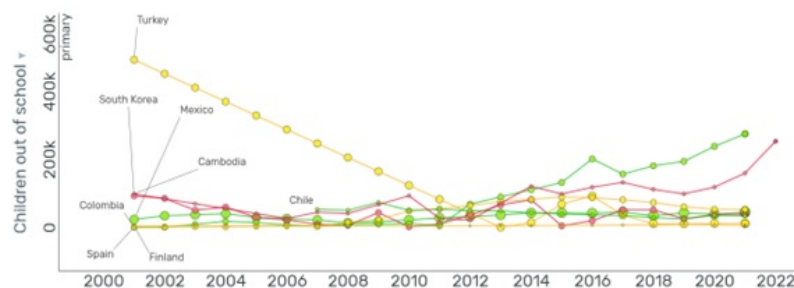


Figure 1. Out-Of-School Children

Source: Own elaboration using Gapminder (2024). Free to use cc-by gapminder.org

Numerous studies have concluded that societies face a phenomenon of complex nature, attributable to the combination of individual, behavioral, emotional, institutional, economic, and social factors that interact with each other and with the characteristics of the context, ultimately influencing school outcomes and creating the necessary conditions for either retention or dropout from the school system (Estévez et al., 2021; García-Jiménez et al., 2020).

School dropout is addressed based on models such as Vincent Tinto's interaction model (1975), which attributes dropout to four determinants: academic, individual, socioeconomic, and institutional. The academic determinant addresses didactics, curriculum, transitions between educational stages, resources, and evaluation, among others. The individual determinant mainly deals with motivation for subjects, expectations, educational experiences, and outcomes obtained before, during, and after the process and how these incite retention. The socioeconomic determinant, including current and future household income and the need to work to improve it, significantly influences early dropout decisions. Finally, the institutional determinant encompasses organizational aspects, work culture, teacher-student relationships, coordination, and support for the student in their educational process, providing a coherent framework for understanding the phenomenon by attributing dropout to internal and external causes, not just an individual decision by the student (Loopers et al., 2023; López Gil et al., 2022; Tinto, 1975, 1994). Notably, there is no academic consensus on the determinants of school dropout, implying that the categorization of explanatory variables can vary significantly depending on the model, approach, or theoretical framework used.

Understanding school dropout requires a comprehensive approach that goes beyond general statistics to explore the underlying determinants influencing retention across different educational levels. The complexity of this issue lies in the interplay of social, economic, and institutional factors that shape students' trajectories. Analyzing databases allows decision-makers to monitor these interconnected variables, track policy impacts, and access institutional strategies aimed at reducing dropout rates. However, to bridge the gap between data analysis and effective intervention, an umbrella review is essential. By synthesizing existing research, it can identify gaps, reveal patterns, and provide a structured framework for understanding the explanatory variables of student dropout in preschool, primary, secondary, and high school education. This methodological approach enhances the ability to develop targeted policies and interventions that address dropouts more effectively across both state and private educational institutions (Barragán et al., 2023).

Therefore, this review's central question was: What variables explain student dropout among children and young people in preschool, primary, secondary, and high school education? Consequently, the objective of this umbrella review was to summarize the findings regarding the variables that explain student dropout among children and young people in preschool, primary, secondary, and high school education.

Given the global interest in education, the structuring of educational systems varies from country to country. For comparative purposes, the International Standard Classification of Education (ISCED) framework was adopted in its 2011 version, which addresses three levels of education. The first level is early childhood education, which enables the development of individual competencies to establish peer relationships and develop academic habits that strengthen personal growth and allow progression to basic education (García Bacete et al., 2021). The second level comprises primary and secondary education, which seeks to consolidate the development of individual capacities and is structured around a curriculum formulated around core knowledge areas (Barragán-Moreno & Lozano-Galindo, 2022; Barragán & Marcelo, 2023). The third level, high school education, is intended to advance towards higher technical or technological education or the world of work, emphasizing general fields such as preparation for higher education or vocational specialization to encourage technical or technological instruction or entry into the workforce, providing the necessary tools to face societal challenges (Barragán & Marcelo, 2023).

This article is divided into four sections. The first corresponds to the reference framework, the second to the methodology used for the review's development, the third presents the results, and the fourth shows the discussion and conclusions.

Conceptualization of Student Dropout

School dropout has been defined as leaving the educational system without obtaining a minimum level of skills before completing some of the years, cycles, or pathways that make up the mandatory educational offer or any training or program before its completion (Lúcio et al., 2023). Dropout types are categorized as absenteeism, failure (repetition), and ultimately leaving the system without completing the educational cycle or pathway. Studies emphasize that absenteeism and poor academic performance are linked to the student's internal feelings, while temporary or permanent departure externalizes the student's feelings and is generally agreed upon with parents, guardians, or caregivers (Evans & Mendez Acosta., 2023; Hamadi & El-Den, 2024).

Determinants and Associated Variables

For this umbrella review, the determinants and variables associated with school dropout were configured based on Tinto's (1975) proposal, adding two additional determinants conceptualized in previous studies: Political and legislative, as well as sociocultural. Below is a synthesis of the determinants and associated variables: 1) Political and legislative; 2) Sociocultural; 3) Academic; 4) Socioeconomic; 5) Institutional; and 6) Individual and family.

Political and Legislative Determinant

This determinant relates to national and regional educational policies, support, and retention programs aimed at reducing social inequality by recognizing education as a fundamental human right, promoting access, retention, and completion of all levels of basic educational offerings for all students, with special attention to those affected by any form of discrimination based on ethnicity, cultural, gender or economic status, among other factors (Barragán & Marcelo, 2023; Cosenz, 2022; Delprato & Frola, 2022; Serio & Herrera, 2021).

Public policy encourages women in traditional or cultural caregiving roles at home or in dependency economies to have alternatives other than those provided by these environments (exclusion zones) (Delprato & Frola, 2022). These zones are characterized by low-income levels, low parental education levels, little supervision and support for children's school activities, migration conditions, race, rurality, and violence, which compel states to create policies that encourage retention through economic incentives (Evans & Mendez Acosta., 2023). Examples include the "Asignación por Hijo" Program in Argentina and "Familias en Acción" in Colombia (Serio & Herrera, 2021). These actions, combined with teacher training programs and the creation or improvement of educational infrastructure, aim to raise awareness and value education as a source of well-being, wealth, recognition, and social mobility.

Sociocultural Determinant

This determinant encompasses the influence of community and social environment, cultural norms and values, as well as discrimination and stigmatization within societies (Chan & Suen, 2023). Therefore, education is considered the first instance of socialization, enculturation, and learning of educational content and social norms for children and young people. This suggests that education should be structured, programmed, and executed, considering the direct relationship of these variables with school success and retention. The social and cultural intervention of the educational offer should involve the specific needs of students from the labor and social demands, along with preferences and gender orientation (Loopers et al., 2023). This will allow studies to influence student behavior, forming intellectual capital that appropriates content and social constructs that promote inclusion and improve the social condition of members, allowing the realization of the real benefits (individual and social returns) of education as a creator of conditions that facilitate school success, personal development, and discourage school dropout.

Academic Determinant

The variables of this determinant confirm the complexity of factors involved in school success and retention. Variables such as the quality and resources of educational institutions, the relationship between students and teachers, institutional policies and practices, and the school environment influence school success and retention (García-Jiménez et al., 2020). Teachers' opinions on the need for continuous training to address weaknesses, channel strengths, and understand student demands, combined with educational environments that encourage knowledge acquisition with information technologies, connectivity, and clean, safe, and pleasant environments, especially in low- and middle-income countries, allow these long and complex educational processes to reach a successful conclusion for students (Bau et al., 2021). Academic performance, defined as the appropriation of new knowledge, is affected by attitudinal factors of the family and teachers, as well as individual motivations towards the benefits of education (Estévez et al., 2021).

Individual and Family Determinants

For this determinant, variables such as socio-emotional competencies (Portela-Pino et al., 2021), student aspirations, academic performance, study habits, and physical and mental health, which overlap with the family determinant (Parviainen et al., 2021) are included. The family aspect refers to both family structure and dynamics (Pike & Grant, 2022).

Studies point out parents' participation in education and the family's educational expectations as causing prolonged absenteeism and physical and mental fatigue due to school and its obligations. In secondary and high school cycles, the emergence of social distancing due to health conditions made school retention a challenge (Matamala et al., 2023), especially when families sometimes justified absences with non-existent illnesses or students feel real pressure from their family's economic needs or social pressure for group recognition, generating complex dynamics of retention and academic outcomes that must be addressed jointly by teachers and families to create in students the self-motivation competencies for education, where they perceive that their time in school is essential and generates personal and social development opportunities, thus mitigating the effects of the socioeconomic determinant, which includes variables such as family income level, parent's employment status, access to resources and basic services.

Institutional Determinant

Regarding the institution to which students are enrolled, Evans and Mendez Acosta. (2023) and Lúcio et al. (2023) pointed out that retention rates increase with improvements in the provision of economic resources and work and study opportunities for low-income girls or adolescent women, along with the improvement of road infrastructure, basic sanitation in the context of the school's influence, generating health, well-being, and productivity conditions higher than those historically presented in these nations. Additionally, He et al. (2023) highlighted how institutionally designed physical activity programs impacted students' motivational and social outcomes.

Socioeconomic Determinant

Socioeconomic explanatory variables of school dropout are highlighted in multiple studies. For example, Brown et al. (2023) highlighted the relationship between economic instability and school dropout. Moreover, they pointed out the impact of food price volatility on school dropouts. Chikhungu et al. (2020) highlighted the positive influence of improving household socioeconomic conditions on student retention in the school system. Similarly, Huisman and Smits (2015) pointed out the incidence of household socioeconomic characteristics in developing countries on school dropout.

It is worth noting that dropout is a multifactorial phenomenon, meaning that the variables involved in the decision to leave school come from a combination of the determinants described. In this sense, during the period from 2019 to 2024, studies on dropout in basic and high school education included the transitional scenario of the pandemic and post-pandemic, linking individual, academic, and institutional determinants.

For preschool and primary levels, the academic determinant showed its influence on dropout through aspects related to the low acquisition of social competencies attributable to school closures due to COVID-19 and the neglect of services for students with special needs. Moreover, the impact of implementing social assistance programs in extremely poor communities that require infrastructure works such as roads, housing, aqueducts, sewers, and handwashing stations was observed. Additionally, programs promoting physical, social, and community activity, among others, that seek to improve health and living conditions in communities and, in response, stimulate access and retention in educational centers were highlighted (He et al., 2023; Sharma & Adhikari, 2022; Woldehanna et al., 2021; Zanoni et al., 2023).

At the secondary level, individual variables such as school burnout syndrome, stress due to unfavorable economic conditions, early onset of sexual relations, especially in girls, sexual orientation, homophobia, bullying, and racial or gender discrimination appear (Chan & Suen, 2023; Evans et al., 2024; Parviainen et al., 2021). Regarding educational offerings, the relevance of content with a gender focus makes girls feel disadvantaged compared to boys appear (Evans et al., 2024; Loopers et al., 2023). Additionally, scholarships with a special focus on girls in low- and middle-income

countries, as well as the influence of their social and cultural status (ECSC), influence their educational and contextual outcomes (Chikhungu et al., 2020; Delprato & Frola, 2022; Evans et al., 2024).

Finally, the transition between levels, especially from primary to secondary, is addressed by the influence of didactic and curricular factors related to content relevance and how it is oriented to facilitate learning. In summary, this content must be imparted coherently to contribute to improving the standard of living (Chan & Suen, 2023; Chikhungu et al., 2020; Evans et al., 2024; Parviainen et al., 2021; Pike & Grant, 2022; Uka & Uka, 2020).

For secondary and high school levels, studies find a positive relationship between academic outcomes and various factors, including economic, social, cultural, and health conditions; migrant or ethnic minority status; consistent class attendance; demotivation toward the educational institution; peer relationships; and marital status. Additionally, school disruption due to the pandemic, along with policies that create exclusion or marginal zones based on social conditions such as violence, armed conflict, and limited accessibility, contribute to social, food, and physical insecurity – factors that, in turn, increase the risk of early school dropout (Bélanger et al., 2023; Delprato & Frola, 2022; Evans & Mendez Acosta, 2023; Guariso & Verpoorten, 2018; Lúcio et al., 2023; Matamala et al., 2023; Tókos et al., 2023; Tudor et al., 2023; Weldeegzie, 2023).

Dropout determinants vary across educational levels; while some factors remain constant, their intensity varies with age. For example, early academic difficulties persist, but teenage pregnancy becomes a stronger dropout predictor in secondary education.

Methodology

The main methodology implemented was the umbrella review to achieve the objective of synthesizing findings on the variables that explain student dropout among children and young people in preschool, primary, secondary, and high school education in state or private educational institutions. Grant and Booth (2009) noted that the umbrella review is a literature review that compiles evidence from multiple systematic reviews, materialized in an accessible and usable document. In the words of Cant et al. (2022), the umbrella review is a systematic review of systematic reviews, broadly covering positions for and against the research object. Complementarily, Manterola et al. (2013) refer to the systematic review as a synthesis of available evidence from primary studies aimed at summarizing information. Finally, according to Chambergo-Michilot et al. (2021), a synopsis of syntheses is an umbrella review. Below is a detailed description of the implementation process.

Review Design and Protocol Registration

Considering the parameters of the International Platform of Registered Systematic Review and Meta-analysis Protocols (Inplasy), the protocol was formulated and registered under code INPLASY202390084 (see Barragán et al., 2023). The general guidelines for this umbrella review were stipulated in this protocol following Barragán Moreno and Guzmán Rincón, A. (2024).

Eligibility and Exclusion Criteria

The selection of systematic reviews had specific eligibility and exclusion criteria. On the one hand, the eligibility criteria were based on documents published as academic journal articles with a final publication status after peer review. These reviews had to focus on student dropout among children and young people in preschool, primary, secondary, and high school education. Only documents written in English, Portuguese, or Spanish were included to ensure full-text comprehension by the researchers. On the other hand, exclusion criteria included discarding review typologies other than systematic ones, such as narrative, mapping, or scoping reviews. Studies analyzing student dropout in higher or tertiary education at any level (technical, technological, university, specialization, master's, or doctoral) were also excluded. Additionally, documents addressing dropouts in modalities such as homeschooling were not included. Works that mixed students from kindergartens or childcare centers or did not conduct a distinct analysis for the student populations were also excluded.

Sources of Information

The information sources consulted to locate documents susceptible to inclusion in this umbrella review consisted of SCOPUS and Web of Science (WoS) as interdisciplinary databases and ERIC as an educational disciplinary database. These three databases were chosen to ensure educational and academic relevance as they encompass peer-reviewed publications that underwent an exhaustive publication process, including peer evaluation, ensuring rigorous methodological and evaluative processes. Other databases like Google Scholar or PsycINFO were excluded due to potential inclusion of non-peer-reviewed or preprint materials.

Search Strategy

The following theoretical search equation was validated by librarians from the Universidad de Bogotá Jorge Tadeo Lozano and executed in the databases mentioned in the information sources, adapting it according to their search engines and particularities (see Table 1).

((“Early childhood education” OR “Preschool education” OR “Preprimary education” OR “Early childhood care and education” OR “ECCE” OR “Nursery schools” OR kindergarden OR kindergarten “Primary education” OR “Elementary education” OR “Lower secondary education” OR “Middle school” OR “Upper secondary education” OR “high school”) NOT (“Parent education” OR “Parenting education” OR “Family education” OR “Special schools”)) AND (“drop?out” OR “dropping out” OR desertion OR attrition OR withdrawal) AND (“Public nature” OR “private nature” OR “Public character” OR “private character” OR “Public or private nature” OR “Public or private character”)

It is worth noting that after conducting a preliminary search, it was found that the theoretical equation retrieved documents related to clinical studies, mental health, and nursing, so limitations had to be added when retrieving systematic reviews since these documents were beyond the scope of this umbrella review. Table 2 presents the adaptations of the equation and its limitations. The broad search in WoS covered the incorporated databases: Web of Science Core Collection, Grants Index, KCI-Korean Journal Database, MEDLINE®, Preprint Citation Index, ProQuest™ Dissertations & Theses Citation Index, and SciELO Citation Index.

Table 1. Adaptation of the Search Equation to the Database Engine.

Database	Education	Limitations
SCOPUS & ERIC	ALL (("Early childhood education" OR "Preschool education" OR "Preprimary education" OR "Early childhood care and education" OR ecce OR "Nursery schools" OR kindergarden OR kindergarten OR "Primary education" OR "Elementary education" OR "Lower secondary education" OR "Middle school" OR "Upper secondary education" OR "high school") AND (drop?out OR "dropping out" OR desertion OR attrition OR withdrawal) AND ("Systematic review" OR "Systematic literature review") AND NOT ("Parent education" OR "Parenting education" OR "Family education" OR "Special schools" OR "Medical treatment" OR "Clinical trial" OR "Medication" OR "Surgery" OR "Mental health" OR "Psychiatry" OR "Psychological treatment" OR "Therapy" OR "Nursing" OR "Health care" OR "Patient care")) AND (LIMIT-TO (SRCTYPE , "j")) AND (LIMIT-TO (PUBSTAGE , "final")) AND (LIMIT-TO (DOCTYPE , "re")) AND (LIMIT-TO (LANGUAGE , "English") OR LIMIT-TO (LANGUAGE , "Spanish"))	Type of resource: journals Publication status: final Publication type: review Language: Spanish and English.
WoS	("Early childhood education" OR "Preschool education" OR "Preprimary education" OR "Early childhood care and education" OR ecce OR "Nursery schools" OR kindergarten OR kindergarten OR "Primary education" OR "Elementary education" OR "Lower secondary education" OR "Middle school" OR "Upper secondary education" OR "high school") (Topic) and (drop?out OR "dropping out" OR desertion OR attrition OR withdrawal) (Topic) and ("Systematic review" OR "Systematic literature review") (Topic) not ("Parent education" OR "Parenting education" OR "Family education" OR "Special schools" OR "Medical treatment" OR "Clinical trial" OR "Medication" OR "Surgery" OR "Mental health" OR "Psychiatry" OR "Psychological treatment" OR "Therapy" OR "Nursing" OR "Health care" OR "Patient care") (Topic) and Preprint Citation Index (Exclude – Database)	Type of publication: review Language: Spanish and English.

Source: Prepared by the authors.

Study Selection and Information Extraction Process

With the documents retrieved from the three information sources, the First Sample (FS) of systematic reviews was formed. This sample of documents was consolidated using the Zotero bibliographic manager to detect duplicate documents (reviews referenced in more than one database) and create an initial data extraction table in which the title, authors, abstract, and keywords of each review were identified. According to Barragán Moreno and Guzmán Rincón (2024), for the FS review, the research team was divided into two groups to conduct independent assessments, which, in case of disagreement, were submitted to the other investigator, acting as a tiebreaker. In assessing this first sample, the inclusion and exclusion criteria were re-verified. The groups' assessments for each review were recorded in a spreadsheet for criteria verification and comparison. Simultaneously, the PRISMA (2020) flow diagram was completed to summarize and quantify the number of documents that would be included in the review.

Starting from the assessment of the first sample, a Second Sample (SS), was configured with those systematic reviews positively evaluated by both groups and the tiebreaking investigator. Again, a data extraction table was created, expanding the information from the previous one to include: title, authors, citation count, year of publication, conclusions,

methodology, limitations, funding sources, study objectives, variables explaining dropout, declaration of potential biases and how they were addressed, and conflict of interest declaration.

Comprehensive Critical Evaluation of the Reviews

Two investigators conducted independent, comprehensive assessments of each of the SS reviews. In case of disagreement, they were submitted to a third investigator acting as a tiebreaker. This assessment was done using the AMSTAR 2 protocol (Shea et al., 2017), which comprises 16 items.

The items considered fundamental are those whose deficiencies can substantially undermine the validity of a systematic review and its conclusions, directly impacting confidence in the reviews' findings. In contrast, items not classified as fundamental are those whose absence or deficiencies do not necessarily compromise the overall validity of the systematic review, although they may still introduce methodological weakness (Shea et al., 2017). According to this protocol, items 2, 4, 7, 9, 11, 13 and 15 form the fundamental domain, and items 1, 3, 5, 6, 8, 10, 12, 14, and 16 are part of the non-fundamental domain. The SS systematic reviews were categorized based on their confidence level, depending on how many and which of the mentioned items were satisfied (see Table 2).

Table 2. Category for Confidence Level of Systematic Reviews.

	Critically low	Critically low	Low	Low	Moderate	High
Fundamental domain	More than two items, 2, 4, 7, 9, 11, 13 and 15, have a No or Partially yes answer.	More than two items, 2, 4, 7, 9, 11, 13 and 15, have a No or Partially yes answer.	Two of the items 2, 4, 7, 9, 11, 13 and 15 have No or Partially yes answers	One of the items 2, 4, 7, 9, 11, 13 and 15 has a No or Partially yes answer.	the items 2, 4, 7, 9, 9, 11, 13 and 15 are answered Yes	the items 2, 4, 7, 9, 9, 11, 13 and 15 are answered Yes
Non-fundamental domain	More than two items 1, 3, 5, 6, 8, 10, 12, 14 and 16 have a no or Partially Yes answer.	One of the items 1, 3, 5, 6, 8, 10, 12, 14 and 16 has answered no or Partially Yes	More than two items, 1, 3, 5, 6, 8, 10, 12, 14 and 16, have a no or Partially Yes answer.	One of the items 1, 3, 5, 6, 8, 10, 12, 14 and 16 has answer no or Partially Yes	More than two items, 1, 3, 5, 6, 8, 10, 12, 14 and 16, have a no or Partially Yes answer.	One of the items 1, 3, 5, 6, 8, 8, 10, 12, 14 and 16 have answer no or Partially Yes

Source: Own elaboration based on Shea et al. (2017).

Information Synthesis Methods

To synthesize the information from the SS, both quantitative and qualitative elements were used. Quantitative information was synthesized narratively, considering the sample size, while qualitative information was synthesized through a comprehensive critical evaluation and the application of the AMSTAR 2 protocol. This approach ensured a systematic appraisal of the methodological quality of the included systematic reviews. Additionally, the analysis was guided by the overarching research question of the umbrella review, which focused on identifying the explanatory variables and determinants of student dropout.

Results

Search, Study Selection, and Comprehensive Critical Evaluation Results

Using the search equation in the databases, 78 documents were retrieved from SCOPUS, 13 from WoS, and 2 from ERIC, forming the FS sample of 93 documents. With the assistance of the Zotero bibliographic manager, no duplicate documents were identified (the files from SCOPUS, ERIC, and WoS were disjointed). Then, FS was reviewed to verify all the eligibility and exclusion criteria, detecting that 49 of them were not systematic reviews, and 38 did not address student dropout. Upon full-text review of the remaining six documents, it was observed that one of them addressed student dropout in general terms, making it impossible to distinguish how it behaved in preschool, primary, secondary, and high school levels, which were present in both the research question and the objective of this article. Thus, SS was constituted with five systematic reviews addressing student dropout in preschool, primary, secondary, and high school education. Figure 2 summarizes the identification of systematic reviews that led to the formation of the FS and SS samples.

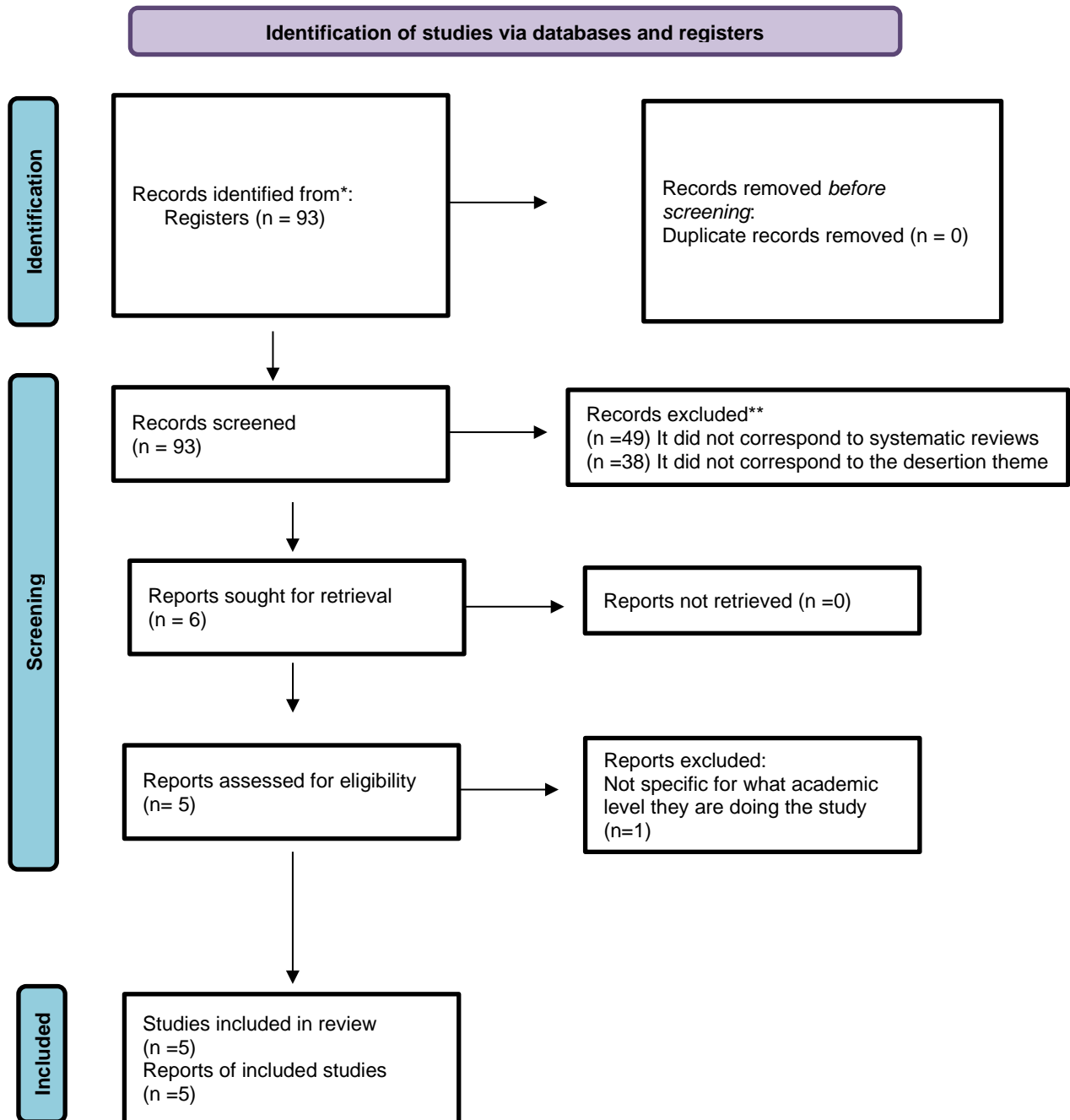


Figure 2. PRISMA Framework Flowchart

Source: Prepared by the authors based on PRISMA (2020).

The full texts of the five systematic reviews that made up SS were used to perform the comprehensive critical evaluation and the application of the AMSTAR 2 protocol shown in Table 3. Discrepancies in the AMSTAR2 evaluation were resolved by a fifth reviewer, whose decision was final. The adjudicator assessed disagreements and provided the final judgment to ensure consistency and reliability.

Table 3. AMSTAR 2 Results and Comprehensive Critical Assessment.

Document	Author	The country where the study was conducted	Category	Conditions fulfilled by the condition
A Systematic Review of the Relationship between High School Dropout and Substance Use	Townsend et al. (2007)	USA (41 studies) and South Africa (1 study)	Critically low	11
A systematic review of the status of children's school access in low- and middle-income countries between 1998 and 2013: using the INDEPTH Network platform to fill the research gaps	Kamanda and Sankoh (2015)	Low- and middle-income countries (LMICs), focusing on regions in Africa, Asia, and Oceania.	Critically low	12
Does the Empirical Literature Inform Prevention of Dropout among Students with Emotional Disturbance? A Systematic Review and Call to Action	Sullivan and Sadeh (2016)	USA	Critically low	9
Race and ethnicity in educational intervention research: A systematic review and recommendations for sampling, reporting, and analysis	Gaias et al. (2020)	USA	Low	7
Re-envisioning the purpose of early warning systems: Shifting the mindset from student identification to meaningful prediction and intervention	McMahon and Sembiente (2020)	USA	Critically low	10

The selection of only five systematic reviews may limit generalizability. However, these reviews were chosen based on strict inclusion criteria to ensure methodological rigor and relevance.

Quantitative Synthesis of the Systematic Reviews

The five systematic reviews comprising the SS sample were published between 2007 and 2020 (each in a different year: 2007, 2015, 2016, 2019, and 2020). The articles were published in the following journals: *Global Health Action*, *Exceptionality: A Special Education Journal*, *Educational Research Review*, *Review of Education*, and *Clinical Child and Family Psychology Review*.

With the help of the academic search engine Semantic Scholar, it was observed that the systematic reviews currently have the following citations: Townsend et al. (2007) with 388, Gaias et al. (2020) with 21, McMahon and Sembiente (2020) with 14, Sullivan and Sadeh (2016) with 10, and Kamanda and Sankoh (2015) with 8. For the most cited publication, a directed force graph was created with the 41 connected articles (Figure 3), that is, articles whose citations and references overlap and, therefore, deal with the same subject of study (similarity metric) (Kraus et al., 2022). The Townsend et al. (2007) article is highlighted in purple, and the larger nodes represent articles with more citations. Citation count reflects a study's academic influence but does not directly determine its quality. Higher citation numbers may indicate broader recognition, yet methodological rigor, relevance, and peer-reviewed standards remain in primary criteria for assessing a study's credibility.

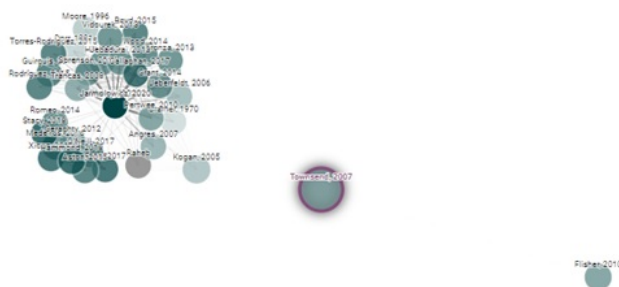


Figure 3. Force-directed graph for Townsend et al. (2007).

Source: Own elaboration using *Connected Papers*. The interactive graph is available at <https://bit.ly/4d100mQ>.

A purely qualitative synthesis was conducted, as effect size sample and meta-analysis were not within the study's scope. This qualitative approach involved critically reviewing the systematic reviews identified through comprehensive analysis, guided by the AMSTAR 2 protocol to assess methodological rigor and reliability. Each systematic review was

evaluated to identify commonalities and divergences in explanatory variables associated with student dropout at preschool, primary, secondary, and high school education levels. Through critical and interpretative analysis, the synthesis provided meaningful insights into the complexity of school dropout factors, facilitating the identification of critical gaps and laying groundwork for policy formulation and targeted educational interventions.

Qualitative Synthesis of Findings on Explanatory Variables

Considering the results of the five systematic reviews, as well as their theoretical frameworks, we move toward answering the research question: "What variables explain student dropout among children and young people in preschool, primary, secondary, and high school education?" In general, the variables analyzed in each of these reviews cluster around individual, socioeconomic, academic and institutional variables.

Individual Variables

Individual variables included the lack of parental support and family environment, considered decisive for school dropout (Townsend et al., 2007). Furthermore, low parental involvement, dysfunctional family structure, and cultural norms also negatively influence dropout (Kamanda & Sankoh, 2015; Sullivan & Sadeh, 2016). Additionally, students with emotional or behavioral problems had a significantly higher dropout rate (Sullivan & Sadeh, 2016). Similarly, McMahon and Sembiente (2020) also pointed out emotional and behavioral difficulties as triggers for dropout. Substance use, such as tobacco, alcohol, cannabis (marijuana), and other illicit drugs, also contributes to dropout (Townsend et al., 2007). Racial and ethnic disparities are a critical factor, as students from racial minorities (e.g., African Americans, Hispanics, Latinos, and Native Americans) face higher dropout rates due to variables such as low quality of socio-emotional and behavioral support, school segregation, and exclusionary disciplinary practices (Gaias et al., 2020).

Socioeconomic Variables

Socioeconomic variables, such as access to employment for adolescents, poverty, and social disadvantage, are crucial in school dropout (Sullivan & Sadeh, 2016; Townsend et al., 2007). For Kamanda and Sankoh (2015), poverty and lack of financial resources hinder continuous access to education. Sullivan and Sadeh (2016) pointed out that dropout among students with emotional disturbances highlights their socioeconomic challenges, including lack of financial and institutional support, which contribute to dropout rates.

Dropout and socioeconomic status are likely to have a bidirectional relationship. While poverty increases dropout risk, leaving school can also lead to lower income and limited opportunities, perpetuating cycles of disadvantages. Future research should explore these reciprocal effects through longitudinal analysis.

Institutional Variables

Regarding the institution in which students are enrolled, deficiencies in school infrastructure and the lack of adequate teaching materials emerged as variables contributing to dropout (Kamanda & Sankoh, 2015). For students from different ethnic backgrounds, the lack of culturally relevant and adapted educational resources contributes to school dropout, perpetuating existing inequities (Gaias et al., 2020). Moreover, among the highlighted variables was the lack of early identification and appropriate intervention for students at risk of dropping out using indicators such as attendance, behavior, and academic performance (McMahon & Sembiente, 2020). Broadly, in reference to public policies, the prominent variables were health and nutrition problems, child labor, and inadequate educational policies, as these do not guarantee a safe and quality school environment (Kamanda & Sankoh, 2015). The quality and effectiveness of educational policies and institutional support are crucial in addressing school dropouts (McMahon & Sembiente, 2020). Kamanda and Sankoh (2015) highlight the role of inadequate school infrastructure, including poor classroom conditions and lack of access to educational resources, as a key determinant of student dropout in low- and middle-income countries. McMahon and Sembiente (2020) discuss how early identification of at-risk students can help prevent dropout but emphasize that these systems must be paired with effective intervention policies to be truly effective.

Academic Variables

Student dropout among children and young people in preschool, primary, and high school education is influenced by several academic factors. Poor academic performance, including low achievement and grade repetition, is a key predictor of school disengagement (McMahon & Sembiente, 2020). Irregular attendance and chronic absenteeism further increase the likelihood of dropout, as students who frequently miss school struggle to keep up with coursework (McMahon & Sembiente, 2020; Sullivan & Sadeh, 2016; Townsend et al., 2007). School disengagement, characterized by low motivation and lack of teacher support, contributes to an increased risk of dropping out, particularly among students who face difficulties in transitioning between educational levels, such as from primary to secondary school (Kamanda & Sankoh, 2015). Additionally, behavioral issues, including disciplinary problems and suspensions, have been linked to higher dropout rates, especially among students from historically marginalized groups (Gaias et al., 2020). Limited access to

quality schools and educational resources exacerbates disparities, particularly affecting students in low- and middle-income countries (McMahon & Sembiante, 2020).

The existing research on educational interventions reveals mixed evidence regarding their effectiveness in reducing student dropout rates. Early Warning Systems (EWS) show potential in identifying at-risk students, but their impact is limited when not paired with interventions (McMahon & Sembiante, 2020). Studies on dropout prevention for students with emotional disturbances highlight a critical lack of rigorous evaluations, with only one intervention, "Check & Connect", showing potential yet inconclusive results (Sullivan & Sadeh, 2016). Research on the relationship between high school dropout and substance use suggests a consistent association, but the causal mechanism remains unclear due to methodological inconsistencies (Townsend et al., 2007). Similarly, studies examining race and ethnicity in educational interventions indicate that most do not explicitly address disparities, limiting their capacity to reduce dropout gaps (Gaias et al., 2020). Finally, systematic reviews on school access in low-and middle-income countries stress that while interventions focus on initial enrollment, their long-term effectiveness in ensuring retention and completion remains largely understudied (Kamanda & Sankoh, 2015). Collectively, the findings underscore the need for more comprehensive, rigorously evaluated, and equity-focused interventions to address dropout challenges effectively.

Conclusion

The analysis of school dropout reveals that this phenomenon is multifactorial and depends on a complex interaction of political and legislative, sociocultural, academic, individual, socioeconomic, and institutional determinants (Delprato & Frola, 2022; García-Jiménez et al., 2020; Pike & Grant, 2022; Serio & Herrera, 2021). However, the analyzed systematic reviews observed a preference for analyzing individual, socioeconomic, and institutional determinants. That said, in the case of variables grouped under the individual determinant, it is observed that personal motivation and academic aspirations are critical variables that directly influence school retention. Research indicates that students with a strong orientation towards academic achievement and who perceive intrinsic value in education tend to have significantly lower dropout rates (Parviainen et al., 2021). Conversely, those who lack a clear vision of their educational future or face emotional and mental health challenges are more likely to drop out of the education system before completing their education (Sullivan & Sadeh, 2016). Moreover, family dynamics, including parental support and family expectations regarding education, play an essential role in student motivation. Families that foster a positive learning environment and have high expectations for their children often see better results in terms of school retention (Pike & Grant, 2022).

Regarding the socioeconomic determinant, poverty and lack of financial resources are recurring variables in studies on school dropout. The need to contribute economically to the household, parents' employment instability, and limited access to basic resources such as food and health create an environment that hinders school retention (Kamanda & Sankoh, 2015), especially in rural areas where conditions are more unfavorable (Barragán-Moreno & Lozano-Galindo, 2022). García-Jiménez et al. (2020), Estévez et al. (2021), Guzmán Rincón et al. (2023), Barragán-Moreno and Lozano-Galindo, and López Gil et al. (2022) show that these factors not only affect initial access to education but are also determinants of continuity and completion of studies. Specifically, students from low-income households face more significant barriers to accessing educational materials, transportation, and, in many cases, a family environment that values and supports education (Evans & Mendez Acosta, 2023; Kamanda & Sankoh, 2015).

The institutional determinant, on the other hand, encompasses aspects such as the quality of school infrastructure, the availability of educational resources, and the relevance of educational policies. The lack of adequate infrastructure, including classrooms in good condition and access to information technologies, is one of the main reasons students in disadvantaged contexts leave school (Barragán-Moreno & Lozano-Galindo, 2022; Kamanda & Sankoh, 2015). Additionally, the lack of support programs that early identify students at risk and offer effective interventions is another critical factor (McMahon & Sembiante, 2020). The literature suggests that without an institutional environment that actively supports quality education, the likelihood of dropout increases considerably (Guzmán Rincón et al., 2023; McMahon & Sembiante, 2020).

On the other hand, the absence of an exhaustive analysis of the political-legislative, sociocultural, and family determinants in the reviews that formed the final sample of the study may be attributed to the tendency of studies to focus on the most immediate and easily measurable factors, such as individual, socioeconomic, and institutional variables. This omission leaves a significant gap in the comprehensive understanding of the school dropout phenomenon since political-legislative determinants, for example, play a crucial role in shaping the regulatory framework that governs education and implementing public policies that can mitigate or exacerbate dropout (Delprato & Frola, 2022). Similarly, sociocultural determinants, such as prevailing norms and values in a community, and family dynamics, such as the level of emotional and academic support parents provide to their children, are essential for understanding how a student's educational environment is constructed (Pike & Grant, 2022).

The systematic reviews identified in this umbrella review provide a comprehensive analysis of existing studies, offering valuable insights into the factors influencing school dropout in different educational settings (Townsend et al., 2007). This approach also allows for identifying gaps in current research, such as the underrepresentation of certain racial/ethnic groups, guiding future studies to address these gaps (Gaias et al., 2020). Additionally, the findings can

inform policymakers about effective interventions and areas that need attention to reduce dropout rates (Gaias et al., 2020). Integrating interdisciplinary perspectives and using advanced technological tools can provide a deeper and more nuanced understanding of the phenomenon (Gaias et al., 2020; Sullivan & Sadeh, 2016). Opportunities for new research include improving reporting standards and implementing early intervention programs, such as alert systems that can identify and support students at risk before they reach the dropout stage (McMahon & Sembiente, 2020).

However, there are significant weaknesses in the reviews, such as inconsistency in reporting on race-ethnicity and other demographic variables, which limits the ability to generalize the findings (Gaias et al., 2020). Furthermore, the limited representation of marginalized groups and methodological variability complicate the synthesis of findings and may lead to inconclusive results (Gaias et al., 2020). Excessive reliance on quantitative data can overlook crucial qualitative insights, and the lack of rigor in self-reporting affects data reliability, especially in studies related to substance use and school dropout (Townsend et al., 2007). The threats include limited resources to conduct comprehensive systematic reviews and frequent changes in educational policies that may impact the relevance and applicability of findings (Gaias et al., 2020). Finally, considering rigorous ethical standards is essential, especially when involving vulnerable populations, which may limit study designs and the ability to obtain generalizable results (Gaias et al., 2020; Kamanda & Sankoh, 2015; Sullivan & Sadeh, 2016).

Regarding bias analysis, it was observed that some of the systematic reviews did not clarify the funding sources of the articles included in their samples, making it impossible to categorize the bias of each of them. Additionally, a disparity was found in the declaration or lack of declaration of funding in the five systematic reviews included in the SS sample of this umbrella review, as in either case, the effect of funding or lack thereof on the respective bias cannot be estimated.

Student dropout in early education levels is a critical issue that requires immediate attention through comprehensive studies like the one proposed in this work, mainly to identify the root causes of dropout through its explanatory variables and the relationships between them. Based on that, contributions can be made to define public policies and practical strategies to address this problem. The development of this umbrella review allowed us to identify the low number of studies on this matter, leading to the conclusion that an effective system is needed that recognizes the complexity of the phenomenon and its origin in a variety of factors—a system that allows for the collection and analysis of data on dropout in basic levels that increases the understanding of how local particularities affect this complex phenomenon.

Furthermore, studies like this enable the detection of early warnings, facilitating timely intervention to prevent dropout. While efforts to increase access and coverage in basic education are recognized, it is important to understand the reasons that lead to dropout so that subsequent actions address poverty gaps and promote educational equity. This, in turn, contributes to reducing social and economic inequalities, ensuring that more students have access to higher education opportunities.

By understanding the needs and challenges of students from basic levels, more inclusive and engaging educational environments can be created, fostering progression to higher levels of education. Therefore, investigating student dropouts can also lead to developing effective strategies for academic success and retention. This includes support programs, mentoring, and additional resources for at-risk students, all aimed at breaking the dropout cycle and promoting a more promising future for students and society.

The umbrella review identified key school dropout determinants and research gaps, particularly in political-legislative and sociocultural aspects. The findings from this umbrella review thus provide a starting point for designing targeted interventions that address local specificities and reduce educational inequities, fostering inclusive environments and facilitating more effective dropout prevention strategies.

Moreover, this umbrella review also revealed opportunities for future work that considers a broad focus on diversity, consistently linking variables related to ethnic and racial diversity to ensure that interventions are effective and equitable. Additionally, the design of holistic models that integrate multiple risk and contextual factors is necessary to understand better and prevent school dropouts. All this is only possible by improving the availability of updated microdata that enables more profound and more effective analyses of school dropout and access to education. Studies must adopt comprehensive and context-sensitive methodologies that integrate qualitative insights with quantitative analysis to better capture the multifaceted reality of student dropout. A critical commitment to equity demands inclusive research designs that consider diverse demographic groups, ensuring that policies and interventions effectively target and benefit the most vulnerable student population. Also, policy design should include targeted teacher training on early dropout risk identification, integrating socio-emotional learning into curricula, expanding financial aid programs, and implementing data-driven Early Warning Systems to proactively support at-risk students at different educational levels.

The feasibility of interventions and policy implementation depends on socioeconomic context. Low-income areas may require stronger financial support and infrastructure investments, while high-income setting might focus on personalized learning strategies and early detections programs to prevent dropout.

Conflict of Interest

The authors declare that there was no potential conflict of interest in preparing the Umbrella Review.

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Authorship Contribution Statement

Barragán Moreno: Concept and design of the study, data acquisition, comprehensive critical evaluation, critical appraisal using AMSTAR 2, interpretation of results, manuscript drafting and editing, approval of the final manuscript. Guzmán Rincón: Conceptualization, systematic search and data acquisition, critical evaluation, critical appraisal using AMSTAR 2, synthesis of qualitative findings, interpretation of results, manuscript drafting, critical revision, final approval. González Támara: Conceptual contribution, systematic review screening, qualitative synthesis, critical assessment of reviews, interpretation of findings, manuscript drafting, final approval. Calderón Carmona: Data extraction and management, critical appraisal using AMSTAR 2, interpretation of data, manuscript drafting, final approval. Lozano Galindo: Critical appraisal support, critical appraisal using AMSTAR 2, synthesis and interpretation of qualitative findings, manuscript revision and editing, final approval.

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